280 - 290 Warren Street, Roxbury MA
Mixed-Use Multi Family Development

Project Notification Form

Submitted Pursuant to Article 80B of the Boston Zoning Code

Submitted by:
Cruz Development Corporation
One John Eliot Square
Roxbury, MA 02119

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

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UTS of Massachusetts, Inc.
Devellis Zrein, Inc.

September 27, 2016

MLF CONSULTING LLC

CRUZ

September 27, 2016

Mr. Brian Golden, Director
Boston Redevelopment Authority
Boston City Hall, 9th Floor
Boston, MA 02201
Attn: Mr. Gary Uter, Project Manager

Re: 280-290 Warren Street, Roxbury
Mixed-Use Residential Development
Project Notification Form (PNF)

Dear Director Golden:

We are pleased to submit this Project Notification Form ("PNF"), in accordance with the Article 80B-1 Large Project Review requirements of the Boston Zoning Code, for real estate property, to be referred to as "280-290 Warren Street", which includes 270-272 Warren Street, 274-276 Warren Street, 280-290 Warren Street, ES Warren Street, and 2-10 Clifford Street, a proposed mixed-use residential/commercial development in the Roxbury neighborhood.

The Project involves the redevelopment of an approximately 54,670 square foot (1.25 acre) site including an existing church along with several vacant structures, in poor condition, and vacant land with a new mixed-use, mixed-income residential development to be developed in two phases, consisting of approximately 95 residential rental units, some of which are for elderly residents, in two 4 - 5 story buildings (the "Buildings") plus approximately 11,334 gsf of ground floor office and retail uses, and all served by approximately 102 garage parking spaces (the "Proposed Project"). As part of the proposed overall residential units, there would be on-site units to address the City of Boston's Inclusionary Zoning Policy. The Proposed Project will further the objectives of Mayor Martin J. Walsh's Housing Plan, Housing a Changing City: Boston 2030.

By combining the 280-290 Warren Street property, owned by the City of Boston and under control of the City's Department of Neighborhood Development, with abutting

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privately owned property, Cruz will implement an approximately $47 million development program for the two-phased residential program that meets the specific housing goals of the city and the Roxbury neighborhood.

In accordance with Boston Redevelopment Authority ("BRA") requirements, please find attached ten (10) copies of the PNF plus a CD disk for placing the PNF filing on the BRA online website portal for public review.

The Proposed Project will exceed the 50,000 square foot total build-out size requirement for a project within a Boston neighborhood and therefore requires the preparation of filing(s) under the Large Project Review regulations, pursuant to the Code. A Letter of Intent to File a Project Notification Form was filed with the BRA for the Proposed Project on July 12, 2016 (attached as **Appendix A** to this PNF).

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

The public notice for the PNF appears in the September 27, 2016 edition of the *Boston Herald*.

On behalf of the entire project team, we would like to thank you and the BRA staff assigned to the 280-290 Warren Street Project, particularly Project Manager, Gary Uter, and Senior Architect, Michael Cannizzo, for invaluable assistance provided to allow the Project Proponent to achieve this comprehensive PNF filing.

We believe that the Proposed Project will be a significant positive addition to the Roxbury neighborhood, by revitalizing this under-utilized site with much-needed housing with a thoughtfully-designed development, and we look forward to processing this PNF with the BRA, City officials, members of the Impact Advisory Committee and the overall community.

Sincerely,

Cruz Development Corporation

Daniel Cruz, Jr., Vice President

Attachment: 280-290 Warren Street Project Notification Form
(10 Copies, Plus CD Disk)

Cc: John Cruz III, President, Cruz Development Corporation
Edgar Carrere, Senior Project Manager, Cruz Development Corporation
Mitchell Fischman, Mitchell L. Fischman ("MLF") Consulting, LLC

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1.0 EXECUTIVE SUMMARY

1.1 Introduction

Cruz Development Corporation, a Massachusetts corporation (the "Proponent" or "Cruz") is submitting this Project Notification Form ("PNF"), in accordance with the Article 80B-1 Large Project Review requirements of the Boston Zoning Code ("Code"), as it relates to real estate property to be referred to as "280-290 Warren Street" which includes 270-272 Warren Street, 280-290 Warren Street, ES Warren Street, and 2-10 Clifford Street, a mixed-use residential/commercial development in the Roxbury neighborhood (the "Project Site"), with the initial building completed to be named the **Dr. Michael E. Haynes Arms** building.

The Proponent's Proposed Project involves the redevelopment of an approximately 54,670 square foot (1.25 acre) site including an existing church along with several vacant structures, in poor condition, and vacant land with a new mixed-use, mixed- income residential development to be developed in two phases, consisting of approximately 95 residential rental units, some of which are for elderly residents, in two 4 - 5 story buildings (the "Buildings") plus approximately 11,334 gsf of ground floor office and retail uses, all served by approximately 102 garage parking spaces (the "Proposed Project"). As part of the proposed overall residential units, there would be on-site units to address the City of Boston's Inclusionary Zoning Policy. In addition, the Proposed Project will further the objectives of Mayor Martin J. Walsh's Housing Plan, Housing a Changing City: Boston 2030.

The Site is bordered by Warren Street, Clifford Street, Waverly Street, and properties between Waverly and Clifford Streets. The existing on-site buildings are proposed to be demolished to enable the new project to be constructed.

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 within one mile of the Site.

By combining the 280-290 Warren Street property (to be called "290 Warren Street"), owned by the City of Boston and under control of the City's Department of Neighborhood Development, with abutting privately owned property, Cruz will implement an approximately $47 million development program for the two-phased residential program that meets the specific housing goals of the city and the Roxbury neighborhood.

The Phase 1 proposal is to construct a 51-unit, mixed-income residential development, as referenced to be named the **Dr. Michael E. Haynes Arms** building, in honor of the former Roxbury state representative, minister, and civil rights leader, with approximately 97,709 gross square feet of floor area for work-force housing. The Phase 1 proposal will utilize the approximately 9,684 sf of land that is under control of the City's Department of Neighborhood Development ("DND") at 290 Warren Street (and for which Cruz has been tentatively designated by DND as the Project Redeveloper in August 2015) plus abutting property located at 2-10 Clifford Street (for which Cruz has a purchase option). The proposed Phase 1

ground floor office space will be occupied by offices for the Cruz Companies. The Phase 1 proposal is for the design, development and construction of the Buildings, that will be consistent with the design of many of the existing buildings found on Warren Street, and includes two-levels of parking for a total of approximately 74 garage spaces on two-levels. The Phase 1 proposal also provides a substantial new anchor of housing and commercial development at a strategic location between Roxbury's Dudley Street and Blue Hill Avenue.

The Phase 2 proposal will require acquisition of two additional properties at 270-272 and 274-276 Warren Street, located on the same block as the Phase 1 properties. Phase 2 will be a mixed-use building, consisting of 4,050 gross square feet of ground-level commercial space and 44-units of elderly housing, both totaling 68,568 gsf of floor area. An additional parking garage for approximately 28 spaces will also be provided for this phase of the development with access coordinated with the Phase 1 development.

This proposal has many important and unique characteristics. Most significantly is the creation of office space for approximately 45 Cruz employees and the economic vitality that they will bring to the neighborhood. The Cruz Companies, founded by John B. Cruz, Jr., have been doing business in Boston and its minority neighborhoods since 1948. Many of these employees are Roxbury residents and this proposal will facilitate keeping and recycling their disposable income in the neighborhood. The multiplier effect of local purchases should bolster existing businesses and foster the creation of new neighborhood-based businesses to serve the needs of the companies, the employees and the new residents.

Surrounded by several abutting and nearby structures of three to five stories in height. The context of the immediate area is supportive and well-suited for the proposed scale and scope of the Proposed Project. See **Figures 1-1** and **1-2** for Project Locus and USGS Map, respectively.

The Project Site is located in the MFR/LS subdistrict of the Roxbury Neighborhood Zoning District (Article 50), which permits multi-family dwellings of up to four stories and office uses, although it is expected that the floor area ratio and height may exceed the zoning limitations and some dimensional requirements may not be met by the proposed project under the existing zoning regulations, and certain use variances or conditional permits will be needed for both the residential and non-residential uses.

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 Boston Zoning Code. In parallel with this filing, the Proponent will seek zoning dimensional relief from the Code from the Boston Zoning Board of Appeal related to the size for the Proposed Project.

A Letter of Intent to File a Project Notification Form was filed with the Boston Redevelopment Authority for the Proposed Project on July 13, 2016 (See **Appendix A**).

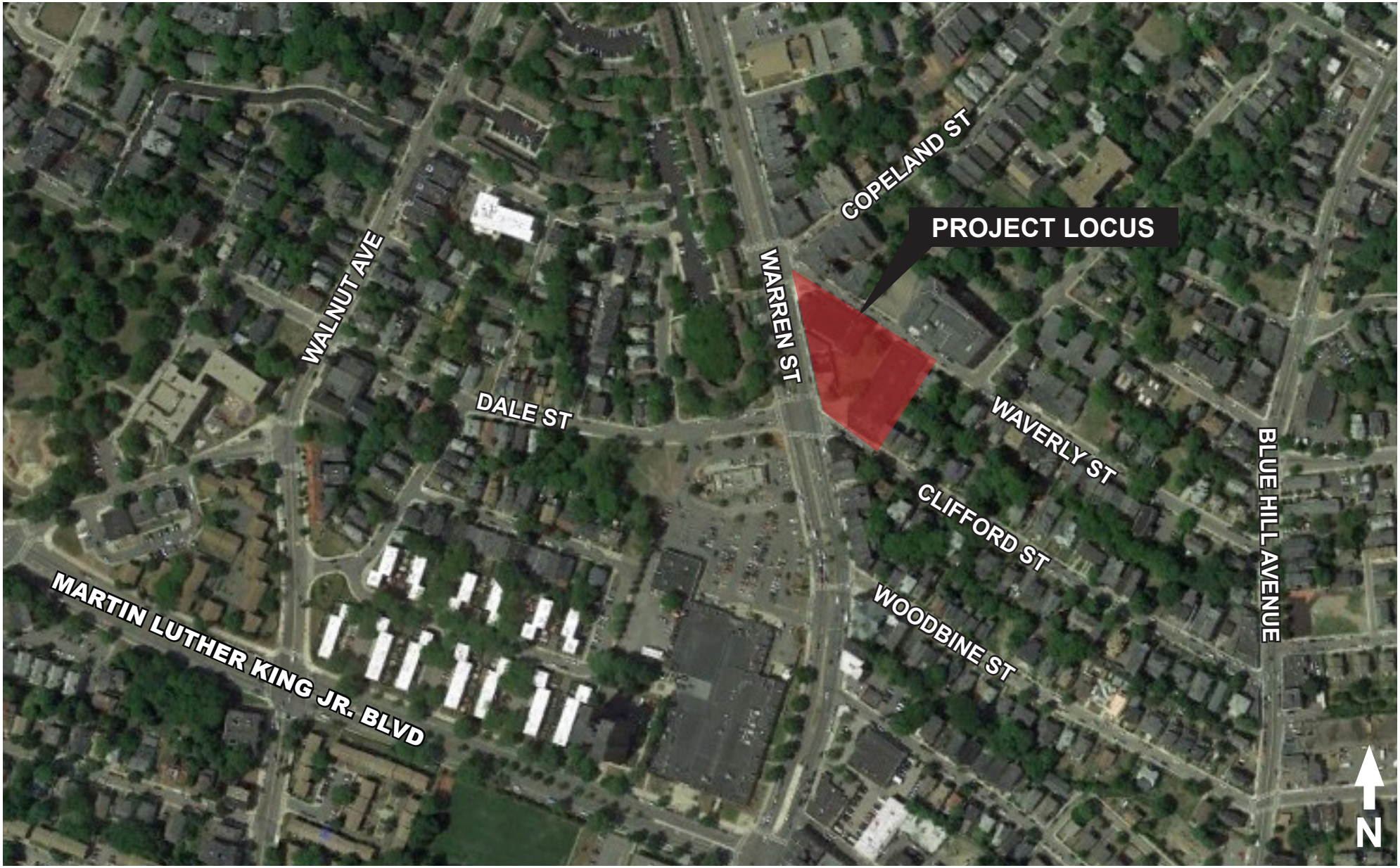


Figure 1-1 Project Locus
270, 280 - 290 and ES Warren St, 2-10 Clifford St, Roxbury

Figure 1 - 2
USGS Map

1.2 Proposed Project

1.2.1 Project Site and Surroundings

The current Site is located in the Warren Street Corridor in Roxbury, between the Dudley Square and Grove Hall business district. The Site is also along a relatively flat section of Warren Street in a mixed use commercial area adjoining a generally single-family and two-family residential neighborhood with some scattered multi-family apartment buildings. The Site has been used for various uses including the former Warren Theater (now church) at 270-272 Warren Street, a former commercial building at 280-290 Warren Street, and a former automotive garage (for the former theatre) from 1927, when it was constructed, until at least 1964, and as a granite warehouse in recent years at 2-10 Clifford Street. ES Warren Street is subject to a right-of-way restriction with adjacent abutters. MBTA bus lines No. 14, 19, 23 and 28 runs along Warren Street, serving the site and the Dudley Square public transportation bus node is within ½ mile north of the site.

Abutters include the Verizon telecommunication building to the north along Clifford Street, residences on Clifford and Warren Streets, and residential/commercial buildings along Warren Street to the south and north.

A review of the Site history by GEI Consultants during the Phase I and II ASTM Environmental Site Assessment investigation in 2015, indicated that between 1888 and 1897 the 2-10 Clifford Street property was part of the Donald Kennedy Medicine Manufacturing Facility. According to Sanborn maps, these building were vacant by 1919, with the automobile garage constructed in 1927 to serve the adjoining theater.

The Church of God of Prophecy Inc at the corner of Warren and Waverly Streets, was formerly the Warren Theater which was constructed in 1926 to house vaudeville and silent movies. It is not clear whether the theater was in operation after 1983.

The Site is located at approximately 70 plus feet above mean sea level. There are no surface waters or wetlands located on the Site. The nearest body of water is the Boston Harbor. See **Figure 1-3** for existing site conditions, and **Figures 1-5** to **1-8** for site and surrounding area context photographs.

1.2.2 Detailed Project Description

The Phase 1 proposal is to construct, at a minimum, a 51-unit, mixed-income residential development to be named the **Dr. Michael E. Haynes Arms** building, with approximately 97,706 gross square feet of floor area for work-force housing. (See **Table 1-1** Approximate Project Dimensions.) The Phase 1 proposal will utilize the approximately 9,684 sf of land that is under control of the City's Department of Neighborhood Development ("DND") (and for which Cruz has been tentatively designated by DND as the Project Redeveloper) plus abutting property located at 2-10 Clifford Street (for which Cruz has an option to purchase). The Phase 1 ground

floor office space will be occupied by offices for the Cruz Companies. The Phase 1 proposal is for the design, development and construction of the Buildings, that will be consistent with the design of many of the existing buildings found on Warren Street, and includes two-levels of parking for a total of approximately 74 garage spaces on two levels. The Phase 1 proposal also provides a substantial new anchor of housing and commercial development at a strategic location between Roxbury's Dudley Street and Blue Hill Avenue.

The Phase 2 proposal will require the acquisition of two additional properties located on the same block as the Phase 1 properties. Another mixed-use building, consisting of ground-level commercial uses and 44-units of elderly housing will be constructed on that site. An additional parking garage for approximately 28 spaces will also be provided for this phase of the development with access coordinated with the Phase 1 development.

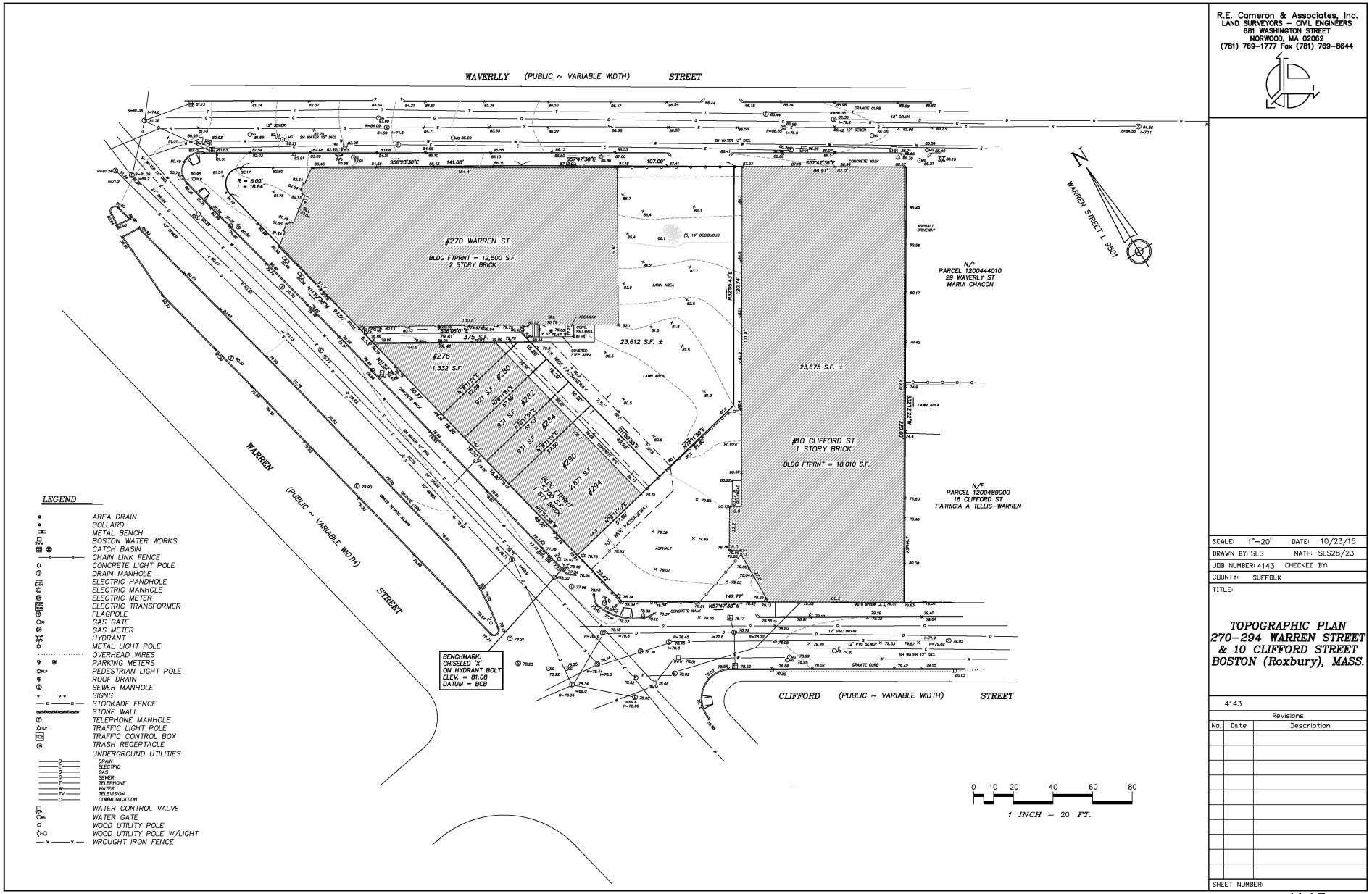
The Proposed Project is ideally situated within close proximity to the MBTA bus lines which connect to other lines at nearby Dudley MBTA Station. The proposed Site is also within close walking distance to neighborhood services on the other side of Warren Street, offering many neighborhood shops and restaurants to service the new residents of the development.

The proposed multi-family residences will have a mixture of unit types and sizes, which will accommodate Roxbury's diverse and growing population, including 44one-bedroom,, 49two-bedroom, and 2 three bedroom units.. The Proponent understands that parking is always a concern to neighborhood residents, and is proposing garage and surface parking that will house 102 parking spaces (at least 1-space for each proposed unit), and bike racks for 95 bikes as required by the Boston Transportation Department guidelines. See **Figure 1-4** for Phasing Plan.

Table 1-1 280-290 Warren Street, Approximate Project Dimensions

Lot Area:	Phase I: Phase 2: **TOTAL SF:**	29,329 sf 25,341 sf **54,670 sf**
Gross Square Feet:	Phase I: Phase 2: **TOTAL SF:**	97,706 sf 68,568 sf **166,274 sf**
FAR:	Phase I: Phase 2: **TOTAL FAR:**	3.33 FAR 2.70 FAR **3.04 FAR**
Floors:	Phase I: Phase 2:	4 - floors 5 - floors
Height:	Phase I: Phase 2:	48 feet 58 feet

The Site circulation plan is designed to create a safe and pleasant entry to the Proposed Project with the residential entrance from Warren and Clifford Streets. Service vehicle and a loading area access will also be provided from Clifford Street (during Phase 1) and Waverly Street (after completion of Phase 2).



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SCALE: 1"=20' DATE: 10/23/15
DRAWN BY: SLS MATH: SLS28/23
JOB NUMBER: 4143 CHECKED BY:
COUNTY: SUFFOLK
TITLE:

TOPOGRAPHIC PLAN
270–294 WARREN STREET
& 10 CLIFFORD STREET
BOSTON (Roxbury), MASS.

4143

Revisions

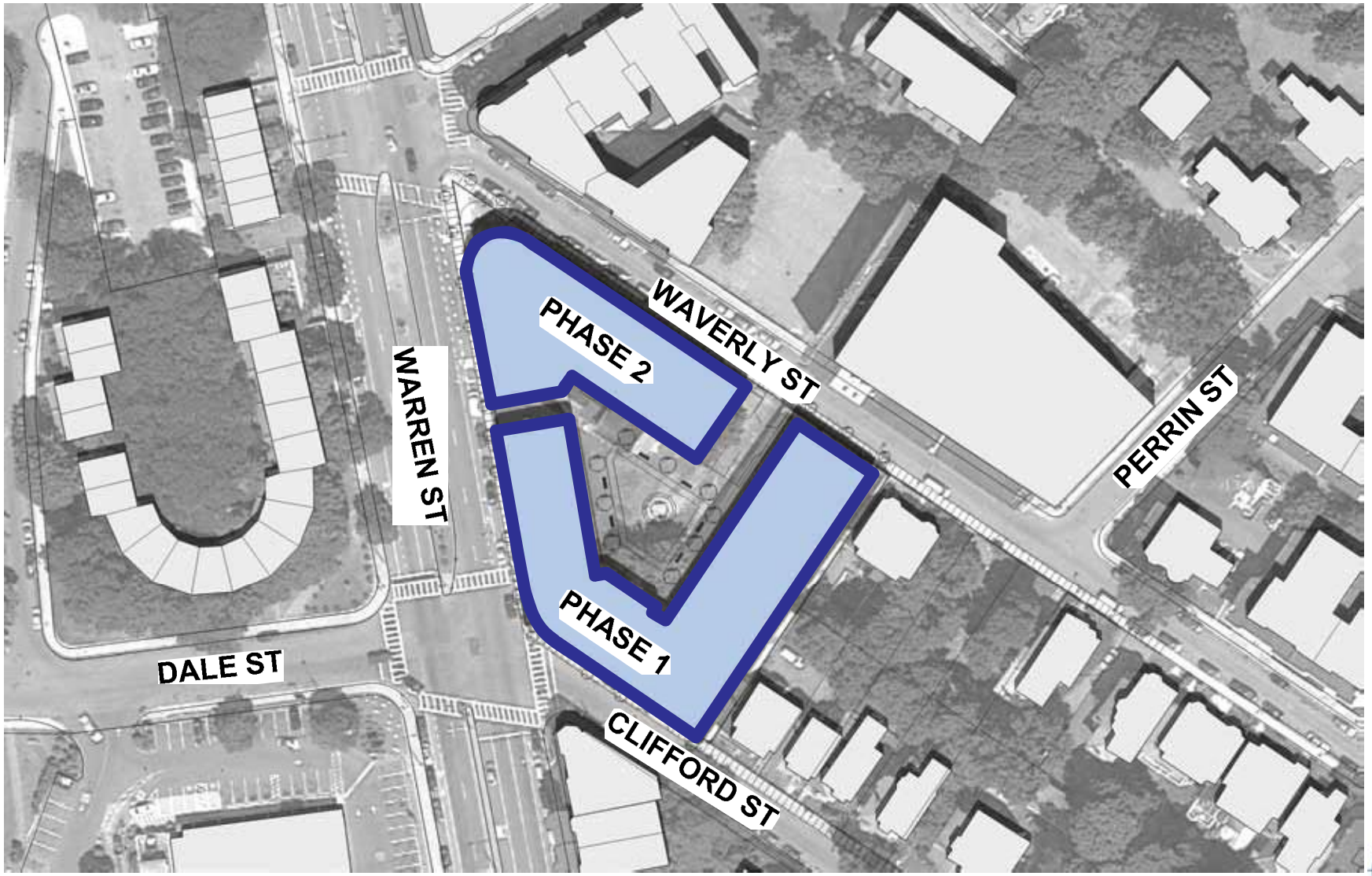
No.	Date	Description

SHEET NUMBER:

4143

Figure 1-3 Existing Conditions Plan
280 - 290 Warren St, 2-10 Clifford St, Roxbury

FIGURE 1-4 : PHASING PLAN



MICHEAL WASHINGTON ARCHITECTS INC. 891 CENTRE STREET, JAMAICA PLAIN, MA 02130	**280 - 290 WARREN STREET**	**CRUZ DEVELOPMENT CORPORATION** ONE JOHN ELIOT SQUARE, ROXBURY , MA 02119

Adjacent to 270-272 Warren St. DND Owned Buildings along Warren St.

270-272 Warren St.at Warren and Waverly Streets

Figure 1-5 Site and Surrounding Area Photographs

Corner of Clifford and Warren Streets

Waverley Street Site Building

Figure 1-6 Site and Surrounding Area Photographs

View of Corner of Warren and Clifford Streets from across Warren

View of Corner of Warren and Clifford Sts and adjacent Warren St Bldgs

Figure 1-7 Site and Surrounding Area Photographs

Vacant site building along Waverly Street

Adjacent residential building to vacant site bldg. along Waverly

Figure 1-8 Site and Surrounding Area Photographs

1.3 Summary of Project Impacts and Mitigation

1.3.1 Urban Design

The proposed design intent of this residential and commercial project is to restore the urban fabric and residential street life of traditional Roxbury and to enhance and encourage further redevelopment of Warren Street between Dudley Square and Blue Hill Avenue.

The location of the Site, at approximately halfway between the Dudley Square and Blue Hill Avenue, appears ideally suited and placed for these goals.

The proposed architectural style is reflective of the architecture along Warren Street and in the adjacent Roxbury residential neighborhoods. The use of brick, traditional bays, mansard roofs and familiar windows, translated into a more modern form, is in keeping with other new residential developments of this era in this area.

It is expected that the Michael E. Haynes project will restore a residential presence and vitality to this long abandoned site and productively refinish and establish this neighborhood edge. To reinforce this sense of extension of the residential fabric, we believe that the commercial, restaurant and office space used at the first floor is traditional on Warren Street and appropriate in restoring a sense of street vitality.

1.3.2 Sustainable Design

The Phase 1 and 2 proposals will provide high efficiency, durable and comfortable units. The project is utilizing the LEED Homes Midrise path. Each unit will have individual heating, cooling and hot water, providing residents with individual control and encouraging careful use and consumption. All of the practices and materials that are used in the residential sections of the building will be employed in the commercial areas as well, ensuring the entire building maintains a high degree of sustainability. The location on one of Boston's central neighborhood thoroughfares will continue to boost the local neighborhood. The project team will work with a third party, green rater, Clearesult, to provide guidance and verification during development and construction.

1.3.3 Wind

The Proposed Project is similar in massing along Warren Street. Although the proposed 48 to 58 feet building heights will exceed the existing zoning allowance of 45 feet, the Proposed Project will be within 5-10 feet of the heights of existing buildings in the immediate vicinity. Therefore, the overall wind environment is not expected to change as a result of the Proposed Project.

1.3.4 Shadow

Section 4.1 of this PNF provides a shadow study analysis describing and graphically depicting the anticipated new shadow impacts from the Michael E. Haynes 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 summer solstice and autumnal equinox.

1.3.5 Daylight

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

1.3.6 Solar Glare

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

1.3.7 Air Quality

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

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

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

1.3.8 Noise Analysis

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

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

Nighttime ambient baseline sound level (L_{90}) monitoring was conducted at three locations deemed to be representative of the nearby residential areas, during the time period when human activity is at a minimum and any future noise would be most noticeable. The lowest nighttime L_{90} measured in the Project area was 45 dBA.

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

The design for the Proposed Project is expected to include as many as ninety nine (99) individual air handling units, three energy recovery units (ERVs), and four (4) garage exhaust fans for the Proposed Project. The current proposed mechanical equipment will comply with both the Massachusetts DEP and City of Boston noise policies without implementing additional mitigation measures.

1.3.9 Stormwater Management and Water Quality

The Proposed Project will improve the quality of stormwater leaving this site. Under existing conditions, there are no known stormwater treatment features. The Project proposes a stormwater management program, designed per BWSC Site Plan requirements, which will provide pretreatment and infiltration, if feasible, prior to discharging stormwater to the drainage system. 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 and the municipal storm drain system. These controls will be inspected and maintained throughout the construction phase until the areas of disturbance have been stabilized through the placement of pavement, structure, or vegetative cover. All necessary dewatering will be conducted in accordance with applicable EPA, MWRA, and BWSC discharge permits. Once construction is complete, the Proposed Project will be in compliance with BWSC Site Plan requirements.

1.3.10 Solid and Hazardous Waste

Solid Waste

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

Hazardous Waste

GEI Consultants, Inc. completed an ASTM Phase I and II Environmental Assessment (ESA), on behalf of Cruz Development Corporation, for the property located at 2-10 Clifford Street. No other environmental assessments were available for other portions of the property. See **Section 4.5.2** for more detailed information.

1.3.11 Geotechnical/Groundwater Impacts Analysis

Based on a Preliminary Geotechnical Summary for the portion of the Site located 10 Clifford Street completed by UTS of Massachusetts, Inc. on January 4, 2016, the subgrade conditions are favorable for supporting the proposed building on a conventional spread footing foundation. The subgrade conditions will be dominated by Shallow Bedrock with deeper pockets of Glacial overburden. Bedrock conditions are expected to be encountered throughout most of the foundation construction depending upon final grading. Groundwater was encountered in the deeper borings at 10-11 feet below grade.

Construction mitigation measures will be incorporated into the Proposed Project to avoid any potential for ground movement and settlement. See **Section 4.6** for a more detailed analysis of the geotechnical/groundwater conditions.

1.3.12 Construction Impacts Analysis

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

The construction period for the Proposed Project is expected to extend for approximately 20 months, beginning in the 1st Quarter 2018 and reaching completion in the 4th Quarter 2020 for the Phase 2 development.

1.3.13 Wetlands/Flood Hazard Zone

There are no wetlands within 500 feet of the Site. The Project Site is located outside of the boundary of the 100-year floodplain. According to the Federal Emergency Management Agency (FEMA) National Flood Insurance Rate Map (F.I.R.M.), for Suffolk County, Massachusetts. The Property is above the 100-year flood level.

1.3.14 Response to Climate Change Resiliency and Adaptability Questionnaire

The Proponent's response to the Climate Change Resiliency and Adaptability Questionnaire is contained in **Appendix E.**

1.3.15 Historic Resources Component

The Site has been used for various uses including the former Warren Theater (now church) at 270-272 Warren Street. The 270-272 Warren Street portion of the Site is also within the Moreland Street National Register (NR) District, which includes approximately 63 acres and approximately 280 buildings in an area between Warren Street and Blue Hill Avenue Streets and extending from two blocks south of Dudley Square to Waverly Street in Roxbury. The NR District includes residential building types in popular use between 1840 and the 1920's. The Warren Theater which was constructed in 1926 to house vaudeville and silent movies. It is not clear whether the theater was in operation after 1983.

Outside of the NR District, the site also includes former commercial building at 280-290 Warren Street, and at 2-10 Clifford Street, a former automotive garage (for the former theatre) from its construction in 1927 until at least 1964, and as a granite warehouse in recent years.

A review of the Site history by GEI Consultants during the Phase I and II ASTM Environmental Site Assessment investigation in 2015, indicated that between 1888 and 1897 the 2-10 Clifford Street property was part of the Donald Kennedy Medicine Manufacturing Facility. According to Sanborn maps, these buildings were vacant by 1919, with the automobile garage constructed in 1927 to serve the adjoining theater.

The Proposed Project site is located within a ¼ mile of some historically significant churches and residential properties. The Moreland Street National Register ("NR") Historic District abuts the project site to the north, and the 270-272 Warren Street former theater building, which is within the Site, is mapped within that NR district.

No known archaeological resources were located within the Project site during the review of Massachusetts Historic Commission files and MACRIS, therefore no impacts to archaeological resources are anticipated. See **Section 5.0** for a further discussion of historic resources in the Project vicinity.

1.3.16 Infrastructure Systems Component

The Project's Civil and MEP Engineers will coordinate with the City agencies and private utility companies responsible for the area's utility systems as the design progresses. Utility connections will be designed to minimize impacts to the surrounding area and all appropriate permits and approvals will be acquired prior to construction. A discussion of the existing infrastructure in the Project area can be found in **Section 6.0.**

The Boston Water and Sewer Commission (BWSC) owns and operates the sanitary sewer, storm drain, and water distribution systems in the City of Boston. A BWSC approved Site Plan and General Service Application is required for the construction of proposed sewer, storm drain, and water connections to the mains. The Proponent will submit the General Service Application and Site Plans to BWSC for review and approval prior to construction. The Site Plans will indicate the existing and proposed sewer lines, storm drain lines, and water mains within the site and in the abutting public ways. The proposed connections to the sewer, storm drain, and water distribution systems will be designed in conformance with the BWSC's Site Plan requirements. The Site Plans will show any existing utilities to be abandoned, the locations of proposed connections, and the limit of work to be performed in the public ways. Abandoned services will be cut and capped at the main line according to BWSC standards.

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

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

1.3.17 Transportation Component

Section 7.0 presents the comprehensive transportation study completed by Howard Stein Hudson for the proposed Project in conformance with the BTD *Transportation Access Plan Guidelines* (2001). The study analyzes existing conditions within the Project study area, as well as conditions forecast to be in place under the seven-year planning horizon of 2023. Pre-filing meetings were held with BTD to confirm the geographic and overall scope of the transportation analysis for this analysis.

Vehicular access/egress will be provided via two full access curb cuts, one along Waverly Street and one along Clifford Street. These driveways will connect via the garage under the building, as shown in **Figure 7-13**. The two full access driveways, located along one-way pairs, will contribute to easy vehicular flow through the site minimizing the need to circle the block due to the one-way street network.

The analysis employs mode use data for the area surrounding the Project site based on 2000 U.S. Census data and BTD data for Area 15 – Roxbury, and identifies the number of trips generated by the Project. Based on published data, it is expected that approximately 57 percent of the residential trips, 59 percent of the office trips, and 53 percent of the trip associated with the commercial use will be vehicle trips.

The trip generation of the site will add up to 410 vehicle trips on a daily basis, with 28 trips during the a.m. peak hour (12 entering/16 exiting) and 36 trips during the a.m. peak hour (18 entering/18 exiting) during the p.m. peak hour.

The Project will provide up to 104 parking spaces. Loading and service operations will occur on-site from Clifford Street during the Phase 1 operations and relocate to Waverly Street following completion of Phase 2.

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 guests and visitors, providing on-site bicycle storage, providing a guaranteed ride home program to employees, and providing a transit pass program to the employees. The transportation coordinator will oversee all transportation issues including managing vehicular and valet operations, service and loading, valet parking, and TDM programs.

1.3.18 Response to Accessibility Guidelines

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

2.0 GENERAL INFORMATION

2.1 Applicant Information

2.1.1 Project Proponent

Cruz Companies has been proudly entwined with the Roxbury community for decades. Founded by John "Bertie" Cruz in 1948, Cruz Development Corporation (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 Cruz III, CDC President, has been involved in real estate development/investment since 1973. CDC currently owns and manages over 900 apartment units for his own portfolio. His most recent project is 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. Cruz Companies would occupy the commercial space on the ground floor of the Phase 1 development, bringing 45 Cruz employees, many of whom are Roxbury residents in the neighborhood. This new space would unite all four Cruz subsidiaries- Cruz Development, Cruz Construction, Cruz Management and Cruz Relocation- under the same roof.

2.1.2 Project Team

Project Name	280-290 Warren Street, Roxbury
Property Owner/Developer	**Cruz Development Corporation** One John Eliot Square Roxbury, MA 02119 John B. Cruz III, President Daniel Cruz, Jr., Vice President Edgar J. Carrere, Senior Project Manager ecarrere@cruzcompanies.com Tel: 617-445-6901

Article 80 Permitting Consultant	**Mitchell L. Fischman Consulting ("MLF Consulting") LLC** 41 Brush Hill Road Newton, MA 02461 Mitch Fischman mitchfischman@gmail.com Tel: 781-760-1726
Legal Counsel	**Tourse & Associates PC** 3 Cannon Street Newton, MA 02461 Tel: 617-969-8035 Dennis Tourse dtourse@tourseassoc.com **McKenzie & Associates, PC** 183 State Street, Suite 6 Boston. MA 02109 Tel: 617-723-0400 Joseph Feaster, Esq. jfeaster@mckenzielawpc.com
Architect	**Micheal Washington Architects** 891 Centre Street, Suite 401 Jamaica Plain, MA 02130 Tel: 617-390-5515 Mike 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 Brian J. Beisel, PTP bbeisel@hasassoc.com Michael Littman mlittman@hshassoc.com

Civil Engineer	**Howard Stein Hudson** 11 Beacon Street, Suite 1010 Boston, MA 02108 Tel: 617-482-7080 Rick Latini, P.E. rlatini@hshassoc.com
Landscape Architect	**DeVellis Zrein Inc.** P.O. Box 307 Foxborough, MA 02035 Tel: 508-473-4114 Catherine Martin cmartin@develliszrein.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 Consultant	**Clearesult** 50 Washington Street, Suite 3000 Westborough, MA 01581 Mike Schofield mike.schofield@clearesult.com Tel: 508-365-3205 x 1304
Construction	**John B. Cruz Construction Company** One John Eliot Square Roxbury, MA 02119 Oscar Carlos, Senior Project Manager/Estimator ocarlos@cruzcompanies.com Tel: 617-445-6901

Environmental/21E Engineer	**GEI Consulting Engineers and Scientists** 40 Unicorn Park Drive Woburn, MA 01801 Catherine G. Johnson, Project Manager cjohnson@GEIconsultants.com Tel: 781-721-4000
Geotechnical Engineer	**UTS of Massachusetts, Inc.** 5 Richardson Lane Stoneham, MA 02180 Kevin M. Martin, P.E. kevinmartinpe@aol.com Tel: 781-438-775

Project Schedule	**280-290 Warren Street Project**
Construction Commencement	1st Quarter 2018
Construction Completion	4th Quarter 2020
Status of Project Design	Schematic

2.2 Legal Information

Legal Judgments or Actions Pending Concerning the Proposed Project:

None.

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

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

Nature and Extent of Any and All Public Easements:

The Project Site is bounded by streets containing sewer, electric, telephone, and gas utilities. ES Warren Street is subject to a right-of-way restriction with adjacent abutters.

2.3 Public Benefits

The Proposed Project will provide substantial benefits to the City of Boston and the Roxbury community. including:

- Creating much needed workforce housing in the Roxbury Neighborhood;
- Creating affordable rental units within the Proposed Project;
- Creating desirable elderly housing in the Roxbury neighborhood.
- Redeveloping blighted and underutilized parcels;
- Encouraging alternative modes of transportation through the use of bicycling and walking, close proximity to the MBTA Dudley Station bus terminal, and access to zip car spaces inside the development's parking garage;
- Creating 95 bike racks within the building to encourage bicycling as a mode of transportation, leading to less vehicular traffic;
- Adding revenue in the form of new property taxes to the City of Boston;
- Creating full time jobs (commercial/ retail); and
- Creating temporary construction and labor jobs.

2.4 Regulatory Controls and Permits

The Proposed Project is located within the Multi-Family Residential / Local Services Subdistrict (MFR/LS) of the Roxbury Neighborhood District (Article 50), which allows the new multi-family and elderly residential uses, but restricts and limits certain dimensional, density, lot, floor area, off-street parking/loading and other requirements for the Proposed Project. Thus, the Proponent will seek the relief required for the Proposed Project by Variance and/or Conditional Use(s) with the City of Boston Board of Appeal.

2.4.1 Compliance with Boston Zoning Code- Use and Dimensional Requirements

The Site is located in a MFR/LS District of the Roxbury Neighborhood District, Article 50 of the Boston Zoning Code (the "Code"). (See **Table 2-1.** MFR/LS District - Zoning Compliance.)

The Site consists of 54,670 square feet of land with proposed improvements of 166,274 square feet of residential housing. Multi-family and elderly dwellings are allowed uses under Article 50, Table F.

The Proposed Project seeks relief from certain requirements of the existing zoning outlined in Article 50. The proposed structure in Phase 1 exceeds the maximum allowable floor-area-ratio ("FAR"). It also exceeds the height limitations for the district and will require relief from the Board of Appeal. The Proposed Project is projected to have an FAR of 3.04, above the allowable 1.0, and a height of 58 feet. Design elements of the project will also be reviewed in accordance with the Large Project Review process.

2.4.2 Compliance with Parking and Off-Street Loading Requirements

The Proposed Project, pursuant to Article 50-43, is subject to Large Project Review, and the required off-street parking spaces and off-street loading facilities will be determined as a part of the Large Project Review in accordance with the provisions of Article 80 of the Code.

The Project provides 39 below-grade and 63 at-grade spaces in a garage for a total of 102 spaces a ratio of approximately 1.1 spaces per residential unit and includes spaces for the ground floor commercial space. Although the proposed parking ratio slightly exceeds the Boston Transportation Department Guidelines for this area, the Proponent has taken into consideration the sensitivity of the community and its desire to maximize parking for new developments in providing as much parking as possible on the Site. The Parking is also enhanced by the building location, close to the Dudley Square MBTA Station and several bus lines.

Table 2-1 MFR/LS District (Article 50) – Zoning Compliance

Dimensional Element	MFR/LS District	Proposed Project (1)	Conditional Use Permits/ Variance(s) Required?
Minimum Lot Size	4,000 SF for 1st three-units = 4,000 SF	54,670 SF	Yes
Lot Area for Each Additional Unit	1,000 SF Per DU =95,000 SF	54,670 SF	Yes
Max. Floor Area Ratio	1.0	3.04	Yes
Max. Building Height	45 feet / 4 -Stories	58 feet / 5 -Stories	Yes
Minimum Lot Width	40 feet	285.37 feet	No
Minimum Lot Frontage	40 feet	285.37 feet	No
Min. Usable Open Space	200 min. SF per DU = 19,600 SF	11,030 SF	Yes
Minimum Front Yard	20	0	Yes
Minimum Side Yard	10	0	Yes
Minimum Rear Yard	20	0	Yes
Minimum Number of Parking Spaces	(2)	102 spaces	No (2)
Minimum Number of Loading Bays	(2)	1	No (2)

1. The dimensions described in this above table may change as the Proposed Project undergoes design review with the BRA.
2. Required off-street parking spaces and loading requirements shall be determined through BRA's Large Project Review in accordance with Article 80 of the Code

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

Agency Name	Permit or Action*
State Agencies	
MA Department of Environmental Protection, Division of Water Pollution Control	Sewer Connection Self Certification
Local Agencies	
Boston Redevelopment Authority	Article 80 Review and Execution of Related Agreements; Section 80B-6 Certificate of Compliance
Boston Department of Neighborhood Development (DND)	Final Redeveloper Designation; NHT, IDP and City of Boston HOME Funds
Boston Transportation Department	Transportation Access Plan Agreement; Construction Management Plan
Boston Department of Public Works Public Improvements Commission	Possible Sidewalk Repair Plan; Curb-Cut Permit; Street/Sidewalk Occupancy Permit; Permit for Street Opening; Other
Boston Landmarks Commission	Art. 85 - Demolition Delay Review
Boston Board of Appeal	Possible Variances and Dimensional Relief from the Existing Zoning Code Requirements
Boston Public Safety Commission Committee on Licenses	Permit for Storage of Fuel in (Emergency Storage) Tanks; Garage License
Boston Fire Department	Approval of Fire Safety Equipment
Boston Water and Sewer Commission	Approval for Sewer and Water and Connections; Construction Site Dewatering; and Storm Drainage
Boston Department of Inspectional Services	Building Permits; Certificates of Occupancy; Other Construction-Related Permits

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

2.5 Public Review Process and Agency Coordination

Prior to submitting this PNF, the Project Proponent conducted extensive preliminary community outreach to seek initial input and support for the Proposed Project; voluntarily canvassed the neighborhood for its own sponsored an initial abutters meeting and hosted site visits with community leadership. The Project Proponent also met extensively during the tentative developer selection process for the Department of Neighborhood Development parcels in 2015. The Proponent integrated the articulated input and community values into its overall development program, and it looks forward to continuing to process and shape the Proposed Project with this most important constituency.

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

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

2.6 Development Impact Payment ("DIP") Status

Based on current schematic design plans, it is not anticipated that Development Impact Payments ("DIP"), in accordance with Article 80B-7 of the Code, will be required for Proposed Project. That project is expected to have approximately 11,000 gross non-residential FAR square feet, and be below the 100,000 gsf threshold where DIP is required.

3.0 URBAN DESIGN AND SUSTAINABILITY COMPONENT

3.1 Site and Surroundings

The Project Site is located in Roxbury and is bounded on the west by Warren Street, on the north by Waverly Street, on the east by residential structures in the adjacent neighborhood and on the south by Clifford Street.

The primary face of the project is on Warren Street between Waverly and Clifford Streets with each of these streets extending from Warren Street to Blue Hill Avenue.

The Warren Street face of the site is primarily composed of multi-family residential and local service uses with Warren Gardens, a major low rise housing development, on the opposite the side of Warren Street. Warren Street is a primarily multifamily residential and local services street, and is located approximately halfway between Dudley Square and Blue Hill Avenue.

This location contributes significantly to the project having a positive impact on Warren Street and the adjacent neighborhood area.

The existing site contains three distinct parcels which combine for a total of 54,670 square feet. The site is occupied by a church located in a transformed movie theater, five store fronts, and an abandoned one story building which extends from Clifford Street to Waverly Street.

The buildings on site will be demolished in two phases. The Warren and Clifford Street structures in Phase I, and the Warren and Waverly Street structures in Phase II. The entire site is scheduled for redevelopment.

The site is basically flat and slopes gently from Clifford Street to Waverly Street and has an approximate six-foot change in elevation. All street edges of the site are developed and have sidewalks.

The neighborhoods behind the site between Clifford and Waverly Streets, from the site to Blue Hill Avenue, consist of well-maintained 1, 2 and 3 family houses, and multifamily buildings in predominantly late 19th Century architectural styles.

The redevelopment of 280-290 Warren Street will have a positive effect on the livability, quality of life and value of the housing and property adjacent to the site.

3.2 Project Description

The Proposed Project consists of construction of 95 units of new family and elderly residential housing units, 11,334 square feet of commercial office space, a coffee shop and restaurant, and 102 parking spaces in a two-level garage completed over two construction phases

Phase I will consist of 51 units of housing, 7,284 square feet of commercial office space, and 74 parking spaces in a two-level garage located on the Warren and Clifford Streets portion of the project.

Phase II will consist of 44 units of elderly housing, 4,050 square feet of coffee shop and restaurant space and 28 parking spaces in a single level garage on the Warren and Waverly Streets corner of the project.

3.3 Proposed Building Uses and Dimensions

A summary of the approximate Proposed Project dimensions is found in the table below.

Table 3-1 280-290 Warren Street - Summary of Proposed Project Dimensions

	Phase 1	Phase 2	Total
Lot Area	29,329 SF	25,341 SF	54,670 SF
Multi-Family Residential Commercial Common Area Community Area Parking Garage (On-Grade) Parking Garage (Below-Grade)	58,052 GSF 7,284 GSF 8,746 GSF 12,687 GSF 12,940 GSF 97,709 GSF	36,120 GSF 4,050 GSF 16,559 GSF 6,314 GSF 5,525 GSF 0 GSF 68,568 GSF	92,172 GSF 11,334 GSF
Gross Floor Area (*Per Boston Zoning Code)*	97,706 GSF	68,568 GSF	166,274 GSF
Number of Residential Units	51 - units	44 - units	95 - Units
Floor Area Ratio	3.33	2.70	3.04
Height of Tallest Portion of Building (*Per Zoning Code*)	48 feet	58 feet	--
Number of Stories	4 - Stories	5 - Stories	--
Parking Spaces: Surface – On-Grade Below-Grade Garage Total	 35 39 74 Spaces	 28 0 28 Spaces	 102 Spaces

3.4 Urban Design Concept

The proposed design intent of this residential and commercial project is to restore the urban fabric and residential street life of traditional Roxbury and to enhance and encourage further redevelopment of Warren Street between Dudley Square and Blue Hill Avenue.

The location of our site, at approximately halfway between the Dudley Square and Blue Hill Avenue, is ideally suited and placed for these goals.

The proposed architectural style is reflective of the architecture along Warren Street and in the adjacent Roxbury residential neighborhoods. The use of brick, traditional bays, mansard roofs and familiar windows, translated into a more modern form, is in keeping with other new residential developments of this era in this area.

It is expected that the 280-290 Warren Street project will restore a residential presence and vitality to this long abandoned site and productively refinish and establish this neighborhood edge.

To reinforce this sense of extension of the residential fabric, we believe that the commercial, restaurant and office space used at the first floor is traditional on Warren Street and appropriate in restoring a sense of street vitality.

On Warren Street, the goal is to create a strong residential presence while restoring the neighborhood tradition of first floor commercial, restaurant and office uses. By siting the main residential entrances on Waverly and Clifford Street corners, the team hopes to improve the safety and user perception of this portion of the street, and separate residential zones from commercial zones.

The entire Warren Street perimeter is redeveloped. The combination of placing neighborhood “eyes” onto the street and the introduction of a new entrance will add both to the safety and positive perception of the Warren Street neighborhood.

The team’s plan for the entry on Waverly Street enhances this entry by creating a welcoming atmosphere for pedestrians during their coming and going on our property by introducing a small sitting area that can also be used by the coffee shop or restaurant. This is proposed to contribute to the liveliness of the Waverly Street entry and corner location and increase security

The intent is not just to fill this abandoned site, but to reactivate Warren Street along this edge with a compatible building of similar size, shape, scale, materials, uses and architectural character as the existing street. Our primary goal being to enhance and improve the character of the street and neighborhood, and increase the quality of the urban experience and increase the value of existing and future adjacent properties.

The siting of the building attempts to accomplish a number of design goals. These goals are different at each face of the building, and yet they all contribute to the overall goal of completion of the street and neighborhood edge, and assuring the final product is compatible with the site and neighborhood at each point of contact.

The other issue driving the Waverly Street front door is the introduction of an entry to the parking garage and behind the Waverly Street main pedestrian entry. This will create addition activity further down Waverly Street from Warren Street.

The Warren street elevation reflects the typical Warren street treatment of providing residential housing above local services and businesses at street level. In Phase 2, space is provided on Warren Street for a coffee shop and a restaurant at the corner of Waverly Street behind storefront windows.

In Phase I, the main entry is on Clifford Street, close to the Warren Street corner, and the entire Warren Street façade includes store front windows at street level. This is the location of 7,284 square feet of office space to be occupied by the developer, Cruz Companies.

If the space is broken up, smaller points of entry will be added. Behind the Clifford Street pedestrian entry, the upper level parking entry is provided which will be the main access to the upper and lower level of parking until Phase II is complete

Both Waverly Street and Clifford Street pedestrian and vehicular entries will encourage traditional commercial activity at street level and housing activity above, with proper zoning for each to allow for the desired use activation at the street level, and with proper zoning of the residential activity on the first level and above.

3.5 Materials and Finishes

The building will be constructed utilizing three primary exterior wall materials. The dominant exterior materials will be brick with precast concrete accents. Metal panels will form the bays. The material used on the mansard roofs, which is a major design element in each elevation, will be standing seam metal roofing.

The first floor store fronts will be aluminum system with one-inch insulating glazing. This treatment is provided to create transparency at street level and an inviting yet secure environment. Inside the courtyard, the walking areas will be surfaced with different shapes and sizes of masonry pavers that will encourage alternative usage and accent the landscaping features and planting.

The materials that are being used for the development are complimentary and compatible with adjacent structures in the immediate neighborhood and on Warren Street.

3.6 Landscape Design

The concept behind the landscape at the 280-290 Warren Street project is to provide a courtyard space and private garden for the residents of the buildings.

As you enter the space you travel down a walkway flanked by small ornamental trees and plants. Tucked next to the walkway are benches where residents may sit, eat lunch, or read.

As you continue down the path, a center tree punctuates the space. A small seat wall circles the tree for sitting and passive activity. The area behind the tree is a larger space which can be utilized for larger community gatherings, a place for tables and chairs or a place for congregation. The lawn around the space softens the edges and gives it a yard like feel.

The streets adjacent to the site are lined with tress and planting. The street trees and pits sit within the first 4' of the sidewalk. The trees help to create a pedestrian zone and provide several functions. They bring scale to the building, they reduce the heat island effect produced from the street, and they also provide a buffer between cars and pedestrians. Signage and other site features maybe added in between the trees to help strengthen the separation between the traffic and the pedestrian.

The small space outside the restaurant is an ideal place for outdoor seating, a small knee wall wraps the space on two sides helping to mitigate the grade and create an on grade patio outside of the restaurant. The wall also helps to create a planter with small ornamental trees that add life to the plaza but also give separation between pedestrians and diners.

The landscape treatment will provide comfortable, pleasant, and valuable open spaces and an edge to the project that will encourage interaction and separation between the inhabitants of the project and the passersby in the adjacent community.

3.7 Sustainable Design/Energy Conservation

3.7.1 Introduction

The Phases 1 and 2 of the 280-290 Warren Street project will provide high efficiency, durable and comfortable units. The project is utilizing the LEED Homes Midrise path. Each unit will have individual heating, cooling and hot water, providing residents with individual control and encouraging careful use and consumption. All of the practices and materials that are used in the residential sections of the building will be employed in the commercial areas as well, ensuring the entire building maintains a high degree of sustainability. The location on one of Boston's central neighborhood thoroughfares will continue to boost the local neighborhood. The project team will work with a third party, green rater, Clearesult, to provide guidance and verification during development and construction.

3.7.2 Innovation and Design Strategy

The two buildings intend to achieve a LEED for Homes Silver level. The preliminary LEED Homes rating is 58. The project has identified many of the durability issues facing this location and intends to integrate the durability planning and management into its construction schedule. The durability prerequisites have been adopted into the project plans and specifications. Clearesult will provide periodic inspections of the durability concerns. The project will achieve a variety of exemplary credits given the central location.

3.7.3 Location and Linkages Strategy

The Warren/Clifford/Waverly block is located along a vibrant commercial road. The Michael Haynes Apartments are expected to earn all of the points available in Locations and Linkages. The project reuses a site far from any sensitive areas or wetlands. There is robust access to parks, commercial establishments and transit. There are multiple car sharing vendors located nearby. Getting to downtown Boston will take about the same amount of time whether driving, taking transit or biking.

3.7.4 Sustainable Sites Strategy

The two buildings will be maximizing the use of land to provide sustainable housing. The construction practices and details will ensure control of all materials and soils, ensuring there is no erosion occurring to any off site areas or sewers. The landscaped area will be located in a central courtyard, shared by the two buildings, and separated from the bustle of the street by the buildings as well, providing a quiet safe area to enjoy the outdoors. The professionally designed landscape will incorporate drought tolerant plants with no invasive species. The courtyard details will ensure a permeable installation. The project intends to install an infiltration system to handle roof runoff and any other site rainwater; however, the location of bedrock very close to the surface has eliminated the viability of a below grade system.

3.7.5 Water Efficiency Strategy

The courtyard space does not currently require irrigation. With little outdoor space the project is also focusing on the water efficiency opportunities in the building. The water using devices will be utilized in both the residential sections as well as the commercial area. The water closet has been selected for both its low water use and its effective operation and low maintenance characteristics. The lavatory faucets and the showerheads (both standard and accessible) will have very low flow ratings.

3.7.6 Energy and Atmosphere Strategy

Each building will surpass AHRAE 90.1 2007 by 20%. The envelope of the building will be robust with continual exterior, as well as cavity insulation in the walls, above coed insulation at the roof, and Energy Star windows. The windows will also have low solar heat gain coefficients to reduce the occurrence of overheating or higher air conditioning costs on the south and west sides. Every unit will have a high efficiency hydro air system, using an instantaneous water heater for DHW and to supply the heating coil, plus a high SEER DX air conditioner coil that uses R410A refrigerant, a non-HCFC refrigerant. The design will employ a compact arrangement.

3.7.7 Materials and Resources

The wall assembly will entail off site panel assembly to reduce material use and assembly waste, and provide greater quality control during the wall fabrication. The project is examining the options for incorporating products that are environmentally preferable through recycled value,

low emissions and locally sourced to reduce transportation impact. The project will work with the waste hauling subcontractor to investigate diversion opportunities, document the waste/recycle stream and achieve a recycle rate of at least 50%.

3.7.8 Indoor Environmental Quality Strategy

The project will earn almost half of the available credits in the EQ section. There will be no fireplaces and the space conditioning combustion appliance will all have closed combustion. Each unit's mechanical ventilation system will comply with ASHRAE standards for design and operation and will be verified by a third party. All of the ducts and air handing systems will be kept sealed during construction to prevent contamination. The city of Boston is a low risk area for radon by the EPA definition; the two buildings are going to evaluate passive radon systems for all enclosed living areas that do not have garage space below. The garage design and construction will minimize any pollutant intrusion to conditioned space.

3.7.9 Awareness and Education

The Michael Haynes Apartments have the particular distinction of being developed, built and operated by the same entity. Cruz Development will be reaching out to the community as it has been during this pre-development phase, and informing the public about its sustainable project. Cruz's' experience with its management division has been that the well informed resident is the most successful resident and has plans for both public and tenant outreach to explain and improve the projects sustainability.

3.8 Urban Design Drawings and LEED Checklist

The 280-290 Warren Street urban design drawings and perspectives, and the LEED Checklist are contained in the following section and include:

Figure 3.1-1: Schematic Design - Cover Sheet
Figure 3.1-2: Schematic Design - Vicinity Plan
Figure 3.1-3: Schematic Design - Neighborhood Context - Aerial
Figure 3.1-3A: Schematic Design - Neighborhood Context - Existing
Figure 3.1-3B: Schematic Design - Neighborhood Context - First Floor Plan
Figure 3.1-3C: Schematic Design - Neighborhood Context - Second, Third, Fourth Floor Plan
Figure 3.1-3D: Schematic Design - Neighborhood Context - Fifth Floor Plan - Phase II Only
Figure 3.1-4: Schematic Design - Garage Lower Level
Figure 3.1-5: Schematic Design - Garage Upper Level / First Floor Plan / Landscape Plan
Figure 3.1-5A: Schematic Design - Garage Upper Level / First Floor Building Entry Diagram
Figure 3.1-6: Schematic Design - Second, Third and Fourth Floor Plan
Figure 3.1-7: Schematic Design - Fifth Floor Plan - Phase II Only
Figure 3.1-8: Schematic Design - Warren and Clifford Street Elevation
Figure 3.1-9: Schematic Design - Waverly Street Elevation
Figure 3.1-10: Schematic Design - Clifford and Warren Street Elevation
Figure 3.1-11: Schematic Design - Typical Section
Figure 3.1-12: Schematic Design - Perspective From Opposite Side of Warren Street
Figure 3.1-13: Schematic Design - Perspective From Warren and Waverly Street
Figure 3.1-14: Schematic Design - Perspective From Courtyard Entry
Figure 3.1-15A: LEED for Homes Midrise Checklist
Figure 3.1-15B: LEED for Homes Midrise Checklist

FIGURE 3.1-1: COVER

280–290 WARREN STREET PROJECT

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

Submitted and Prepared by:
Cruz Development Corporation
One John Eliot Square
Roxbury, MA 02119

In Association with:
Micheal Washington Architects Inc
Mitchell L. Fischman Consulting LLC
Howard Stein Hudson
Tech Environmental
Clearesult
Tourse and Associates PC

PHASE I: UNIT COUNT

UNITS/ FLOOR	1BR 800 SF	2BR 999 SF	3BR 1285 SF	TOTAL
1ST FLOOR				0
2ND FLOOR	1	14	2	17 (18684 SQ. FT)
3RD FLOOR	2	15		17 (18684 SQ. FT)
4TH FLOOR	1	16		17 (18684 SQ. FT)
TOTAL UNITS	4	45	2	51 (56052 SQ. FT)
BASEMENT LEVEL PARKING SPACES				39
1ST FLOOR LEVEL PARKING SPACES				35

PHASE II: UNIT COUNT

UNITS/ FLOOR	1BR 860 SF	2BR 999 SF	TOTAL
1ST FLOOR			
2ND FLOOR	10	1	11 (9030 SQ. FT)
3RD FLOOR	10	1	11 (9030 SQ. FT)
4TH FLOOR	10	1	11 (9030 SQ. FT)
5TH FLOOR	10	1	11 (9030 SQ. FT)
TOTAL UNITS	40	4	44 (36120 SQ. FT)
PARKING SPACES			28

BUILDING SQUARE FOOTAGE PROVIDED PHASE I

	1ST FLOOR	2ND FLOOR	3RD FLOOR	4TH FLOOR	TOTAL
RESIDENTIAL	0 SF	18684 SF	18684 SF	18684 SF	56052 SQ. FT
COMMERCIAL (CRUZ)	7284 SF				7284 SQ. FT
COMMUNITY AREA	0 SF	0 SF	0 SF	0 SF	0 SQ. FT
COMMON AREA	1525 SF	2407 SF	2407 SF	2407 SF	8746 SQ. FT
ONSITE PARKING (72)	12697 SF				12697 SF
TOTAL SQUARE FEET	20,614 SF	21,091SF	21,091SF	21,091SF	84,779 SF

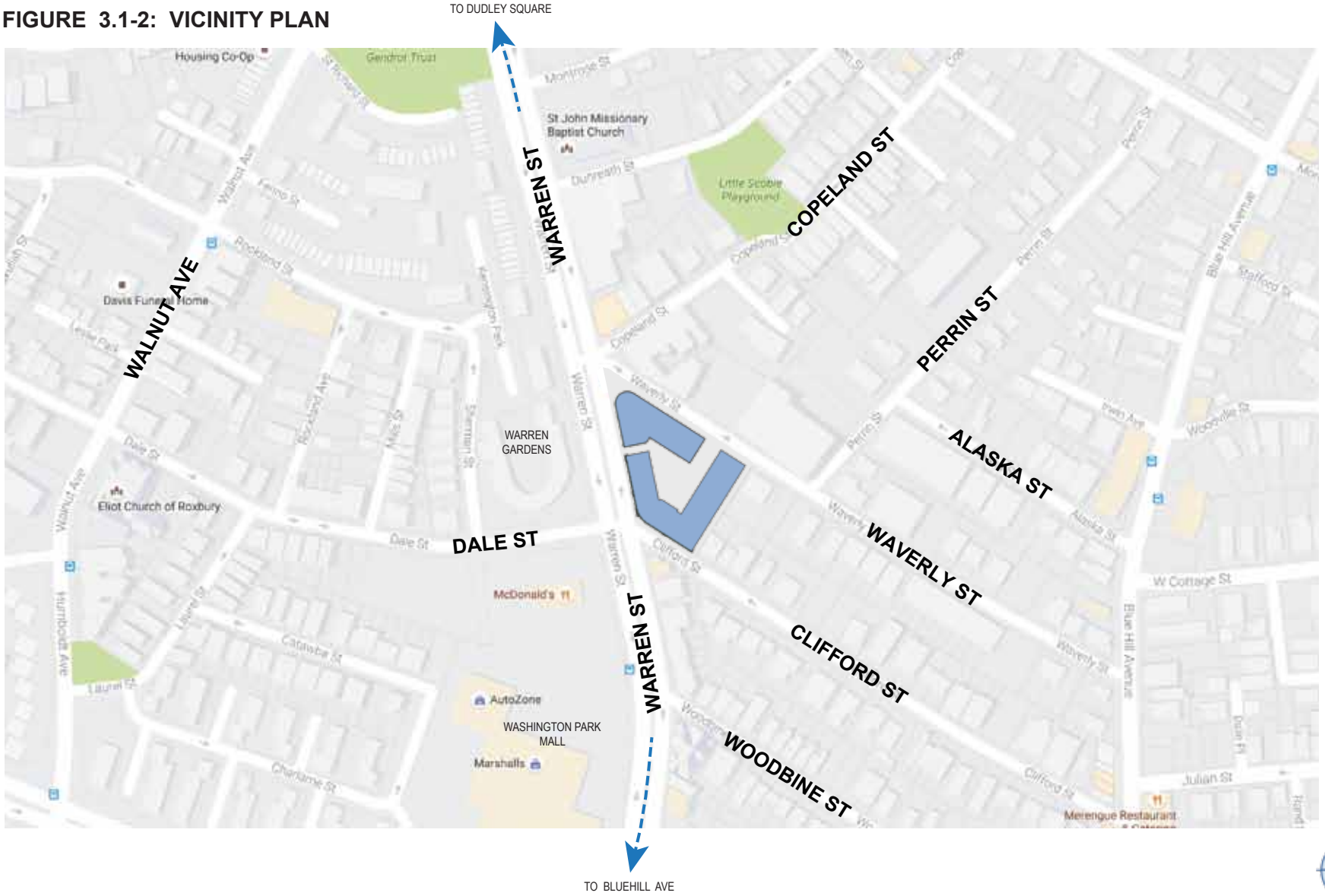
BUILDING SQUARE FOOTAGE PROVIDED PHASE I BASEMENT

	BASEMENT
STORAGE	1219 SQ.FT.
RECREATIONAL ROOM	1280 SQ.FT.
CONFERENCE ROOM/ OFFICE/KITCHEN(CRUZ)	2400 SQ.FT.
MECHANICAL	1340 SF.FT.
COMMON SPACE	1294 SF.FT.
PARKING	12940 SF.FT.
TOTAL SQUARE FEET	20473 SF.FT.

BUILDING SQUARE FOOTAGE PROVIDED PHASE II

	1ST FLOOR	2ND FLOOR	3RD FLOOR	4TH FLOOR	5TH FLOOR	TOTAL
RESIDENTIAL	0 SF	9030 SF	9030 SF	9030 SF	9030 SF	36,120 SF
COMMERCIAL	4050 SF	0	0	0	0	4050 SF
COMMUNITY AREA	134 SF	1545 SF	1545 SF	1545 SF	1545 SF	6314 SF
COMMON AREA	4751 SF	2952 SF	2952 SF	2952 SF	2952 SF	16559 SF
ONSITE PARKING (28)	5525 SF					5,525 SF
TOTAL SQUARE FEET	13,527 SF	13,527 SF	13,527 SF	13,527 SF	13,527 SF	68,568 SF

FIGURE 3.1-2: VICINITY PLAN

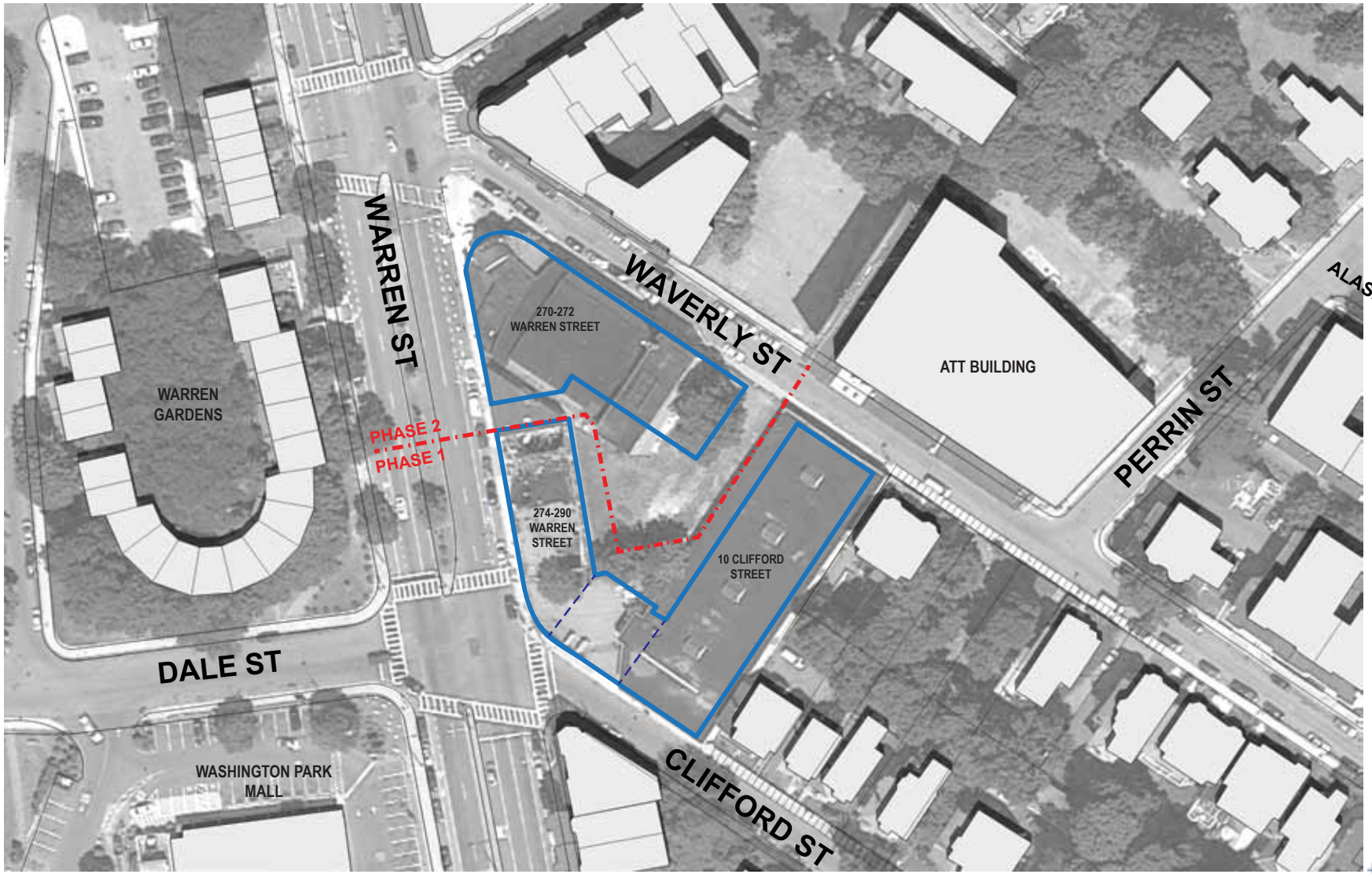


MICHEAL WASHINGTON ARCHITECTS INC. 891 CENTRE STREET, JAMAICA PLAIN, MA 02130	**280 - 290 WARREN STREET**	**CRUZ DEVELOPMENT CORPORATION** ONE JOHN ELIOT SQUARE, ROXBURY , MA 02119

FIGURE 3.1-3: NEIGHBORHOOD CONTEXT AERIAL

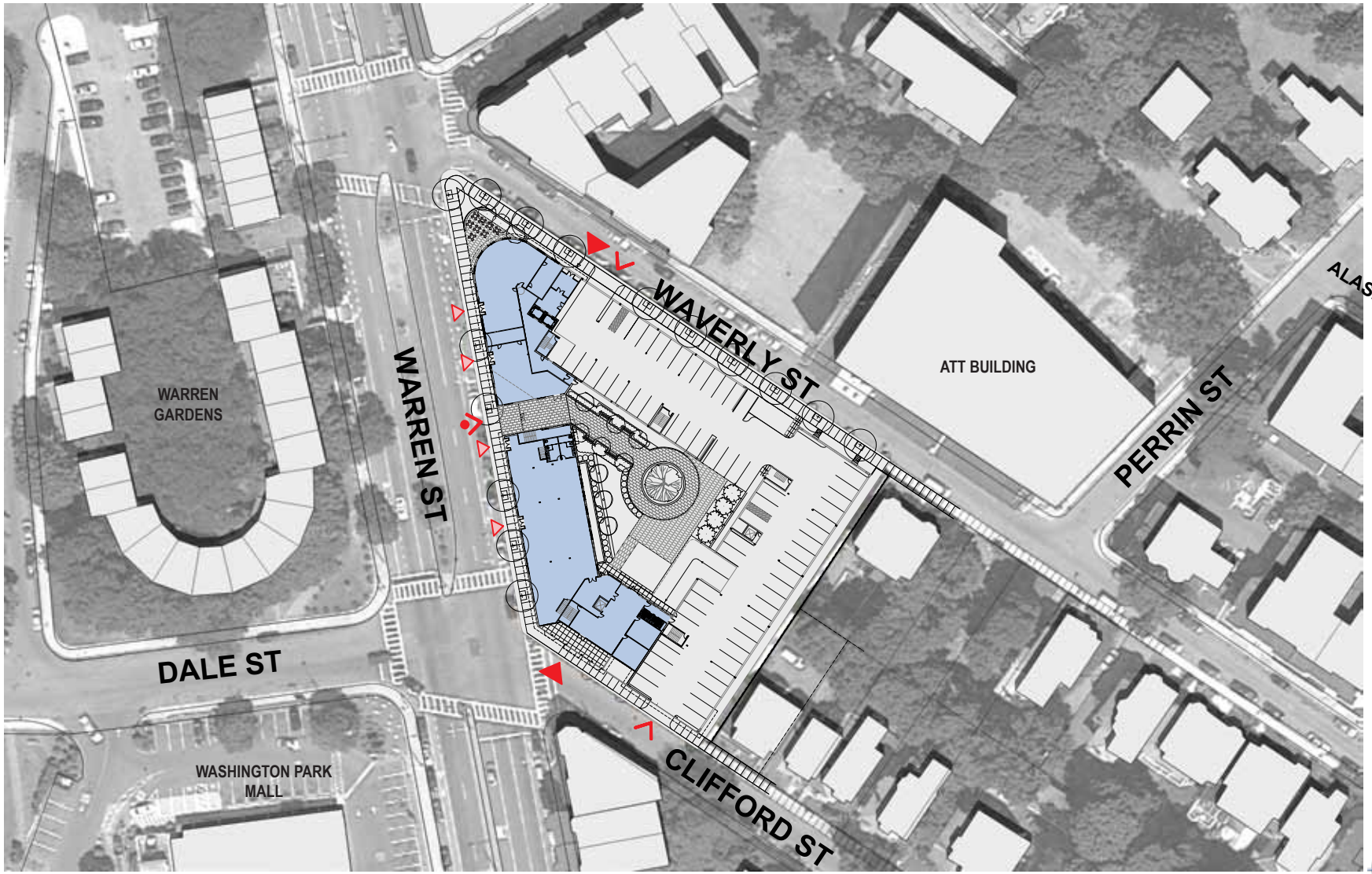
MICHEAL WASHINGTON ARCHITECTS INC. 891 CENTRE STREET, JAMAICA PLAIN, MA 02130	**280 - 290 WARREN STREET**	**CRUZ DEVELOPMENT CORPORATION** ONE JOHN ELIOT SQUARE, ROXBURY , MA 02119

FIGURE 3.1-3A: NEIGHBORHOOD CONTEXT - EXISTING



MICHEAL WASHINGTON ARCHITECTS INC. 891 CENTRE STREET, JAMAICA PLAIN, MA 02130	**280 - 290 WARREN STREET**	**CRUZ DEVELOPMENT CORPORATION** ONE JOHN ELIOT SQUARE, ROXBURY , MA 02119

FIGURE 3.1-3B: NEIGHBORHOOD CONTEXT - 1ST FLOOR



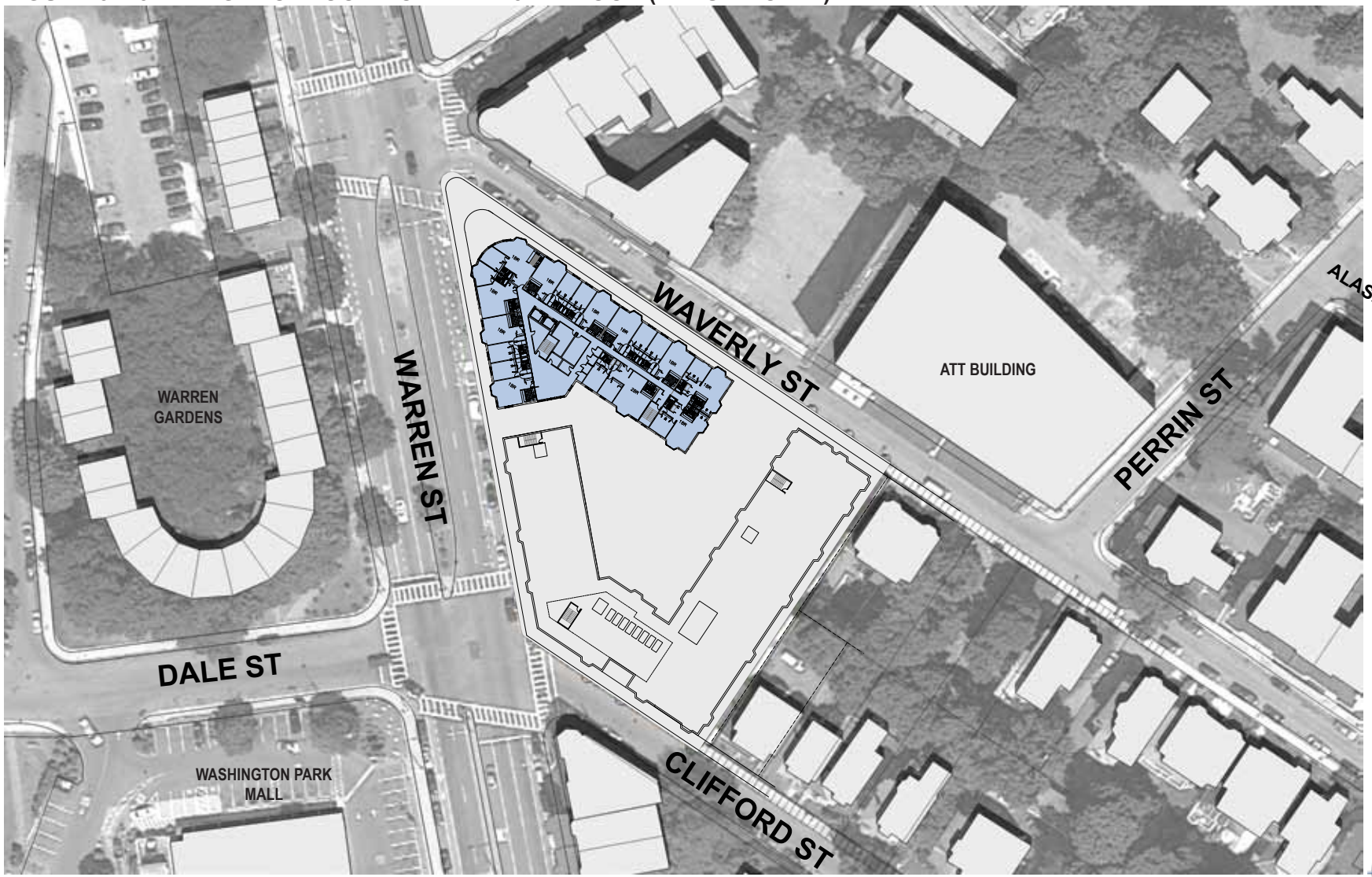
LEGEND KEY: ▲ MAIN ENTRY △ SECONDARY ENTRY ^ PARKING ENTRY ^ COURTYARD ENTRY

MICHEAL WASHINGTON ARCHITECTS INC. 891 CENTRE STREET, JAMAICA PLAIN, MA 02130	**280 - 290 WARREN STREET**	**CRUZ DEVELOPMENT CORPORATION** ONE JOHN ELIOT SQUARE, ROXBURY , MA 02119

FIGURE 3.1-3C: NEIGHBORHOOD CONTEXT - 2ND, 3RD, 4TH FLOOR

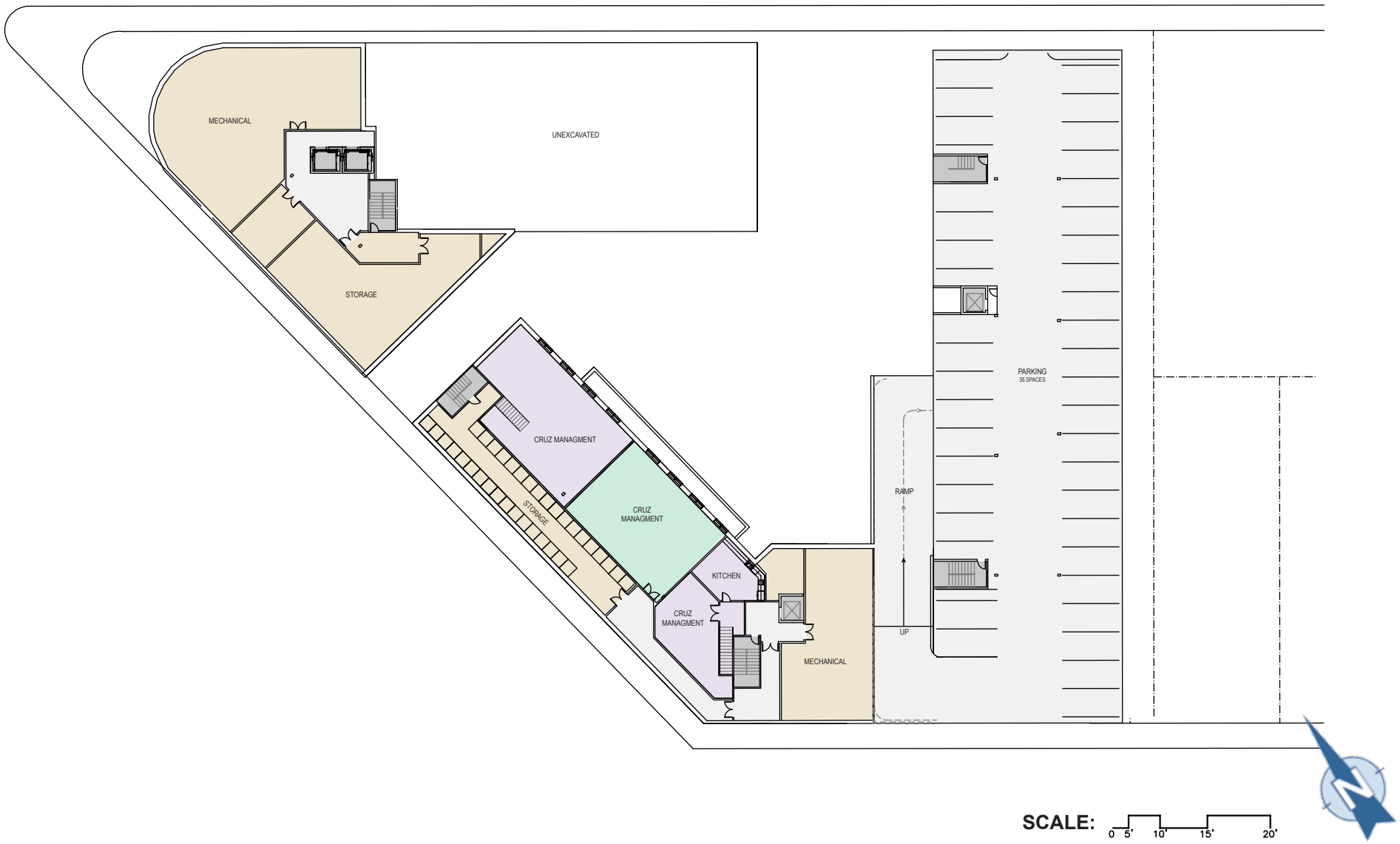
MICHEAL WASHINGTON ARCHITECTS INC. 891 CENTRE STREET, JAMAICA PLAIN, MA 02130	**280 - 290 WARREN STREET**	**CRUZ DEVELOPMENT CORPORATION** ONE JOHN ELIOT SQUARE, ROXBURY , MA 02119

FIGURE 3.1-3D: NEIGHBORHOOD CONTEXT - 5TH FLOOR (PHASE 2 ONLY)



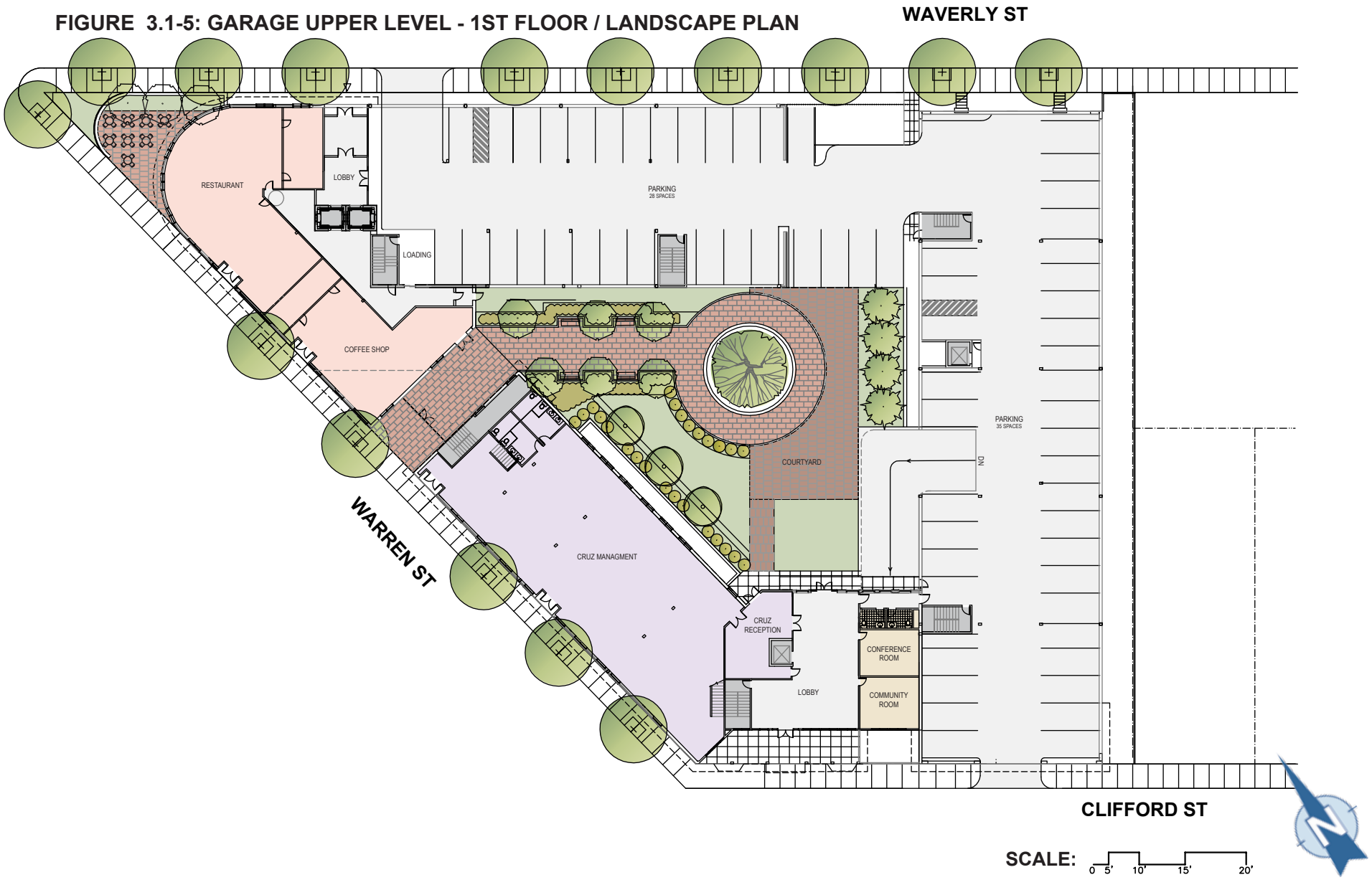
MICHEAL WASHINGTON ARCHITECTS INC. 891 CENTRE STREET, JAMAICA PLAIN, MA 02130	**280 - 290 WARREN STREET**	**CRUZ DEVELOPMENT CORPORATION** ONE JOHN ELIOT SQUARE, ROXBURY , MA 02119

FIGURE 3.1-4: GARAGE LOWER LEVEL



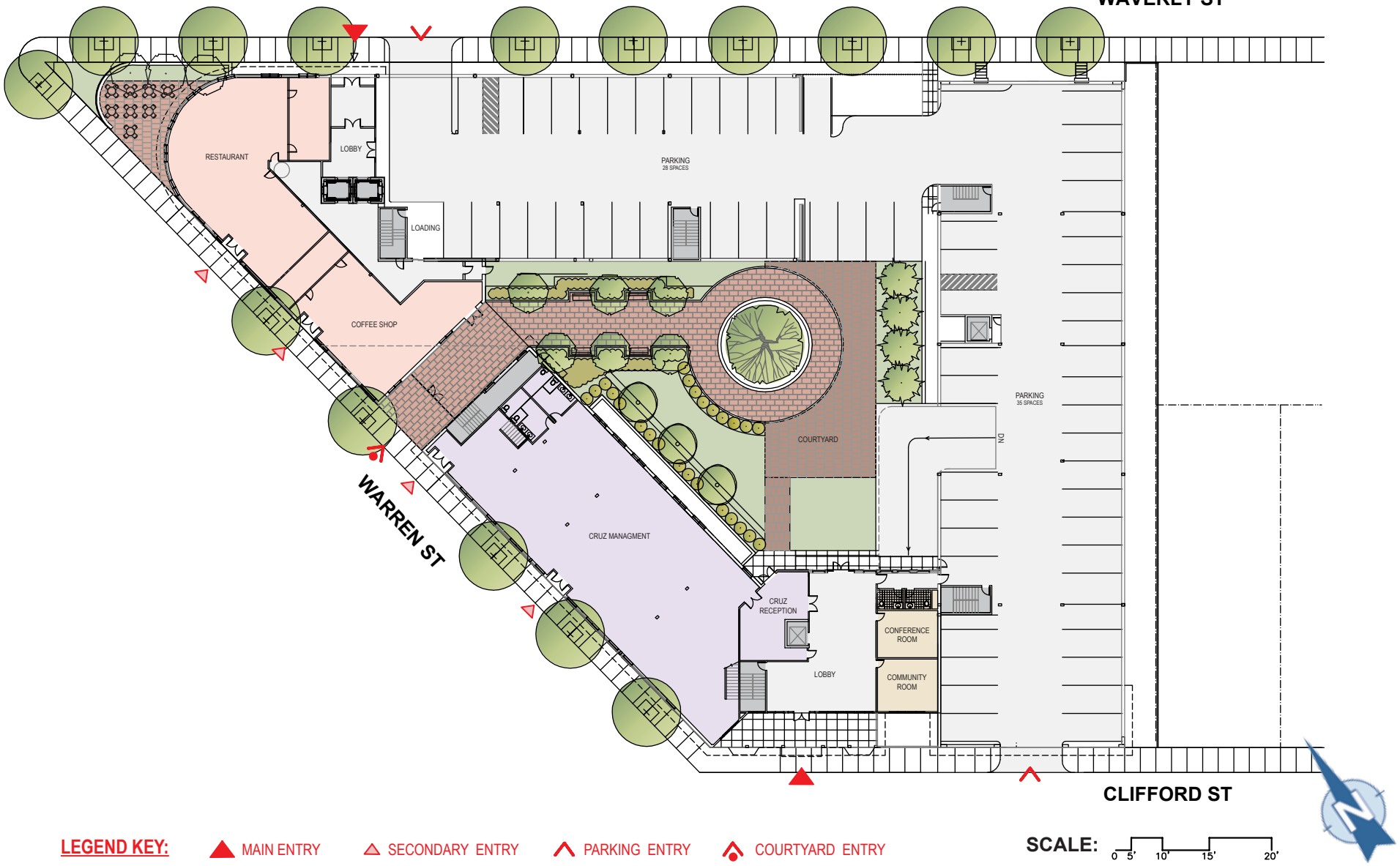
MICHEAL WASHINGTON ARCHITECTS INC. 891 CENTRE STREET, JAMAICA PLAIN, MA 02130	**280 - 290 WARREN STREET**	**CRUZ DEVELOPMENT CORPORATION** ONE JOHN ELIOT SQUARE, ROXBURY , MA 02119

FIGURE 3.1-5: GARAGE UPPER LEVEL - 1ST FLOOR / LANDSCAPE PLAN



MICHEAL WASHINGTON ARCHITECTS INC. 891 CENTRE STREET, JAMAICA PLAIN, MA 02130	**280 - 290 WARREN STREET**	**CRUZ DEVELOPMENT CORPORATION** ONE JOHN ELIOT SQUARE, ROXBURY , MA 02119

FIGURE 3.1-5A: GARAGE UPPER LEVEL - 1ST FLOOR BUILDING ENTRY DIAGRAM



LEGEND KEY: ▲ MAIN ENTRY △ SECONDARY ENTRY ^ PARKING ENTRY ^ COURTYARD ENTRY

SCALE: 0 5' 10' 15' 20'

MICHEAL WASHINGTON ARCHITECTS INC. 891 CENTRE STREET, JAMAICA PLAIN, MA 02130	**280 - 290 WARREN STREET**	**CRUZ DEVELOPMENT CORPORATION** ONE JOHN ELIOT SQUARE, ROXBURY , MA 02119

FIGURE 3.1-6: 2ND, 3RD, AND 4TH FLOOR LEVEL

MICHEAL WASHINGTON ARCHITECTS INC. 891 CENTRE STREET, JAMAICA PLAIN, MA 02130	**280 - 290 WARREN STREET**	**CRUZ DEVELOPMENT CORPORATION** ONE JOHN ELIOT SQUARE, ROXBURY , MA 02119

FIGURE 3.1-7: 5TH FLOOR LEVEL

MICHEAL WASHINGTON ARCHITECTS INC. 891 CENTRE STREET, JAMAICA PLAIN, MA 02130	**280 - 290 WARREN STREET**	**CRUZ DEVELOPMENT CORPORATION** ONE JOHN ELIOT SQUARE, ROXBURY , MA 02119

FIGURE 3.1-8: WARREN ST & CLIFFORD ST ELEVATION

MICHEAL WASHINGTON ARCHITECTS INC.
891 CENTRE STREET, JAMAICA PLAIN, MA 02130

280 - 290 WARREN STREET

CRUZ DEVELOPMENT CORPORATION
ONE JOHN ELIOT SQUARE, ROXBURY , MA 02119

FIGURE 3.1-9: WAVERLY ST ELEVATION

MICHEAL WASHINGTON ARCHITECTS INC.

891 CENTRE STREET, JAMAICA PLAIN, MA 02130

280 - 290 WARREN STREET

CRUZ DEVELOPMENT CORPORATION

ONE JOHN ELIOT SQUARE, ROXBURY , MA 02119

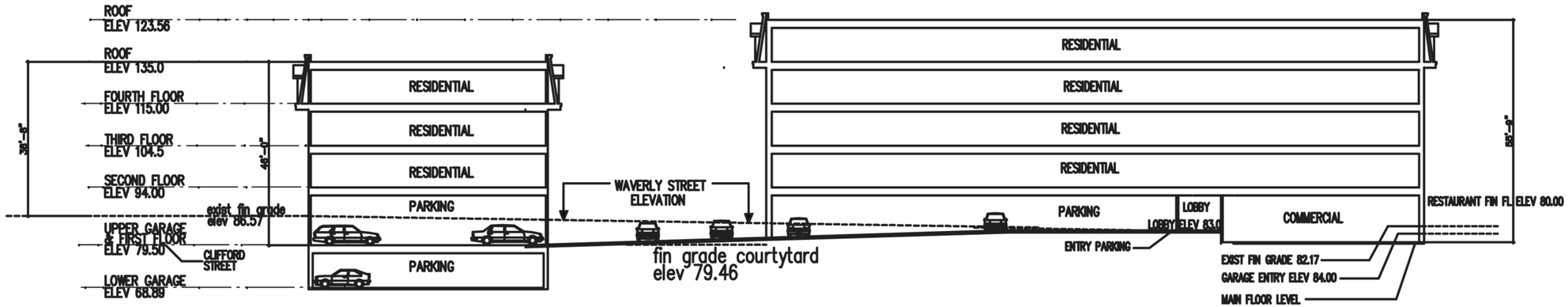
FIGURE 3.1-10: CLIFFORD ST & WARREN ST ELEVATION

MICHEAL WASHINGTON ARCHITECTS INC.
891 CENTRE STREET, JAMAICA PLAIN, MA 02130

280 - 290 WARREN STREET

CRUZ DEVELOPMENT CORPORATION
ONE JOHN ELIOT SQUARE, ROXBURY , MA 02119

FIGURE 3.1-11: TYPICAL SECTION



PHASE I BUILDING
FROM WAVERLY ST

PHASE II BUILDING
FROM WAVERLY ST.

MICHEAL WASHINGTON ARCHITECTS INC. 891 CENTRE STREET, JAMAICA PLAIN, MA 02130	**280 - 290 WARREN STREET**	**CRUZ DEVELOPMENT CORPORATION** ONE JOHN ELIOT SQUARE, ROXBURY , MA 02119

FIGURE 3.1-12: PERSPECTIVE FROM OPPOSITE SIDE OF WARREN ST

PERSPECTIVE FROM WARREN STREET AND DALE STREET

FIGURE 3.1-12: PERSPECTIVE FROM OPPOSITE SIDE OF WARREN ST

PERSPECTIVE FROM WARREN STREET AND DALE STREET

MICHEAL WASHINGTON ARCHITECTS INC.

891 CENTRE STREET, JAMAICA PLAIN, MA 02130

280 - 290 WARREN STREET

CRUZ DEVELOPMENT CORPORATION

ONE JOHN ELIOT SQUARE, ROXBURY , MA 02119

FIGURE 3.1-13: PERSPECTIVE FROM WARREN ST & WAVERLY ST

PERSPECTIVE FROM WARREN STREET AND WAVERLY STREET

MICHEAL WASHINGTON ARCHITECTS INC.

891 CENTRE STREET, JAMAICA PLAIN, MA 02130

280 - 290 WARREN STREET

CRUZ DEVELOPMENT CORPORATION

ONE JOHN ELIOT SQUARE, ROXBURY , MA 02119

FIGURE 3.1-13: PERSPECTIVE FROM WARREN ST & WAVERLY ST

PERSPECTIVE FROM WARREN STREET AND WAVERLY STREET

MICHEAL WASHINGTON ARCHITECTS INC.

891 CENTRE STREET, JAMAICA PLAIN, MA 02130

280 - 290 WARREN STREET

CRUZ DEVELOPMENT CORPORATION

ONE JOHN ELIOT SQUARE, ROXBURY , MA 02119

FIGURE 3.1-14: PERSPECTIVE FROM COURTYARD ENTRY

Figure 3.1-15A. LEED for Homes Mid-Rise Project Checklist

for Homes

Builder Name:	***Cruz Development***
Project Team Leader (if different):	***Micheal Washington, Micheal Washington Architects***
Home Address (Street/City/State):	***Warren Street, Roxbury, MA***

Project Description:

Building type: ***Mid-rise multi-family*** # of stories: ***5***

# of units: ***91*** Avg. Home Size Adjustment: ***-8.5***

Adjusted Certification Thresholds

Certified: ***36.5*** Gold: ***66.5***

Silver: ***51.5*** Platinum: ***81.5***

Project Point Total

Prelim: ***58 + 8.5 maybe pts*** Final: ***13.5***

Certification Level

Prelim: ***Silver*** Final: ***Not Certified***

Final Credit Category Total Points

ID: 0 ***SS: 4*** ***EA: 7*** ***EQ: 0***

LL: 0 ***WE: 0*** ***MR: 2.5*** ***AE: 0***

Minimum Point Thresholds Not Met for Final Rating

date last updated :

last updated by :

					Max Pts	Project Points Preliminary			Final
Innovation and Design Process (ID)			(No Minimum Points Required)		Max	Y/Pts	Maybe	No	Y/Pts
1. Integrated Project Planning		1.1	Preliminary Rating		Prereq	Y			
		1.2	Energy Expertise for MID-RISE		Prereq	Y			
		1.3	Professional Credentialed with Respect to LEED for Homes		1	0	0		0
		1.4	Design Charrette		1	0	0		0
		1.5	Building Orientation for Solar Design		1	0	0		0
		1.6	Trades Training for MID-RISE		1	0	0		0
2. Durability Management Process		2.1	Durability Planning		Prereq	Y			
		2.2	Durability Management		Prereq	Y			
		2.3	Third-Party Durability Management Verification		3	3	0		0
3.Innovative or Regional Design	✎	3.1	Innovation #1 _____		1	0	0		0
	✎	3.2	Innovation #2 _____		1	0	0		0
	✎	3.3	Innovation #3 _____		1	0	0		0
	✎	3.4	Innovation #4		1	0	0		0
				Sub-Total for ID Category:	**11**	3	0		0
Location and Linkages (LL)			(No Minimum Points Required)	*OR*	Max	Y/Pts	Maybe	No	Y/Pts
1. LEED ND		1	LEED for Neighborhood Development	**LL2-6**	10	0	0		0
2. Site Selection	✎	2	Site Selection		2	2	0		0
3. Preferred Locations		3.1	Edge Development		1	0	0		0
		3.2	Infill	**LL 3.1**	2	2	0		0
		3.3	Brownfield Redevelopment for MID-RISE		1	0	0		0
4. Infrastructure		4	Existing Infrastructure		1	1	0		0
5. Community Resources/ Transit		5.1	Basic Community Resources for MID-RISE		1	0	0		0
		5.2	Extensive Community Resources for MID-RISE	**LL 5.1, 5.3**	2	0	0		0
		5.3	Outstanding Community Resources for MID-RISE	**LL 5.1, 5.2**	3	3	0		0
6. Access to Open Space		6	Access to Open Space		1	1	0		0
				Sub-Total for LL Category:	**10**	9	0		0
Sustainable Sites (SS)			(Minimum of 5 SS Points Required)	*OR*	Max	Y/Pts	Maybe	No	Y/Pts
1. Site Stewardship		1.1	Erosion Controls During Construction		Prerequisite	Y			
		1.2	Minimize Disturbed Area of Site for MID-RISE		1	1	0		0
2. Landscaping	✎	2.1	No Invasive Plants		Prerequisite	Y			
	✎	2.2	Basic Landscape Design	**SS 2.5**	1	1	0		0
	✎	2.3	Limit Conventional Turf for MID-RISE	**SS 2.5**	2	1	1		0
	✎	2.4	Drought Tolerant Plants for MID-RISE	**SS 2.5**	1	1	0		0
	✎	2.5	Reduce Overall Irrigation Demand by at Least 20% for MID-RISE		3	0	0		0
3. Local Heat Island Effects	✎	3.1	Reduce Site Heat Island Effects for MID-RISE		1	0	1		0
	✎	3.2	Reduce Roof Heat Island Effects for MID-RISE		1	1	0		0
4. Surface Water Management	✎	4.1	Permeable Lot for MID-RISE		2	0	2		0
		4.2	Permanent Erosion Controls		1	0	0		0
	✎	4.3	Stormwater Quality Control for MID-RISE		2	0	2		0
5. Nontoxic Pest Control		5	Pest Control Alternatives		2	1.5	0.5		0
6. Compact Development		6.1	Moderate Density for MID-RISE		2	0	0		0
		6.2	High Density for MID-RISE	**SS 6.1, 6.3**	3	0	0		0
		6.3	Very High Density for MID-RISE	**SS 6.1, 6.2**	4	4	0		4
7. Alternative Transportation		7.1	Public Transit for MID-RISE		2	2	0		0
		7.2	Bicycle Storage for MID-RISE		1	1	0		0
		7.3	Parking Capacity/Low-Emitting Vehicles for MID-RISE		1	0	1		0
				Sub-Total for SS Category:	**22**	13.5	7.5		4

Figure 3.1-15B. LEED for Homes Mid-rise Project Checklist (continued)

					Max Pts	Project Points Preliminary			Final
Water Efficiency (WE)			(Minimum of 3 WE Points Required)	*OR*	Max	Y/Pts	Maybe	No	Y/Pts
1. Water Reuse	✎	1	Water Reuse for MID-RISE		5	0	0		0
2. Irrigation System	✎	2.1	High Efficiency Irrigation System for MID-RISE	**WE 2.2**	2	0	0		0
	✎	2.2	Reduce Overall Irrigation Demand by at Least 45% for MID-RISE		2	0	0		0
3. Indoor Water Use		3.1	High-Efficiency Fixtures and Fittings		3	1	0		0
		3.2	Very High Efficiency Fixtures and Fittings		6	4	0		0
		3.3	Water Efficient Appliances for MID-RISE		2	1	1		0
			Sub-Total for WE Category:		**15**	6	1		0
Energy and Atmosphere (EA)			(Minimum of 0 EA Points Required)	*OR*	Max	Y/Pts	Maybe	No	Y/Pts
1. Optimize Energy Performance		1.1	Minimum Energy Performance for MID-RISE		Prereq	Y			
		1.2	Testing and Verification for MID-RISE		Prereq	Y			
		1.3	Optimize Energy Performance for MID-RISE		34	7	0		7
7. Water Heating	✎	7.1	Efficient Hot Water Distribution		2	0	0		0
		7.2	Pipe Insulation		1	0	0		0
11. Residential Refrigerant		11.1	Refrigerant Charge Test		Prereq	Y			
Management		11.2	Appropriate HVAC Refrigerants		1	1	0		0
			Sub-Total for EA Category:		**38**	8	0		7
Materials and Resources (MR)			(Minimum of 2 MR Points Required)	*OR*	Max	Y/Pts	Maybe	No	Y/Pts
1. Material-Efficient Framing		1.1	Framing Order Waste Factor Limit		Prereq	Y			
		1.2	Detailed Framing Documents	**MR 1.5**	1	0	0		0
		1.3	Detailed Cut List and Lumber Order	**MR 1.5**	1	0	0		0
		1.4	Framing Efficiencies	**MR 1.5**	3	0	0		0
		1.5	Off-site Fabrication		4	4	0		0
2. Environmentally Preferable	✎	2.1	FSC Certified Tropical Wood		Prereq	Y			
Products	✎	2.2	Environmentally Preferable Products		8	2	0		0
3. Waste Management		3.1	Construction Waste Management Planning		Prereq	Y			
		3.2	Construction Waste Reduction		3	2.5	0		2.5
			Sub-Total for MR Category:		**16**	8.5	0		2.5
Indoor Environmental Quality (EQ)			(Minimum of 6 EQ Points Required)	*OR*	Max	Y/Pts	Maybe	No	Y/Pts
2. Combustion Venting		2	Basic Combustion Venting Measures		Prereq	Y			
3. Moisture Control		3	Moisture Load Control		1	0	0		0
4. Outdoor Air Ventilation	✎	4.1	Basic Outdoor Air Ventilation for MID-RISE		Prereq	Y			
		4.2	Enhanced Outdoor Air Ventilation for MID-RISE		2	0	0		0
		4.3	Third-Party Performance Testing for MID-RISE		1	1	0		0
5. Local Exhaust	✎	5.1	Basic Local Exhaust		Prerequisite	Y			
		5.2	Enhanced Local Exhaust		1	1	0		0
		5.3	Third-Party Performance Testing		1	0	0		0
6. Distribution of Space	✎	6.1	Room-by-Room Load Calculations		Prereq	Y			
Heating and Cooling		6.2	Return Air Flow / Room by Room Controls		1	0	0		0
		6.3	Third-Party Performance Test / Multiple Zones		2	0	0		0
7. Air Filtering		7.1	Good Filters		Prereq	Y			
		7.2	Better Filters	**EQ 7.3**	1	0	0		0
		7.3	Best Filters		2	0	0		0
8. Contaminant Control	✎	8.1	Indoor Contaminant Control during Construction		1	1	0		0
		8.2	Indoor Contaminant Control for MID-RISE		2	1	0		0
	✎	8.3	Preoccupancy Flush		1	0	0		0
9. Radon Protection	✎	9.1	Radon-Resistant Construction in High-Risk Areas		Prereq	Y			
	✎	9.2	Radon-Resistant Construction in Moderate-Risk Areas		1	1	0		0
10. Garage Pollutant Protection		10.1	No HVAC in Garage for MID-RISE		Prereq	Y			
		10.2	Minimize Pollutants from Garage for MID-RISE	**EQ 10.3**	2	2	0		0
		10.3	Detached Garage or No Garage for MID-RISE		3	0	0		0
11. ETS Control		11	Environnmental Tobacco Smoke Reduction for MID-RISE		1	1	0		0
12. Compartmentalization		12.1	Compartmentalization of Units		Prereq	Y			
of Units		12.2	Enhanced Compartmentalization of Units		1	0	0		0
			Sub-Total for EQ Category:		**21**	8	0		0
Awareness and Education (AE)			(Minimum of 0 AE Points Required)		Max	Y/Pts	Maybe	No	Y/Pts
1. Education of the	✎	1.1	Basic Operations Training		Prereq	Y			
Homeowner or Tenant	✎	1.2	Enhanced Training		1	0	0		0
		1.3	Public Awareness		1	1	0		0
2. Education of Building Manager	✎	2	Education of Building Manager		1	1	0		0
			Sub-Total for AE Category:		**3**	2	0		0

4.0 ENVIRONMENTAL PROTECTION COMPONENT

4.1 Shadow Impacts Analysis

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 summer solstice.

4.1.1 Vernal Equinox (March 21)

Figures 4-1 through **4-3** depict shadows on March 21.

At 9:00 AM, shadows are cast in a northwesterly direction onto portions of Warren Street. There are no shadows on the façade of the residential structures adjacent to the site **(Figure 4-1).**

At 12:00 Noon, shadows are cast in the northerly direction onto portions of Waverly Street **(Figure 4-2).**

At 3:00 PM, shadow from the project is cast northeasterly across Waverly Street onto adjacent residential structures on the north side of the street up to the 2nd floor. (Figure 4.1-3)

4.1.2 Summer Solstice (June 21)

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

At 9:00 AM, shadows are cast in a northwesterly direction onto portions of Warren Street and Clifford Street (**Figure 4-4**).

At 12:00 Noon, shadows are cast in the northwesterly direction onto a portion Waverly Street (**Figure 4-5**).

At 3:00 PM, shadows from the project are cast northeasterly across onto Waverly Street and slightly north onto the residential structures adjacent to the site (**Figure 4-6**).

At 6:00 PM, overall neighborhood shadows are long. New shadows from the project are cast easterly across Waverly Street and southeasterly onto the residential structures on the north side of Clifford Street (**Figure 4-7**).

4.1.3 Autumnal Equinox (September 21)

Figures 4-8 through **4-11** depict shadow impacts on September 21.

At 9:00 AM, shadows are cast in a northwesterly direction onto portions of Warren Street. There are no shadows on the façade of the residential adjacent to the site (**Figure 4-8**).

At 12:00 Noon, shadows are cast in the northerly direction onto portions of Waverly Street (**Figure 4-9**).

At 3:00 PM, shadow from the project is cast northeasterly across Waverly Street onto adjacent residential structures on the north side of the street up to the 2nd floor (**Figure 4-10**).

At 6:00 PM, new shadows from the project are cast easterly across Waverly Street and on the houses adjacent to the site and the structures on the east side of Waverly Street (**Figure 4-11**).

4.1.4 Winter Solstice (December 21)

Figures 4-11 through **4-14** depict shadow impacts on December 21. Winter sun casts the longest shadows of the year.

At 9:00 AM, shadows are cast in a northwesterly direction and cover a portion of Warren Street and Waverly Street (**Figure 4-12**).

At 12:00 Noon, shadows are cast in the northerly direction across portions of Waverly Street onto the occupied residential building and a small portion of the ATT building across the street (**Figure 4-13**).

At 3:00 PM, shadows from the project are cast northeasterly across Waverly Street onto larger portions of occupied residential building and the ATT building across the Waverly Street. (**Figure 4-14**).

4.1.5 Summary

New shadow is generally limited to the streets surrounding the Site. Although late afternoon and evening shadows will extend in a northeasterly direction toward the residential building adjacent to the site and the commercial building on the easterly side of Waverly Street, there is almost no impact on the East Boston Greenway to the south of the Proposed Project. Overall, the Project's shadow impacts will be consistent with current patterns and will not adversely impact the Project Site and surrounding areas.

FIGURE 4-1 MARCH 21 - 9AM

AZIMUTH 125.7 - ALTITUDE 33

Spring Equinox:

MARCH 21 @ 9:00am

MICHEAL WASHINGTON ARCHITECTS INC. 891 CENTRE STREET, JAMAICA PLAIN, MA 02130	**280 - 290 WARREN STREET**	**CRUZ DEVELOPMENT CORPORATION** ONE JOHN ELIOT SQUARE, ROXBURY , MA 02119

FIGURE 4-2 MARCH 21 - 12PM

AZIMUTH -176.9 - ALTITUDE 48

Spring Equinox:

MARCH 21 @ 12:00pm

MICHEAL WASHINGTON ARCHITECTS INC. 891 CENTRE STREET, JAMAICA PLAIN, MA 02130	**280 - 290 WARREN STREET**	**CRUZ DEVELOPMENT CORPORATION** ONE JOHN ELIOT SQUARE, ROXBURY , MA 02119

FIGURE 4-3 MARCH 21 - 3PM

AZIMUTH -121.8 - ALTITUDE 30.5

Spring Equinox:

MARCH 21 @ 3:00pm

MICHEAL WASHINGTON ARCHITECTS INC. 891 CENTRE STREET, JAMAICA PLAIN, MA 02130	**280 - 290 WARREN STREET**	**CRUZ DEVELOPMENT CORPORATION** ONE JOHN ELIOT SQUARE, ROXBURY , MA 02119

FIGURE 4-4 JUNE 21 - 9AM

AZIMUTH 93.5 - ALTITUDE 39.9

Summer Solstice:

JUNE 21 @ 9:00am

MICHEAL WASHINGTON ARCHITECTS INC. 891 CENTRE STREET, JAMAICA PLAIN, MA 02130	**280 - 290 WARREN STREET**	**CRUZ DEVELOPMENT CORPORATION** ONE JOHN ELIOT SQUARE, ROXBURY , MA 02119

FIGURE 4-5 JUNE 21 - 12PM

AZIMUTH 149.4 - ALTITUDE 68.8

Summer Solstice:

JUNE 21 @ 12:00pm

MICHEAL WASHINGTON ARCHITECTS INC. 891 CENTRE STREET, JAMAICA PLAIN, MA 02130	**280 - 290 WARREN STREET**	**CRUZ DEVELOPMENT CORPORATION** ONE JOHN ELIOT SQUARE, ROXBURY , MA 02119

FIGURE 4-6 JUNE 21 - 3PM

AZIMUTH -113.7 - ALTITUDE 56.5

Summer Solstice:

JUNE 21 @ 3:00pm

N

MICHEAL WASHINGTON ARCHITECTS INC. 891 CENTRE STREET, JAMAICA PLAIN, MA 02130	**280 - 290 WARREN STREET**	**CRUZ DEVELOPMENT CORPORATION** ONE JOHN ELIOT SQUARE, ROXBURY , MA 02119

FIGURE 4-7 JUNE 21 - 6PM

AZIMUTH -79.3 - ALTITUDE 23.9

Summer Solstice:

JUNE 21 @ 6:00pm

N

MICHEAL WASHINGTON ARCHITECTS INC. 891 CENTRE STREET, JAMAICA PLAIN, MA 02130	**280 - 290 WARREN STREET**	**CRUZ DEVELOPMENT CORPORATION** ONE JOHN ELIOT SQUARE, ROXBURY , MA 02119

FIGURE 4-8 SEPTEMBER 21 - 9AM

AZIMUTH 115.3 - ALTITUDE 25.9

Autumnal Equinox:

SEPTEMBER 21 @ 9:00am

MICHEAL WASHINGTON ARCHITECTS INC. 891 CENTRE STREET, JAMAICA PLAIN, MA 02130	**280 - 290 WARREN STREET**	**CRUZ DEVELOPMENT CORPORATION** ONE JOHN ELIOT SQUARE, ROXBURY , MA 02119

FIGURE 4-9 SEPTEMBER 21 - 12PM

AZIMUTH 166.0 - ALTITUDE 47.4

Autumnal Equinox:

SEPTEMBER 21 @ 12:00pm

MICHEAL WASHINGTON ARCHITECTS INC.
891 CENTRE STREET, JAMAICA PLAIN, MA 02130

280 - 290 WARREN STREET

CRUZ DEVELOPMENT CORPORATION
ONE JOHN ELIOT SQUARE, ROXBURY , MA 02119

FIGURE 4-10 SEPTEMBER 21 - 3PM

AZIMUTH -132.9 - ALTITUDE 37.4

Autumnal Equinox:

SEPTEMBER 21 @ 3:00pm

MICHEAL WASHINGTON ARCHITECTS INC. 891 CENTRE STREET, JAMAICA PLAIN, MA 02130	**280 - 290 WARREN STREET**	**CRUZ DEVELOPMENT CORPORATION** ONE JOHN ELIOT SQUARE, ROXBURY , MA 02119

FIGURE 4-11 SEPTEMBER 21 - 6PM

AZIMUTH -96.0 - ALTITUDE 7.3

Autumnal Equinox:

SEPTEMBER 21 @ 6:00pm

N

MICHEAL WASHINGTON ARCHITECTS INC. 891 CENTRE STREET, JAMAICA PLAIN, MA 02130	**280 - 290 WARREN STREET**	**CRUZ DEVELOPMENT CORPORATION** ONE JOHN ELIOT SQUARE, ROXBURY , MA 02119

FIGURE 4-12 DECEMBER 21 - 9AM

AZIMUTH 141.9 - ALTITUDE 14.2

Winter Solstice:

DECEMBER 21 @ 9:00am

N

MICHEAL WASHINGTON ARCHITECTS INC. 891 CENTRE STREET, JAMAICA PLAIN, MA 02130	**280 - 290 WARREN STREET**	**CRUZ DEVELOPMENT CORPORATION** ONE JOHN ELIOT SQUARE, ROXBURY , MA 02119

FIGURE 4-13 DECEMBER 21 - 12PM

AZIMUTH -175.6 - ALTITUDE 24.1

Winter Solstice:

DECEMBER 21 @ 12:00pm

MICHEAL WASHINGTON ARCHITECTS INC. 891 CENTRE STREET, JAMAICA PLAIN, MA 02130	**280 - 290 WARREN STREET**	**CRUZ DEVELOPMENT CORPORATION** ONE JOHN ELIOT SQUARE, ROXBURY , MA 02119

FIGURE 4-14 DECEMBER 21 - 3PM

AZIMUTH -135.1 - ALTITUDE 10

Winter Solstice:

DECEMBER 21 @ 3:00pm

MICHEAL WASHINGTON ARCHITECTS INC. 891 CENTRE STREET, JAMAICA PLAIN, MA 02130	**280 - 290 WARREN STREET**	**CRUZ DEVELOPMENT CORPORATION** ONE JOHN ELIOT SQUARE, ROXBURY , MA 02119

4.2 Air Quality

Tech Environmental, Inc. performed air quality analyses for the Proposed Project (the "Project") to be located at 280-290 Warren Street in Roxbury, MA. These analyses consisted of: 1) an evaluation of existing air quality; 2) an evaluation of potential carbon monoxide (CO) impacts from the operation of the Project's parking garages, and 3) an analysis to determine whether the project meets the BRA criteria for requiring a microscale CO analysis.

4.2.1 Existing Air Quality

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

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

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

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

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

P = primary standard; S = secondary standard.
[a] 99th percentile 1-hour concentrations in a year (average over three years).
[b] One exceedance per year is allowed.
[c] 98th percentile 1-hour concentrations in a year (average over three years).
[d] 98th percentile 24-hour concentrations in a year (average over three years).
[e] Three-year average of annual arithmetic means.
[f] As of March 18, 2013, the U.S. EPA lowered the $PM_{2.5}$ annual standard from 15 ug/m^3 to 12 ug/m^3.
[g] Three-year average of the annual 4th-highest daily maximum 8-hour ozone concentration must not exceed 0.070 ppm (138 ug/m^3) (effective October 28, 2015) and the annual PM_{10} standard was revoked in 2006.

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

Pollutant, Averaging Period	Monitor Location	Value (□g/m^3)	NAAQS (□g/m^3)	Percent of NAAQS
CO, 1-hour	Harrison Avenue, Boston	2,519	40,000	6%
CO, 8-hour	Harrison Avenue, Boston	1,832	10,000	18%
NO_2, 1-hour	Harrison Avenue, Boston	90.9	188	48%
NO_2, Annual	Harrison Avenue, Boston	32.8	100	33%
Ozone, 8-hour	Harrison Avenue, Boston	125	138	91%
PM_{10}, 24-hour	Harrison Avenue, Boston	37	150	25%
$PM_{2.5}$, 24-hour	Harrison Avenue, Boston	16.4	35	47%
$PM_{2.5}$, Annual	Harrison Avenue, Boston	7.2	12	60%
Lead, Quarterly	Harrison Avenue, Boston	0.014	1.5	1.1%
SO_2, 1-hour	Harrison Avenue, Boston	30.8	196	16%

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

Notes:

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

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

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

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

4.2.2 Parking Garages

The Project also includes two parking garages designed to provide parking spaces for 72 vehicles at the Waverly Street entrance garage and 30 vehicles at the Clifford Street entrance garage . An analysis of the worst-case air quality impacts from the proposed parking garage was performed (see **Appendix B**). The procedures used for this analysis are consistent with U.S. EPA's Volume 9 guidance.[1]

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

The objective of this analysis was to determine the maximum CO concentrations inside the garage and at the closest sensitive receptors surrounding the Project. These closest sensitive receptors include: nearby existing buildings and pedestrians at ground level anywhere near the Project. CO emissions from motor vehicles operating inside the garage were calculated and the CO concentrations inside the garage and surrounding the Project were based on morning and afternoon peak traffic periods. The parking garages CO emissions were modeled using an U.S. EPA-approved air model.

Garage Ventilation System

The proposed parking garage will require mechanical ventilation. The garage ventilation system will be designed to provide adequate dilution of the motor vehicle emissions before they are vented outside. The design of the garage ventilation system will meet all building code requirements. Full ventilation of the Waverly Street entrance garage and Clifford Street entrance garage will require a maximum flow of approximately 6,100 and 28,200 cubic feet per minute (cfm) of fresh air, respectively. This quantity of air is designed to meet the building code and will be more than adequate to dilute the emissions inside the parking garage to safe levels before they are vented outside. The garage ventilation exhaust will likely be located at the rooftop.

Peak Garage Traffic Volumes

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

Table 4.2-3 Peak-Hour Garage Traffic Volumes

Garage Location	Period	Entering (vehicles/hour)	Exiting (vehicles/hour)	Total (vehicles/hour)
Waverly Street Entrance Garage	AM Peak Hour	11	1	12
	PM Peak Hour	16	1	17
Clifford Street Entrance Garage	AM Peak Hour	1	15	16
	PM Peak Hour	2	17	19

Source: Howard Stein Hudson

Motor Vehicle Emission Rates

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

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

Peak Garage CO Emission Rate and CO Concentration Inside the Garage

The peak one-hour CO emission rate for the Waverly Street entrance garage was calculated to be 0.0101 grams/second for the morning peak hour and 0.0143 grams per second for the afternoon peak hour. The peak one-hour CO emission rate for the Clifford Street entrance garage was calculated to be 0.0452 grams/second for the morning peak hour and 0.0537 grams/second for the afternoon peak hour Applying the maximum volumetric garage ventilation flow rate for the parking garages, the peak one-hour CO concentration inside the Waverly Street garage was calculated to be 3.08 parts of CO per million parts of air (ppm) for the morning and 4.36 ppm of CO for the afternoon peak hour. The peak one-hour CO concentration inside the Clifford Street garage was calculated to be 2.97 ppm of CO for the morning peak hour and 3.52 ppm of CO for the afternoon peak hour. These predictions represent conservative estimates of the peak garage CO emissions and concentrations.

Peak Ambient CO Concentration

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

The AERMOD model in screening-mode was used to predict the maximum concentration of CO by modeling the parking garages emissions as volume sources using worst-case meteorological conditions for an urban area. The screening-mode option simulates modeling results predicted by AERMOD. The predicted concentrations presented here represent the worst-case air quality

impacts from the parking garages at all locations around the Project. AERMOD predicted one-hour average concentrations of air pollutants.

AERMOD predicted that the maximum one-hour CO concentration from the parking garages will be 0.07 ppm (87.38 $\mu g/m^3$). This concentration represents the maximum CO concentration at any location surrounding the Project. AERSCREEN guidance allows the maximum eight-hour CO impact to be conservatively estimated by multiplying the maximum one-hour impact by a factor of 0.9 (i.e. the eight-hour impact is 90% of the one-hour impact). The maximum predicted eight-hour CO concentration was determined to be approximately 0.063 ppm (0.07 ppm x 0.9).

The U.S. EPA has established National Ambient Air Quality Standards (NAAQS) to protect the public health and welfare in ambient air, with a margin for safety. The NAAQS for CO are 35 ppm for a one-hour average and 9 ppm for an eight-hour average. The Commonwealth of Massachusetts has established the same standards for CO. Conservative, urban CO background values of 1.8 ppm for a one-hour period and 1.5 ppm for an eight-hour period were added to the maximum predicted garage ambient impacts to represent the CO contribution from other, more distant, sources. With the conservative background concentration added, the peak, total, one-hour and eight-hour CO impacts from the parking garages, at any location around the Project, will be no larger than 1.56 ppm and 1.87 ppm, respectively. These maximum predicted total CO concentrations (garage exhaust impacts plus background) are safely in compliance with the NAAQS. This analysis demonstrates that the operation of the parking garage will not have an adverse impact on air quality.

Table 4.2-4 Peak Predicted Parking Garage Air Quality Impacts

Location	Peak Predicted One-Hour Impact (ppm)	One-Hour NAAQS (ppm)	Peak Predicted Eight-Hour Impact (ppm)	Eight-Hour NAAQS (ppm)
Outside – Surrounding the Building* (Parking Garage)	1.870	35 (NAAQS)	1.563	9 (NAAQS)

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

4.2.3 Microscale CO Analysis for Selected Intersections

The Boston Redevelopment Authority (BRA) and the Massachusetts DEP typically require a microscale air quality analysis for any intersection in the Project study area where the level of service (LOS) is expected to deteriorate to D and the proposed project causes a 10% increase in traffic or where the level of service is E or F and the project contributes to a reduction in LOS.

For such intersections, a microscale air quality analysis is required to examine the carbon monoxide (CO) concentrations at sensitive receptors near the intersection.

A microscale air quality analysis was not performed for this Project due to the Project trip generation having minimal impacts on the overall delays at the four intersections. The Project will generate approximately 28 motor vehicle trips during the morning peak traffic hour and approximately 36 motor vehicle trips during the afternoon traffic hour. Under the Build scenario, the overall LOS will be the same during the morning peak traffic hour for all intersections. Under the Build scenario, the overall LOS will be the same during the afternoon peak traffic hour for all intersections. **Table 4.2-4** shows a comparison of the Existing (2015) and Build (2020) LOS at the five intersections. The motor vehicle traffic generated by the Project will not have a significant impact on air quality at any intersection in the Project area and a microscale air quality analysis is not necessary for this Project.

Table 4.2-4 Summary of Build Case Level of Service

Intersection	Existing LOS (AM/PM)	Build LOS (AM/PM)	Requires Analysis?
Warren Street & Dale Street/Clifford Street - signalized	C/C	C/C	NO
Warren Street & Waverly Street/Copeland Street - signalized	A/B	A/B	NO
Blue Hill Avenue/Waverly Street - unsignalized	A/A	A/A	NO
Blue Hill Avenue/Clifford Street	D/B	D/B	NO
Blue Hill Avenue/Julian Street	A/A	A/A	NO

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

Source: Howard Stein Hudson

Conclusions

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

4.3 Noise Impacts

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

4.3.1 Common Measures of Community Noise

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

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

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

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

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

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

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

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

4.3.2 Noise Regulations

Commonwealth Noise Policy

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

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

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

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

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

Local Regulations

The City of Boston Environment Department regulates noise through the Regulations for the Control of Noise as administered by the Air Pollution Control Commission. The Project is located in an area consisting of commercial and residential uses. The Project will have low-rise residential uses to the north, east, west, and south. The Project must comply with Regulation 2.2 for noise levels in Residential Zoning Districts at these residential locations**. Table 4.3-3** lists the maximum allowable octave band and broadband sound pressure levels for residential and business districts. Daytime is defined by the City of Boston Noise Regulations as occurring

between the hours of 7:00 a.m. and 6:00 p.m. daily except Sunday. Compliance with the most restrictive nighttime residential limits will ensure compliance for other land uses with equal or higher noise limits.

Table 4.3-2 Common Indoor and Outdoor Sound Levels

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

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

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

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

4.3.3 Pre-Construction Sound Level Measurements

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

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

Monitoring Location #1: 21 Clifford St.

Monitoring Location #2: Warren & Dale St.

Monitoring Location #3: 20 Waverly St.

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

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

The sound level monitoring was conducted on Thursday, May 26, 2016. Weather conditions during the sound survey were conducive to accurate sound level monitoring: the temperature ranged from 70^{o}F to 72^{o}F, the skies were mostly clear, and the winds were 0 to 5 mph. The microphone of the sound level analyzer was fitted with a 3-inch windscreen to negate any effects of wind-generated noise.

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

The results of the nighttime baseline sound level measurements are presented in **Table 4.3-4**, and the complete measurement printouts are provided in **Appendix C**. The nighttime background L_{90} level was 44.5 dBA at Location #1, 45.7 dBA at Location #2, and 45.2 dBA at Location #3. The octave band data in **Table 4.3-4** show that no pure tones were detected in the nighttime noise measurements.

Table 4.3-4 Nighttime Baseline Sound Level Measurements, May 26, 2016

Sound Level Measurement	(Location #1) Clifford St. 12:05 a.m. - 12:35 a.m.	(Location #2) Warren & Dale St. 12:40 a.m. - 1:10 a.m.	(Location #3) Waverly St. 1:16 a.m. – 1:46 a.m.
Broadband (dBA)			
Background (L_{90})	44.5	45.7	45.2
Octave Band L_{90} (dB)			
16 Hz	50.2	50.0	50.2
32 Hz	53.4	55.7	53.7
63 Hz	53.5	56.2	55.4
125 Hz	50.2	52.8	54.4
250 Hz	46.7	45.0	48.4
500 Hz	42.1	41.8	42.6
1000 Hz	38.9	41.1	38.7
2000 Hz	36.4	38.2	35.3
4000 Hz	37.6	37.6	37.1
8000 Hz	40.6	40.5	40.4
16000 Hz	43.9	43.9	43.9
Pure Tone?	No	No	No

4.3.4 Reference Data and Candidate Mitigation Measures

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

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

- Residential Building (Residential Units): Seventy (51) Carrier Rooftop condenser units. For the Phase I building, and forty eight (48) Carrier Rooftop condenser units for the Phase II building.
- Residential Building (Common Area): Two (2) P125 Energy Recovery Rooftop units for the Phase I building, and one (1) P123 Energy Recovery Rooftop unit for the Phase II building.
- Residential Building (Garages): One (1) Garage exhaust fan, One (1) Garage supply fan for each building.

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

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

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

Noise Mitigation

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

4.3.5 Calculated Future Sound Levels

Methodology

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

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

Receptors

The closest/worst-case sensitive (residential) location is to the west of the project area at 6 Waverly Street. This location was selected based on the proximity of the equipment (smaller

[3] Cadna-A Computer Aided Noise Abatement Program, Version 4.6

distances correspond to larger noise impacts) and the amount of shielding by the project (residences further from the project will experience less shielding from the Project's rooftop mechanical equipment, which may result in larger potential noise impacts from the Project). This location is expected to receive the largest sound level impacts from the Project's rooftop mechanical equipment. It can be classified as a residential zone.

The sound level impacts from the building's mechanical equipment were predicted at the closest residential location, as well as additional residential uses to the north (2 & 6 Waverly Street), east (29 Waverly Street and 16 Clifford Street), south (300-304A Warren Street), and west (55-73 Kensington Park). Figure 1 in Appendix C shows the locations of the modeled noise receptors. Noise impacts at other nearby noise-sensitive locations (residences, parks, etc.) farther from the Project Site will be less than those predicted for these receptors.

4.3.6 Compliance with State and Local Noise Standards

The City of Boston and DEP noise standards apply to the operation of the mechanical equipment at the proposed Project. The details of the noise predictions are presented in **Tables 4.3-5** through **4.3-10**. The sound impact analysis includes the simultaneous operation of the Project's rooftop HVAC equipment. The predicted sound levels are worst-case predictions that represent all hours of the day, as the analysis assumes full operation of the mechanical equipment 24-hours a day. The typical sound level impacts from the mechanical equipment will likely be lower than what is presented here, since most of the mechanical equipment will operate at full-load only during certain times of the day and during the warmer months of the year, it is not likely that all of the mechanical equipment will operate at the same time. Sound level impacts at locations farther from the Project (e.g. other residences, etc.) will be lower than those presented in this report.

City of Boston Noise Standards

The noise impact analysis results, presented in **Tables 4.3-5** through **4.3-10**, reveal that the sound level impact at the upper floors of the closest residences will be between 36.4 and 41.9 dBA. The smallest sound level impact of 36.4 dBA is predicted to occur at 16 Clifford Street. The largest sound level impact of 41.9 dBA is predicted to occur at 6 Waverly Street. Noise impacts predicted at all locations are in compliance with the City of Boston's nighttime noise limit (50 dBA) for a residential area. Note that sound levels from the Project will be below the residential nighttime limits at all times. The results also demonstrate compliance with the City of Boston, residential, non-daytime, octave band noise limits at both closest locations.

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

Massachusetts DEP Noise Regulations

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

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

As shown in **Tables 4.3-5** through **4.3-10**, the Project is predicted to produce a less than 2 dBA change in the background sound levels at all modeled locations. Therefore, the Project's worst-case sound level impacts during the quietest nighttime periods will be in compliance with the Massachusetts DEP allowed noise increase of 10 dBA. The noise predictions for each octave band indicate that the mechanical equipment will not create a pure tone condition at any location.

Table 4.3-5 Estimated Future Sound Level Impacts – Anytime, 6 Waverly Street (Worst Case Residence) – Location R1

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	68
63 Hz	67	62
125 Hz	61	50
250 Hz	52	43
500 Hz	46	37
1000 Hz	40	35
2000 Hz	33	26
4000 Hz	28	17
8000 Hz	26	7
Broadband (dBA)	**50**	**42**
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L_{90} (Location #3)	45.2
280-290 Warren Street Project*	41.9
Calculated Combined Future Sound Level	46.9
Calculated Incremental Increase	+1.7
Compliance with DEP Noise Policy?	Yes

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

Table 4.3-6 Estimated Future Sound Level Impacts – Anytime, 2 Waverly Street – Location R2

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	63
63 Hz	67	58
125 Hz	61	47
250 Hz	52	39
500 Hz	46	34
1000 Hz	40	31
2000 Hz	33	23
4000 Hz	28	13
8000 Hz	26	1
Broadband (dBA)	**50**	**39**
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L_{90} (Location #1)	45.2
280-290 Warren Street Project*	38.5
Calculated Combined Future Sound Level	46.0
Calculated Incremental Increase	+0.8
Compliance with DEP Noise Policy?	Yes

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

Table 4.3-7 Estimated Future Sound Level Impacts – Anytime, 29 Waverly (closest property line) – Location R3

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	61
63 Hz	67	58
125 Hz	61	45
250 Hz	52	37
500 Hz	46	32
1000 Hz	40	29
2000 Hz	33	18
4000 Hz	28	12
8000 Hz	26	4
Broadband (dBA)	**50**	**37**
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L_{90} (Location #1)	44.5
280-290 Warren Street Project*	36.7
Calculated Combined Future Sound Level	45.2
Calculated Incremental Increase	+0.7
Compliance with DEP Noise Policy?	Yes

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

Table 4.3-8 Estimated Future Sound Level Impacts – Anytime, 55-73 Kensington Park – Location R4

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	61
63 Hz	67	56
125 Hz	61	46
250 Hz	52	39
500 Hz	46	33
1000 Hz	40	31
2000 Hz	33	24
4000 Hz	28	15
8000 Hz	26	2
Broadband (dBA)	**50**	**38**
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L_{90} (Location #1)	45.7
280-290 Warren Street Project*	37.7
Calculated Combined Future Sound Level	46.3
Calculated Incremental Increase	+0.6
Compliance with DEP Noise Policy?	Yes

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

Table 4.3-9 Estimated Future Sound Level Impacts – Anytime, 16 Clifford Street – Location R5

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	62
63 Hz	67	60
125 Hz	61	43
250 Hz	52	35
500 Hz	46	28
1000 Hz	40	27
2000 Hz	33	19
4000 Hz	28	15
8000 Hz	26	10
Broadband (dBA)	**50**	**36**
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L_{90} (Location #1)	44.5
280-290 Warren Street Project*	36.4
Calculated Combined Future Sound Level	45.1
Calculated Incremental Increase	+0.6
Compliance with DEP Noise Policy?	Yes

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

Table 4.3-10 Estimated Future Sound Level Impacts – Anytime, 300-304A Warren Street – Location R6

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	61
63 Hz	67	59
125 Hz	61	47
250 Hz	52	40
500 Hz	46	34
1000 Hz	40	31
2000 Hz	33	22
4000 Hz	28	14
8000 Hz	26	4
Broadband (dBA)	**50**	**39**
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L_{90} (Location #2)	44.5
280-290 Warren Street Project*	38.6
Calculated Combined Future Sound Level	45.5
Calculated Incremental Increase	+1.0
Compliance with DEP Noise Policy?	Yes

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

4.3.7 Conclusions

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

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

4.4 Stormwater Management and Water Quality

4.4.1 Stormwater Management

The Proposed Project will improve the quality of stormwater leaving this site. Under existing conditions, there are no known stormwater treatment features. The Project proposes a stormwater management program, designed per BWSC Site Plan requirements, which will provide pretreatment and infiltration, if feasible, prior to discharging stormwater to the drainage system. An operation and maintenance plan will be developed to support the long-term functionality of the proposed stormwater management system.

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

4.4.2 Water Quality Impact

The Proposed Project will not impact the water quality of nearby water bodies. Erosion and sediment control measures will be implemented during construction to minimize the discharge of site materials off-site and to BWSC systems. Erosion and sediment controls will include perimeter sediment barriers, catch basin protection, dewatering controls, and stone tracking pad. These controls will be maintained throughout construction until all disturbed areas have been stabilized.

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

4.5 Solid and Hazardous Waste Materials

4.5.1 Solid Waste

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

Upon completion of construction, the Proposed Project will generate approximately 139 tons of solid waste per year, based on the assumption that each residential unit generates 8 lbs of solid waste per day. Residential waste will be handled through a trash chute extending to all floors, and then compacted before being brought to the loading / unloading areas. The solid waste for the very limited commercial use will also be deposited in dumpster in the loading and unloading areas.

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

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

4.5.2 Hazardous Waste and Materials

GEI Consultants, Inc. completed an ASTM Phase I and II Environmental Assessment (ESA), on behalf of Cruz Development Corporation, for the property located at 2-10 Clifford Street. No other environmental assessments were available for other portions of the property.

Based on GEI's evaluation, one REC (Recognized Environmental Conditions), defined as evidence of past, current or future potential release of oil or hazardous materials (OHM) at 2-10 Clifford Street, as follows:

- The property was used as an automotive garage from approximately 1927 until at least 1964. According to historical documents, this limited portion of the Site formerly stored and used chemical products such as gasoline, denatured alcohol, lubricating oil, and kerosene as part of daily operations.

GEI also identified two HRECs (Historically Recognized Environmental Conditions) that has achieved regulatory closure without the use of required controls or conditions (e.g. Activity and Use Limitations [AULs], engineering controls, etc) at the 2-10 Clifford Street portion of the Site including:

- Removal of five underground storage tanks; and
- Release of oil to soil at nearby 26 Waverly Street, to the north across Waverly Street which achieved regulatory closure with a Permanent Solution. Although this site constitutes a HREC, GEI indicated that it was not expected to affect conditions at the 2-10 Clifford Street.

A Phase II ESA was completed along with Smith & Wessel Associates, Inc. to conduct a hazardous materials inspection at the 2-10 Clifford Street portion of the site. The results of this inspection indicated that minor lead paint and small amounts of asbestos were present in the building, with the cost to remediate these materials estimated at approximately $25,000.00.

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

4.6 Geotechnical/Groundwater Impacts Analysis

Based on a Preliminary Geotechnical Summary for the portion of the Site located 10 Clifford Street completed on January 4, 2016 by UTS of Massachusetts, Inc., the subgrade conditions are favorable for supporting the proposed building on a conventional spread footing foundation. The subgrade conditions will be dominated by Shallow Bedrock with deeper pockets of Glacial overburden. Bedrock conditions are expected to be encountered throughout most of the foundation construction depending upon final grading. Groundwater was encountered in the deeper borings at 10-11 feet below grade.

Construction mitigation measures will be incorporated into the Proposed Project to avoid any potential for ground movement and settlement. Additional geotechnical exploration and engineering is expected to be completed as the project design progresses.

4.7 Construction Impact

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

4.7.1 Construction Management Plan

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

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

4.7.2 Proposed Construction Program

Construction Activity Schedule

The construction period for the Proposed Project is expected to last approximately 20 months, beginning in the 1st Quarter 2018 for Phase 1 and reaching completion in the 4th Quarter 2020 for Phase 2. The City of Boston Noise and Work Ordinances will dictate the normal work hours, which will be from 7:00 AM to 6:00 PM, Monday through Friday. Saturday work will be only in the event of schedule delay or unusual tasks such as street openings, etc.

Perimeter Protection/Public Safety

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

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

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

4.7.3 Construction Traffic Impacts

Construction Vehicle Routes

Specific truck routes will be established with BTD through the CMPs. These established truck routes will prohibit truck travel on 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 transported via the major regional highway system including Warren Street directly to the site, passing through residential areas in Roxbury as little as possible.

Construction Worker Parking

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

Limited parking in designated areas of the Project Site and lay-down area(s) will be allowed. Parking will be discouraged in the immediate neighborhood. Further, given the Proposed

Project's close proximity to public transportation service (e.g., MBTA bus service) public transit use will be encouraged with the Proponent and general contractor working to ensure the construction workers are informed of the many public transportation options immediately adjacent to this area. Terms and conditions related to worker parking will be written into each subcontractor's contract. The general contractors will provide a weekly orientation with all new personnel to ensure enforcement of this policy.

Pedestrian Traffic

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

4.7.4 Construction Environmental Impacts and Mitigation

Construction Air Quality

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

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

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

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

Construction Noise Impacts

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

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

4.7.5 Rodent Control

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

4.7.6 Utility Protection During Construction

During construction, the City and the Commonwealth's infrastructure will be protected using sheeting and shoring, temporary relocations, and construction staging as required. See **Section 6.8** for additional information.

5.0 HISTORIC RESOURCES COMPONENT

The Proposed Project site is located in Roxbury. The historic resources within one-quarter-mile radius of the Proposed Project are summarized in **Table 5-1** below.

5.1 Historic Resources Within the Project Site

The Site is located in the Warren Street Corridor in Roxbury, between the Dudley Square and Grove Hall business district. The Site is also along a relatively flat section of Warren Street in a mixed-use commercial area adjoining a generally single-family and two-family residential neighborhood with some scattered multi-family apartment buildings. The Site has been used for various uses including the former Warren Theater (now church) at 270-272 Warren Street, former commercial building at 280-290 Warren Street, and a former automotive garage (for the former theatre) from 1927, when it was constructed, until at least 1964, and as a granite warehouse in recent years at 2-10 Clifford Street.

The Site has been used for various uses including the former Warren Theater (now church) at 270-272 Warren Street. The 270-272 Warren Street portion of the Site is also within the Moreland Street National Register (NR) Historic District, which includes 280 buildings in an area between Warren and Blue Hill Avenue, and Waverly and Alaska Streets in Roxbury. The former Warren Theater was constructed in 1926 to house vaudeville and silent movies. It is not clear whether the theater was in operation after 1983.

Outside of the NR District, the site also includes former commercial building at 280-290 Warren Street, and at 2-10 Clifford Street, a former automotive garage (for the former theatre) from its construction in 1927 until at least 1964, and as a granite warehouse in recent years.

A review of the Site history by GEI Consultants during the Phase I and II ASTM Environmental Site Assessment investigation in 2015, indicated that between 1888 and 1897 the 2-10 Clifford Street property was part of the Donald Kennedy Medicine Manufacturing Facility. According to Sanborn maps, these building were vacant by 1919, with the automobile garage constructed in 1927 to serve the adjoining theater.

5.2 Historic Resources Within the Vicinity of the Project Site

Abutters include the Verizon telecommunication building to the north along Clifford Street, residences on Clifford and Warren Streets, and residential/commercial buildings along Warren Street to the south and north.

The Proposed Project site is located within one-quarter mile of some historically significant residential and other properties. The Moreland Street Historic National Register (NR) District abuts the project site to the north, and the 270-272 Warren Street former theater building that is within the Site, is mapped within that NR district. See **Figure 5-1. Historic Resources.**

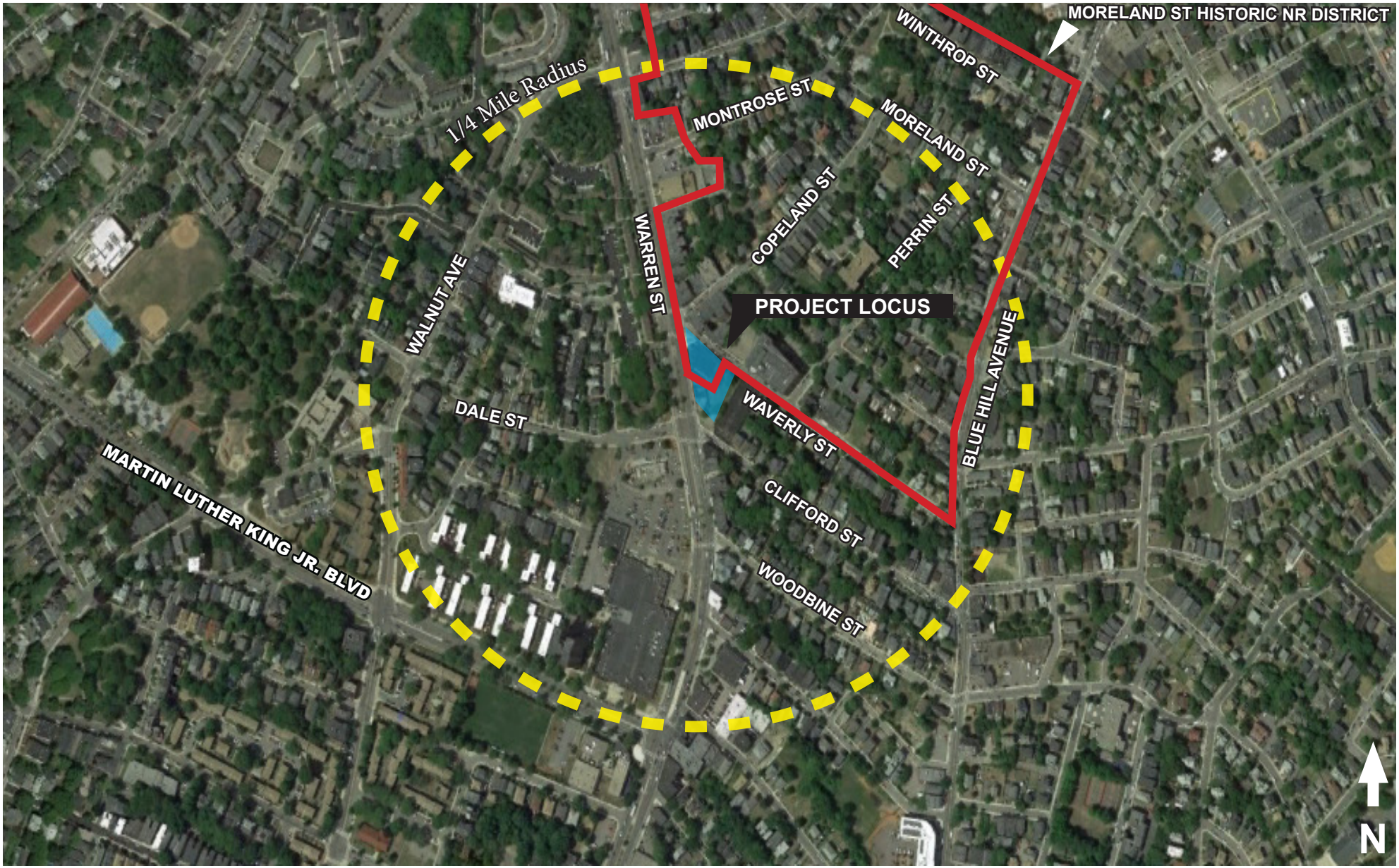


Figure 5-1 Historic Resources
270, 280 - 290 and ES Warren St, 2-10 Clifford St, Roxbury

A description of the Moreland Street Historic NR District is presented below:

- The Moreland Street Historic NR District is a historic district generally bounded by Kearsarge and Blue Hill Avenues, and Warren, Waverly and Winthrop Streets in Roxbury. It encompasses 63 acres and 280 primary buildings of primarily residential use and character which was developed between 1840 and the 1920's. The various housing types represent a cross-section of architectural styles from the period, including Second Empire, Italianate, and Queen Anne Styles. The 280 buildings are considered a fairly well preserved grouping with a remarkable degree of integrity with streetscapes keeping their historic appearance when compared to other sections of Roxbury. The district was listed in the National Register of Historic Places in 1984.

Table 5.1 Historic Resources in the Vicinity of the Project Site

Address	Historic Resource	Designation
3-39 Alaska Street	Moreland St. Historic NR District	
4-10 Aspen Street	Moreland St. Historic NR District	
3-6 Burton Avenue	Moreland St. Historic NR District	
3-77 Copland Street	Moreland St. Historic NR District	
56 Dale Street	Nat. Reg. Indiv. Property (02/09/04)	BOS. 12781
72 Dale Street	Local Landmark	BOS. 14294
1-39 Dunreath Street	Moreland St. Historic NR District	
1-37 Fairland Street	Moreland St. Historic NR District	
8-26 Irwin Avenue	Moreland St. Historic NR District	
2-33 Montrose Street	Moreland St. Historic NR District	
2-102 Moreland Street	Moreland St. Historic NR District	
11-76 Perrin Street	Moreland St. Historic NR District	
118-120 Walnut Avenue	Nat. Reg. Indiv. Property (02/09/04)	BOS.12781
26-76 Waverly Street	Moreland St. Historic NR District	
2-12 Whiting Street	Moreland St. Historic NR District	

5.3 Archaeological Resources

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

6.0 INFRASTRUCTURE SYSTEMS COMPONENT

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. The analysis also discusses any anticipated Project-related impacts on the utilities and identifies mitigation measures to address these potential impacts.

A detailed infrastructure analysis will be performed when the Project proceeds into the Design Development Phase. The Project's team will coordinate with the appropriate utilities to address the capacity of the area utilities to provide services for the new building. A Boston Water and Sewer Commission (BWSC) Site Plan and General Service Application is required for the new water, sanitary sewer, and storm drain connections. In addition, a Storm Water Pollution Prevention Plan will be submitted specifying best management measures for protecting the BWSC drainage systems during construction.

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

6.1 Sanitary Sewer System

6.1.1 Existing Sewer System

The Boston Water and Sewer Commission ("BWSC") owns and maintains the sanitary sewer system adjacent to the site on Warren Street, Clifford Street, and Waverly Street (See **Figure 6-1**). BWSC record drawings indicate an existing 10-inch sanitary sewer line runs south along Warren Street, an existing 12-inch sanitary sewer line runs northwest along Clifford Street, and a 12-inch sanitary sewer line runs to the northwest and southeast in Waverly Street.

The existing Project Site consists of vacant buildings with the exception of the church at 270 - 272 Warren Street, which is operational and holds services.

Table 6-1 Existing Sanitary Sewer Flows

Use	Quantity	Unit Flow Rate	Estimated Maximum Daily Flow (gpd)
Vacant Buildings	-	-	0 gpd
Church	250 seats	3 gpd/seat	750 gpd
Total			**750 gpd**

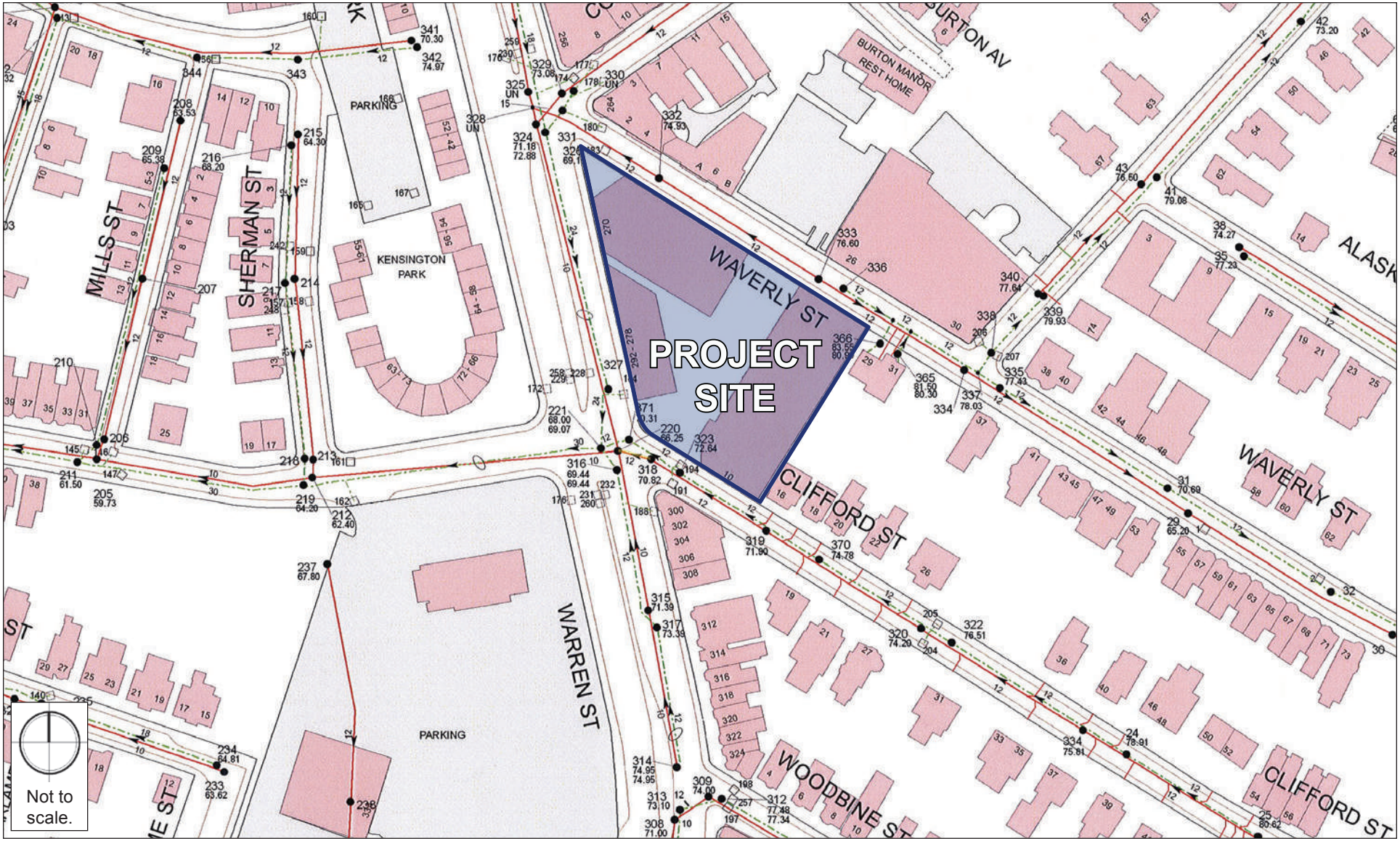


Figure 6-1.
Existing BWSC Sewer System

6.1.2 Project-Generated Sewage Flow

The Proposed Project will generate an estimated 17,446 gallons per day (gpd) based on design sewer flows provided in 310 CMR 15.000-The State Environmental Code, Title 5 and the proposed building program as summarized in **Table 6-2**. This is a net increase of 19,756 gpd.

Table 6-2 Projected Sanitary Sewer Flows

Use	Quantity	Unit Flow Rate	Estimated Maximum Daily Flow (gpd)
Phase 1			
Residential	100 bedrooms	110 gpd/bedroom	11,000 gpd
Office	9,684 sf	75 gpd/1,000 sf	726 gpd
Phase 2			
Residential	48 bedrooms	110 gpd/bedroom	5,280 gpd
Restaurant/Coffee Shop[1]	100 seats	35 gpd/seat	3,500 gpd
		Total	**20,506 gpd**
		Total Net	**19,756 gpd**

[1] Based 4,050 sf space with 50% space being used for dining and 20 sf/person.

6.1.3 Sanitary Sewage Connection

The proposed buildings' sanitary services will tie into the existing BWSC sanitary sewer mains in streets. All existing building services will be cut and capped at the main if the wyes are not reused. Incidental runoff from the second floor parking level will flow through a gas and oil separator prior to being piped to the sanitary sewer service. Gas and oil separators will conform to BWSC and MWRA standards. The Proponent will submit a Site Plan to the BWSC for review and approval.

6.1.4 Sewer System Mitigation

To help conserve water and reduce the amount of wastewater generated by the Proposed Project, the Proponent will use water conservation devices in compliance with all pertinent Code requirements to reduce water usage and sewer generation.

6.2 Water System

6.2.1 Existing Water Service

The water distribution system in the vicinity of the Project Site is owned and maintained by BWSC (see **Figure 6-2**). BWSC record drawings indicate there is an existing 12-inch DICL installed in 2007 in Warren Street, an existing 12-inch DICL installed in 2006 in Clifford Street,

and an existing 12-inch DICL installed in 1981 in Waverly Street. The water mains are part of the Southern High service network.

It appears fire hydrants located on Waverly Street and Warren Street will provide sufficient coverage for the Project. The Proponent will design appropriate domestic and fire protection lines and confirm the fire hydrant coverage for the Project with the consultation of BWSC and the Boston Fire Department (BFD) during the detailed design phase. All existing building services will be cut and capped at the main.

The BWSC record flow test data containing actual flow and pressure for hydrants within the vicinity of the site will be requested by the Proponent. If hydrant flow data is not available for any hydrants located near the project site, as the design progresses, the Proponent will request hydrant flows be conducted by the BWSC adjacent to the site. Hydrant flow data must be less than a year old to be used as a design tool. The Proponent will confirm that the flow and pressure is sufficient for the redevelopment and coordinate any proposed changes with BWSC and the Boston Fire Department (BFD) during the detailed design phase.

6.2.2 Anticipated Water Consumption

The Project's water demand estimate for domestic services is based on the project's estimated sewage generation, plus a factor to account for consumption, system losses, and other usages to estimate an average water demand. The total estimated water demand is 21,730 gpd. The water for the Project will be supplied by BWSC.

6.2.3 Proposed Water Service

The proposed buildings' water services will tie into the existing BWSC water mains in streets. The water supply systems servicing the building will be gated so as to minimize public hazard or inconvenience in the event of a water main break. Final locations and sizes of the services will be provided on a Site Plan during the detailed design phase and submitted to BWSC for review and approval.

Domestic and fire services to the buildings will be metered in accordance with BWSC's requirements. Water meters will be of a type approved by BWSC and tied into the BWSC's Automatic Meter Reading (AMR) System. Fixture counts and water meter sizing information will be provided and services will be designed and coordinated with the BWSC as part of the Site Plan review process and General Service Application. A backflow preventer will be installed on the fire protection service and will be coordinated with BWSC's Cross Connection Control Department.

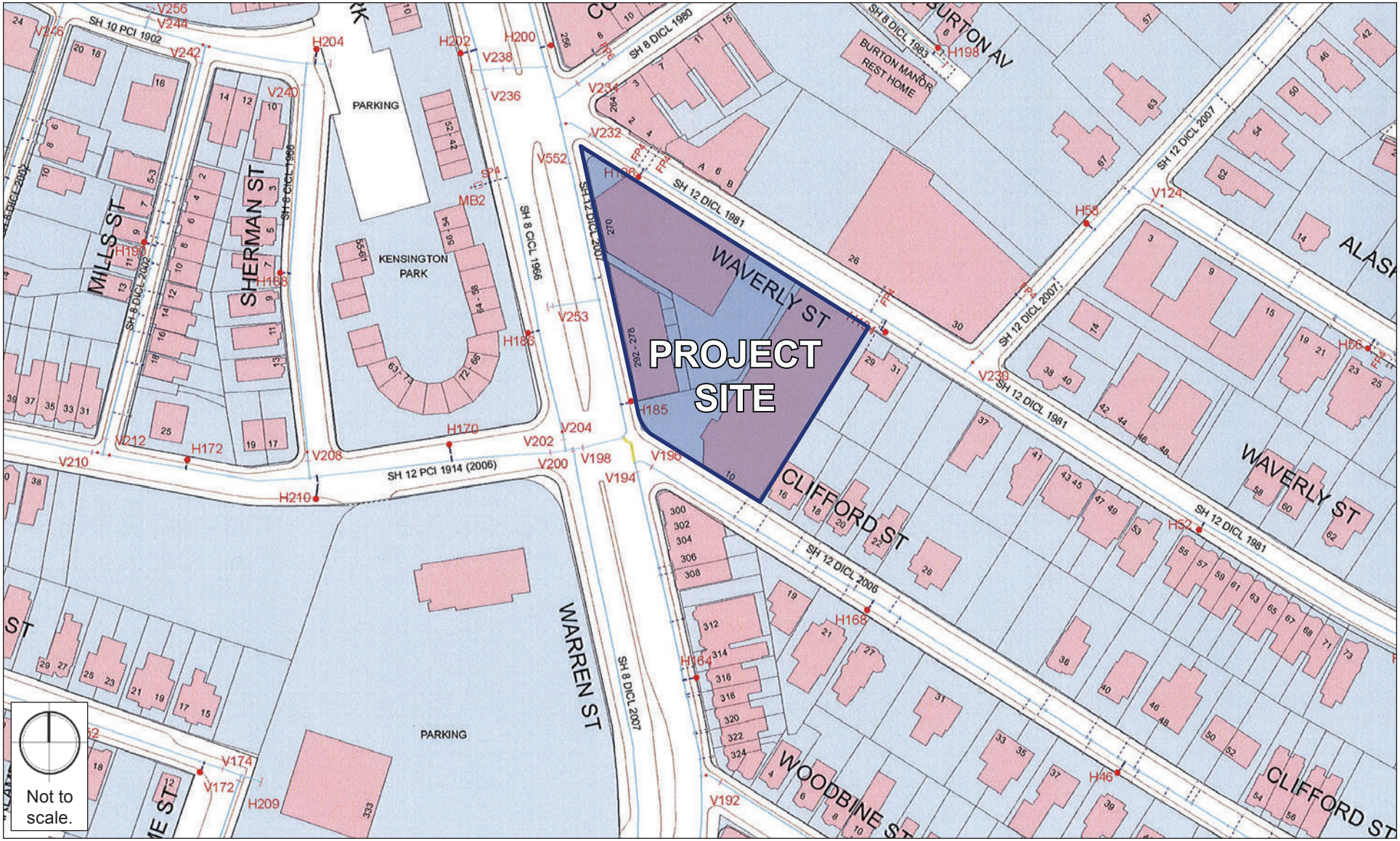


Figure 6-2.
Existing BWSC Water System

6.2.4 Water Supply System Mitigation

As discussed in the Sewer System Mitigation Section, water conservation measures such as the use of water conservation devices in compliance with all pertinent Code requirements are being considered to reduce potable water usage.

6.3 Storm Drainage System

6.3.1 Existing Drainage Conditions

The storm drain system in the vicinity of the Project site is owned and maintained by BWSC (see Figure 6-1). There is a 12-inch storm drain in Clifford Street, a 24-inch storm drain in Warren Street. There is a 12-inch storm drain in Waverly Street, but only a small portion of the line is along the Project Site. These storm lines connect to a combined sewer downstream and ultimately conveyed to Massachusetts Water Resources Authority's (MWRA) Deer Island Treatment Plant.

Approximately 80% of the existing site is covered with buildings and pavement with the remaining area covered with lawn. Runoff from the Project site is currently collected and conveyed to the surrounding municipal storm drain systems. There are no existing stormwater management systems on site. With the exception of the lawn which provides some infiltration of direct rainfall, there is no existing water quality treatment or peak runoff attenuation provided on the existing site before discharging into the BWSC system.

6.3.2 Proposed Drainage Systems

BWSC Site Plan requirements dictate that the first one inch of rainfall, times the impervious area on site, must be infiltrated prior to discharge to a storm drain or combined sewer. For Phase 1, the proposed building with a basement level will occupy the majority of the site. Bedrock was also encountered at test borings at depths of approximately 5-19 ft.

The proposed stormwater management system for each phase will provide pretreatment and infiltration, if feasible, prior to discharging stormwater to the drainage system and will meet the Boston Water and Sewer Commission (BWSC) Site Plan requirements. The existing storm drain utility infrastructure surrounding the Site appears to be of adequate capacity to service the needs of the Project. The Project will result in an increase in impervious area, but will improve the quality and attenuate the quantity of stormwater runoff being discharged to BWSC storm drain system through the installation of an on-site infiltration system.

In addition to the installation of an on-site infiltration system, stormwater runoff will be treated through the use of deep sump catch basins and water quality treatment units. An operation and maintenance plan will be developed to support the long-term functionality of the proposed stormwater management system.

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

6.4 Water Quality

The Project will not impact the water quality of nearby water bodies. The Project proposes a stormwater management program, designed per BWSC Site Plan requirements, which will provide pretreatment and infiltration, if feasible, prior to discharging stormwater to the drainage system. 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 and the municipal storm drain system. These controls will be inspected and maintained throughout the construction phase until the areas of disturbance have been stabilized through the placement of pavement, structure, or vegetative cover.

All necessary dewatering will be conducted in accordance with applicable EPA, MWRA, and BWSC discharge permits. Once construction is complete, the Proposed Project will be in compliance with BWSC Site Plan requirements.

6.5 Electric Systems

Eversource owns and maintains the electrical transmission system in the vicinity of the Project. The electrical power supply design and loads for the building will be coordinated with Eversource during the design phase. The Proponent is investigating energy conservation measures, including energy efficient lighting and heating and cooling systems for the Project.

6.6 Telephone and Cable Systems

Verizon owns and maintains infrastructure in the vicinity of the Project site. The actual size and location of the proposed building services will be coordinated with Verizon during the detailed design phase. Any upgrades will be coordinated with the provider.

6.7 Steam and Gas Systems

The Proposed Project is not expected to require steam service and there is no steam infrastructure in the Project area.

National Grid owns and maintains a 6-inch and 12-inch low pressure gas main in Warren Street and a 6-inch low pressure gas main in Clifford Street and in Waverly Street. The project is expected to use natural gas for heating and domestic hot water. The actual size and location of the building services will be coordinated with National Grid during the detailed design phase.

6.8 Utility Protection During Construction

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

7.0 TRANSPORTATION COMPONENT

7.1 Introduction

Howard Stein Hudson (HSH) has conducted an evaluation of the transportation impacts of a proposed residential development to be located at 270-272, 280-290 Warren Street, ES Warren Street, and 2-10 Clifford Street (the "Project" and/or "Site"), in Boston's Roxbury neighborhood. This transportation study adheres to the Boston Transportation Department (BTD) Transportation Access Plan Guidelines and the Boston Redevelopment Authority's Article 80 development review process. The study includes an evaluation of existing conditions, future conditions with and without the Project, projected parking demand, transit services, and pedestrian and bicycle activity.

7.1.1 Project Description

The Project site is located in the Roxbury Neighborhood to the South of Dudley Square. The site consists of several parcels located at 270-272, 280-290 Warren Street, ES Warren Street and 2-10 Clifford Street. The site consists of two vacant buildings and an active church. The remaining space is currently open space.

The Project will include the construction to be completed in two phases with approximately 51 residential units, 44 elderly housing units, approximately 9,684 square feet of office space, and approximately 3,177 square feet ground floor retail space. The project will include approximately 104 parking spaces on a two level garage. Vehicular access will be provided via two driveways, one to be located along Clifford Street and one to be located along Waverly Street.

7.1.2 Study Area

The transportation study area is generally bounded by the Blue Hill Avenue to the east, Clifford Street to the south, Warren Street to the west, and Waverly Street to the north. The study area includes the following four intersections:

- Warren Street/Clifford Street/Dale Street (signalized);
- Warren Street/Waverly Street/Copeland Street (signalized);
- Blue Hill Avenue/Waverly Street (unsignalized); and
- Blue Hill Avenue/Clifford Street (unsignalized).

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

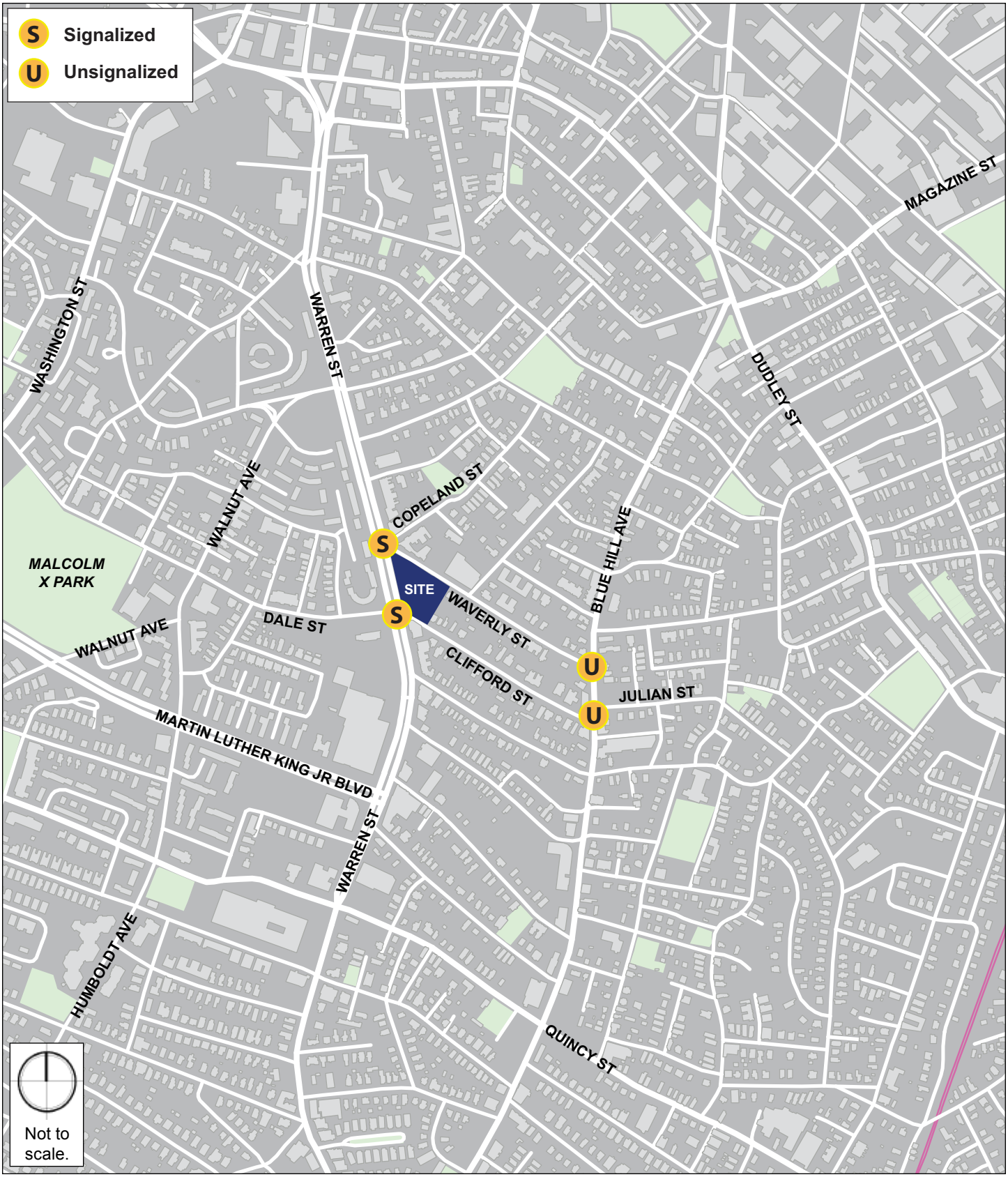


Figure 7-1.
Study Area Intersections

7.1.3 Study Methodology

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

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

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

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

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

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

7.2 Existing (2016) Condition

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

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:

Warren Street is a two-way, four lane roadway divided by a concrete median located adjacent to the west of the Project site. Warren Street is classified as an urban minor arterial roadway under

BTD jurisdiction and runs in a predominately north-south direction between Washington Street in Dudley Square to the north and Blue Hill Avenue in Dorchester to the south. In the vicinity of the site, sidewalks and on-street parking are provided on both side of the roadway.

Blue Hill Avenue is a two-way, two lane roadway located to the east of the Project site. Charles Park Road is classified as an urban minor arterial roadway under BTD jurisdiction and runs in a predominately north-south direction between Dudley Street to the north and the Blue Hills Parkway to the south. In the vicinity of the site, sidewalks and on-street parking are provided on both sides of the roadway.

Clifford Street is a one-way westbound, one-lane roadway located adjacent to the south of the Project site. Clifford Street is classified as a local roadway under BTD jurisdiction and runs in a predominately southeast-northwest direction between Blue Hill Avenue to the southeast and Warren Street to the northwest. In the vicinity of the site, sidewalks and on-street parking are provided on both sides of the roadway.

Waverly Street is a one-way eastbound, one-lane roadway located adjacent to the north of the Project site. Waverly Street is classified as a local roadway under BTD jurisdiction and runs in a predominately southeast-northwest direction between Blue Hill Avenue to the southeast and Warren Street to the northwest. In the vicinity of the site, sidewalks and on-street parking are provided on both sides of the roadway.

Copeland Street is a one-way westbound, one-lane roadway located to the north of the Project site. Copeland Street is classified as a local roadway under BTD jurisdiction and runs in a predominately northeast-southwest direction between Moreland Street to the northeast and Warren Street to the southwest. In the vicinity of the site, sidewalks and on-street parking are provided on both sides of the roadway.

Dale Street is a two-way, two-lane roadway located to the west of the Project site. Dale Street is classified as a local roadway under BTD jurisdiction and runs in a predominately east-west direction between Washington Street to the west and Warren Street to the east. In the vicinity of the site, sidewalks and on-street parking are provided on both sides of the roadway.

Julian Street is a one-way westbound, one-lane roadway located to the east of the Project site. Julian Street is classified as a local roadway under BTD jurisdiction and runs in a predominately east-west direction between Howard Avenue to the east and Blue Hill Avenue to the west. In the vicinity of the site, sidewalks and on-street parking are provided on both sides of the roadway.

7.2.2 Existing Intersection Conditions

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

Warren Street/Clifford Street/Dale Street is a four legged, signalized intersection located adjacent to the southwest of the project site. The Dale Street eastbound approach consists of a shared left-turn/ right-turn travel lane and a parking lane. Clifford Street westbound approach consists of a shared left-turn/through/right-turn travel lane and a parking lane. The Warren Street northbound approach consists of three travel lanes, a left-turn only lane, and two through lanes, with a bike lane and a parking lane. The Warren Street southbound approach consists of two travel lanes, a through lane, and a shared through/right-turn lane, with a bike lane, and a parking lane. Crosswalks, wheelchair ramps, and pedestrian signal equipment are provided across all approaches to the intersection, with the exception of the east side of the northern crosswalk. However, curb ramps are not provided through the concrete median along Warren Street causing people in wheelchairs to go around the end of the median.

Warren Street/Waverly Street/Copeland Street is a four legged, signalized intersection with three approaches located adjacent to the northwest of the Project site. The Copeland Street westbound approach consists of one shared hard left-turn/left-turn/right-turn travel lane and a parking lane. The Warren Street northbound approach consists of two travel lanes, a through lane and a shared through/hard-right-turn lane, with a bike lane and a bus stop. The Warren Street southbound approach consists of three travel lanes, a left-turn only lane, and two through lanes, with a bike lane, and a parking lane. Crosswalks, wheelchair ramps, and pedestrian signal equipment are provided across all approaches to the intersection.

Blue Hill Avenue/Waverly Street is a three legged, unsignalized intersection located to the east of the Project site. The Waverly Street eastbound approach consists of one shared left-turn/right-turn lane and a parking lane and operates under stop control. The Blue Hill Avenue northbound and southbound approaches both consist of one through lane and a parking lane and operate under free control. Wheelchair ramps are provided across the west side of the intersection.

Blue Hill Avenue/Clifford Street is a three legged, unsignalized intersection with two approaches, located to the east of the Project site. The Blue Hill Avenue northbound approach consists of one shared left-turn/through lane and a parking lane and operates under free control. The Blue Hill Avenue southbound approach consists of one shared through/right-turn lane and a parking lane and operates under free control. A crosswalk and wheelchair ramps are provided across the west side of the intersection.

7.2.3 Existing Parking and Curb Use

An inventory of the on-street parking in the vicinity of the Project was collected. On-street parking is generally unrestricted with some curb side space dedicated towards MBTA bus stops, or handicapped parking. Additionally, on the side streets, many lots have private driveways that occupy additional curb space. The on-street parking regulations within the study area are shown in **Figure 7-2**.

Figure 7-2.
On-street Parking and Curb Use

Car Sharing Services

Car sharing enables easy access to short term vehicular transportation. Vehicles are rented on an hourly or daily basis, and all vehicle costs (gas, maintenance, insurance, and parking) are included in the rental fee. Vehicles are checked out for a specific time period and returned to their designated location.

Car sharing, predominantly served by Zipcar in the Boston area, provides easy access to vehicular transportation for those who do not own cars. The nearby car sharing locations within a half-mile of the Project site are shown in **Figure 7-3.**

7.2.4 Existing Public Transportation

The Project is located adjacent to several MBTA bus route, less than 1 mile from the Commuter Rail, and just over 1 mile to the MBTA orange line. The following describes each public transportation route located in the vicinity of the Project site. The nearby public transit services are shown in **Figure 7-4** and summarized in **Table 7-1**.

MBTA Bus Routes

There are four MBTA Bus routes that stop adjacent to the Project site along Warren Street at the intersection of Waverly Street. The 14, 19, 23, and 28 MBTA Bus routes all travel along Warren Street to Ruggles Station via Dudley Street. Additionally the 15, 41, 42, 44, and 45 routes have stops less than a half a mile from the site.

Commuter Rail Needham Line

The Fairmount Line and the Franklin Line of the MBTA commuter rail system stops at Uphams Corner, located less than one mile from the Project site.

The Fairmont Line runs between South Station in Boston to the north and Readville Station in Readville to the south. The Fairmount Line operates with weekday service from 5:39 a.m. to 11:30 p.m. with approximately 45 minute peak hour headways. Weekend service runs from 6:50 a.m. to 11:55 p.m. with approximately 60 minute headways.

The Franklin Line runs between South Station in Boston to the north and Forge Park/495 to the south. The Franklin Line operates with weekday service from 3:50 a.m. to 12:51 a.m. with approximately 30 minute peak hour headways. Weekend service runs from 6:35 a.m. to 12:19 a.m. with approximately 120 minute headways.

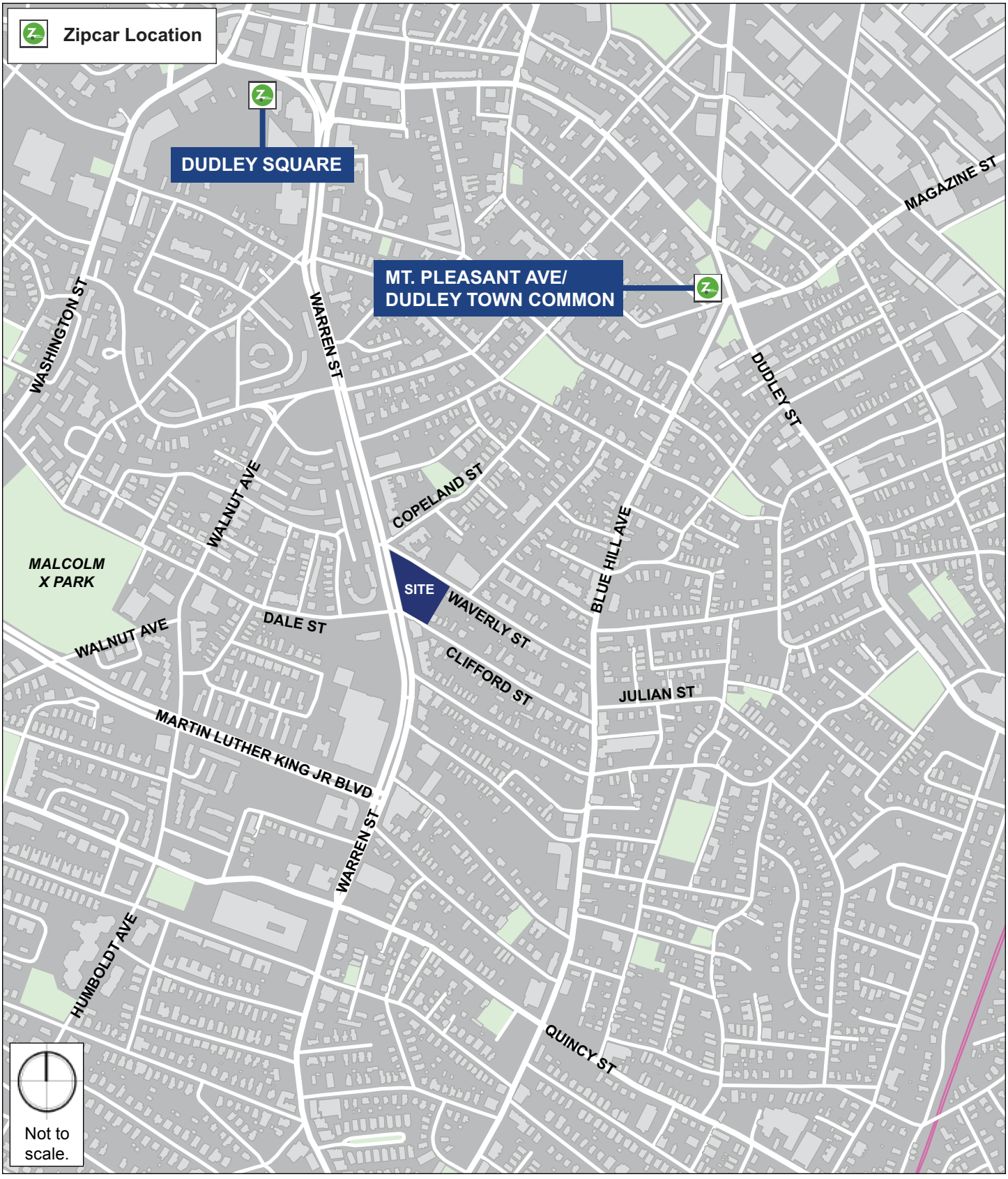


Figure 7-3.
Car Sharing Services

Figure 7-4.
Public Transportation

Table 7-1 Existing Public Transportation

Route	Description	Peak-hour Headway (mins)*
Commuter Rail		
Fairmount Line	South Station - Readville	45
Franklin Line	South Station – Forge Park/495	30
Local Bus Routes		
14	Roslindale Square - Heath Street via Dudley Station, Grove Hall & Jackson Square Station	38
15	Kane Square or Fields Corner Station - Ruggles Station via Uphams Corner	6
19	Fields Corner Station - Kenmore or Ruggles Station via Grove Hall & Dudley Station	14
23	Ashmont Station - Ruggles Station via Washington Street	6
28	Mattapan Station - Ruggles Station via Dudley Station	7
41	Centre Street & Eliot Street - JFK/UMass Station via Dudley Station, Centre Street & Jackson Square Station	22
42	Forest Hills Station - Dudley or Ruggles Station via Washington Street	12
44	Jackson Square Station - Ruggles Station via Seaver Street & Humboldt Avenue	12
45	Franklin Park Zoo - Ruggles Station via Blue Hill Avenue	10

* Source: MBTA.com, 2016. Headways vary.

7.2.5 Existing Traffic Data

Turning Movement Counts (TMCs) were conducted during the weekday a.m. and weekday p.m. peak periods (7:00 – 9:00 a.m. and 4:00 – 6:00 p.m., respectively) at the study area intersections on Tuesday, May 24, 2016. The TMCs consist of vehicle classification including car, heavy vehicle, pedestrian, and bicycle movements.

Based on the TMC data, the vehicular traffic peak hours for the study area intersection are 7:00 a.m. – 8:00 a.m. and 4:00 p.m. – 5:00 p.m. along Warren Street and between 8:00 a.m. – 9:00 a.m. and 5:00 p.m. – 6:00 p.m. along Blue Hill Avenue. The detailed traffic counts are provided in **Appendix D.**

Seasonal Adjustment

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

7.2.6 Existing (2016) Traffic Volumes

Existing traffic volumes were collected to develop the Existing (2016) Condition vehicular traffic volumes. The Existing (2016) Condition weekday a.m. Peak Hour and weekday p.m. Peak Hour traffic volumes are shown in **Figure 7-5** and **Figure 7-6**, respectively.

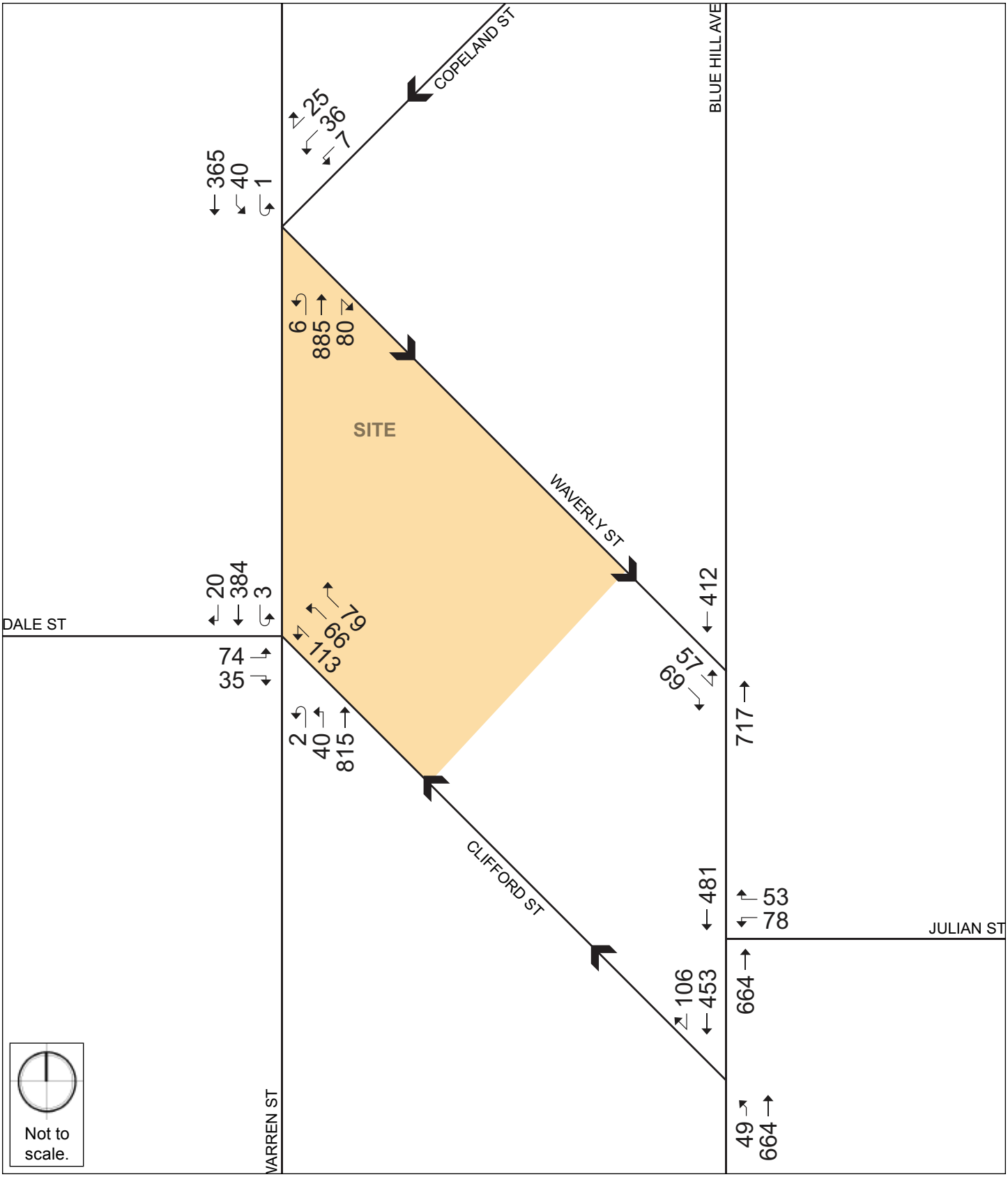


Figure 7-5.
Existing (2016) Condition Traffic Volumes, Weekday a.m. Peak Hour

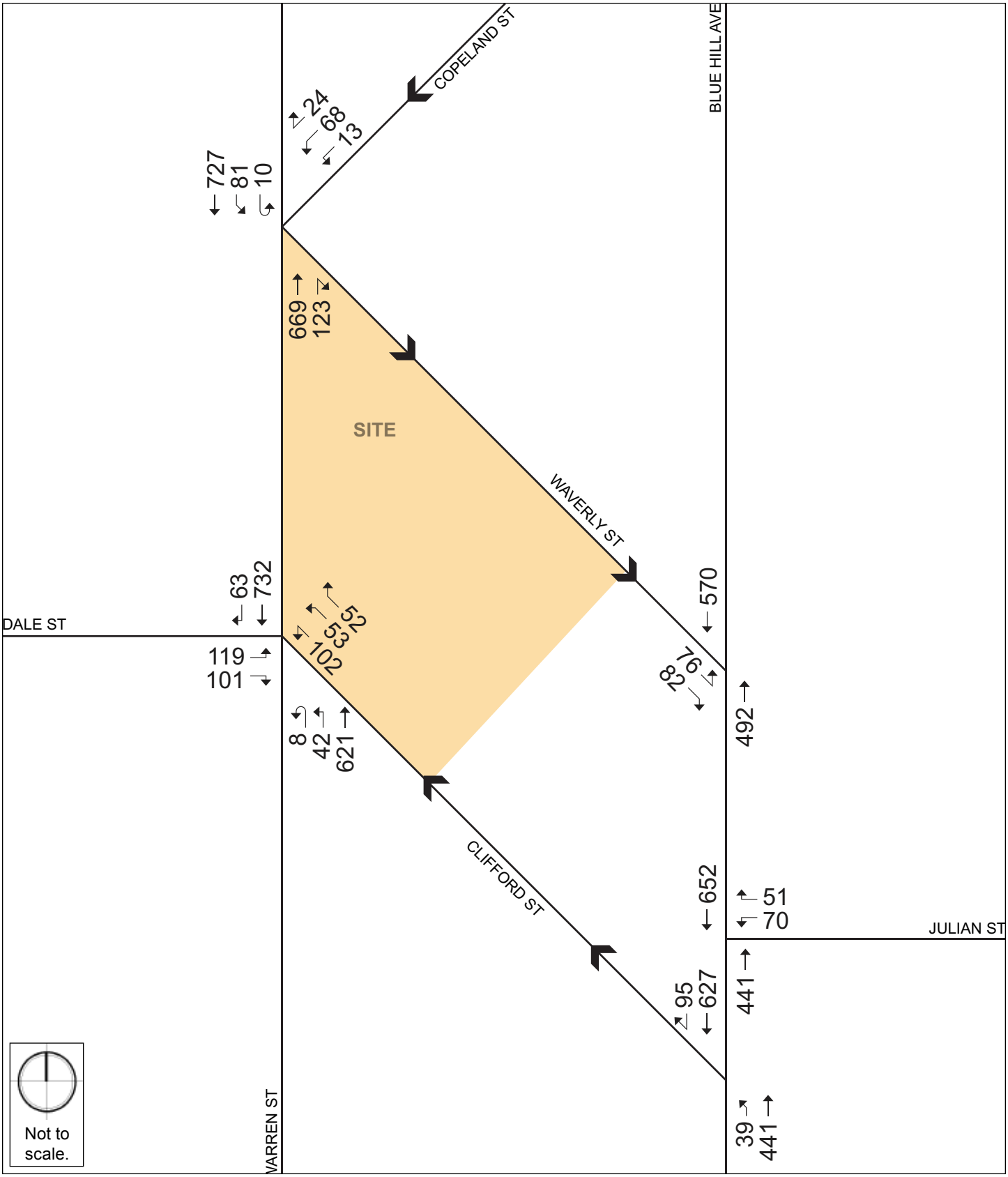


Figure 7-6.
Existing (2016) Condition Traffic Volumes, Weekday p.m. Peak Hour

7.2.7 Existing Bicycle Volumes and Accommodations

In recent years, bicycle use has increased dramatically throughout the City of Boston. The Project site is conveniently located in close proximity to several bicycle facilities. The City of Boston's "Bike Routes of Boston" map indicates that Waverly Street is designated as a beginner route, suitable for all types of bicyclists including new cyclists, cyclists with limited on-road experience, and/or children. Warren Street, Martin Luther King Boulevard, Humboldt Avenue, West Cottage Street, and Moreland Street are designated as intermediate routes, suitable for riders with some on-road experience. Washington Street, Townsend Street, and Quincy Street are designated as advanced routes suitable for traffic-confident cyclists.

To determine the amount of bicycle activity within the study area, bicycle counts were collected concurrent with the TMCs. The weekday a.m. Peak Hour and weekday p.m. Peak Hour bicycle volumes are presented in **Figure 7-7**.

Bicycle Sharing Services

The Project site is also located in proximity to a bicycle sharing station provided by Hubway. Hubway is the Boston area's bicycle sharing service, which was launched in 2011 and currently consists of more than 1,600 shared bicycles at more than 160 stations throughout Boston, Brookline, Cambridge, and Somerville. The nearest Hubway station to the Project site is located at Dudley Square. This station has 16 bicycle docks and is approximately a one-half mile walk to the north from the Project site. **Figure 7-8** shows the nearby Hubway stations.

7.2.8 Existing Pedestrian Volumes and Accommodations

In general, sidewalks are provided on both sides of all roadways and are in good condition. Crosswalks and wheelchair ramps are provided at most study area intersections. Pedestrian signal equipment is provided at both of the signalized study area intersections.

To determine the amount of pedestrian activity within the study area, pedestrian counts were conducted concurrent with the TMCs at the study area intersection. The weekday a.m. Peak Hour and weekday p.m. Peak Hour pedestrian volumes are presented in **Figure 7-9**.

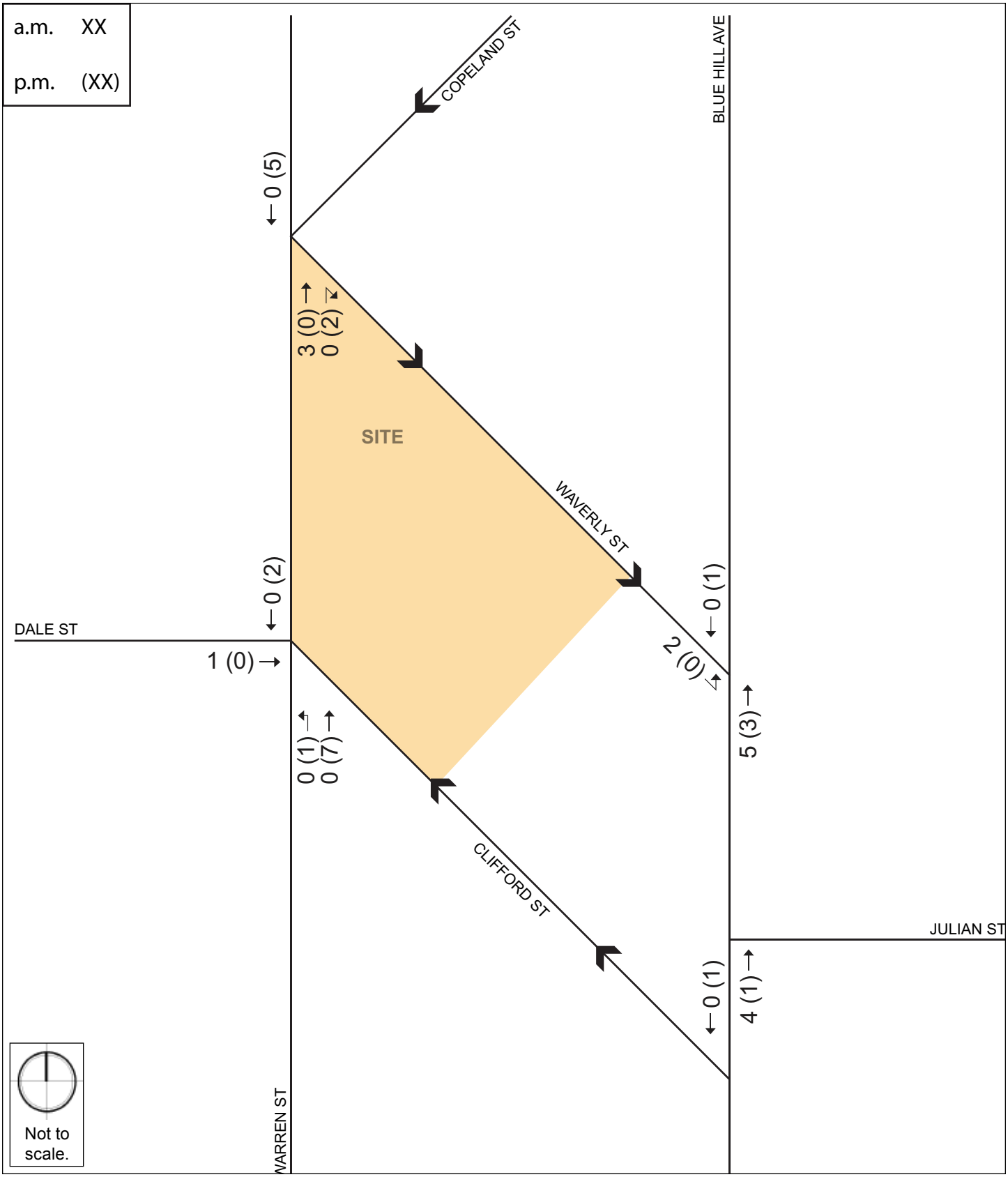


Figure 7-7.
Existing (2016) Condition Bicycle Volumes, Weekday a.m. and p.m. Peak Hours

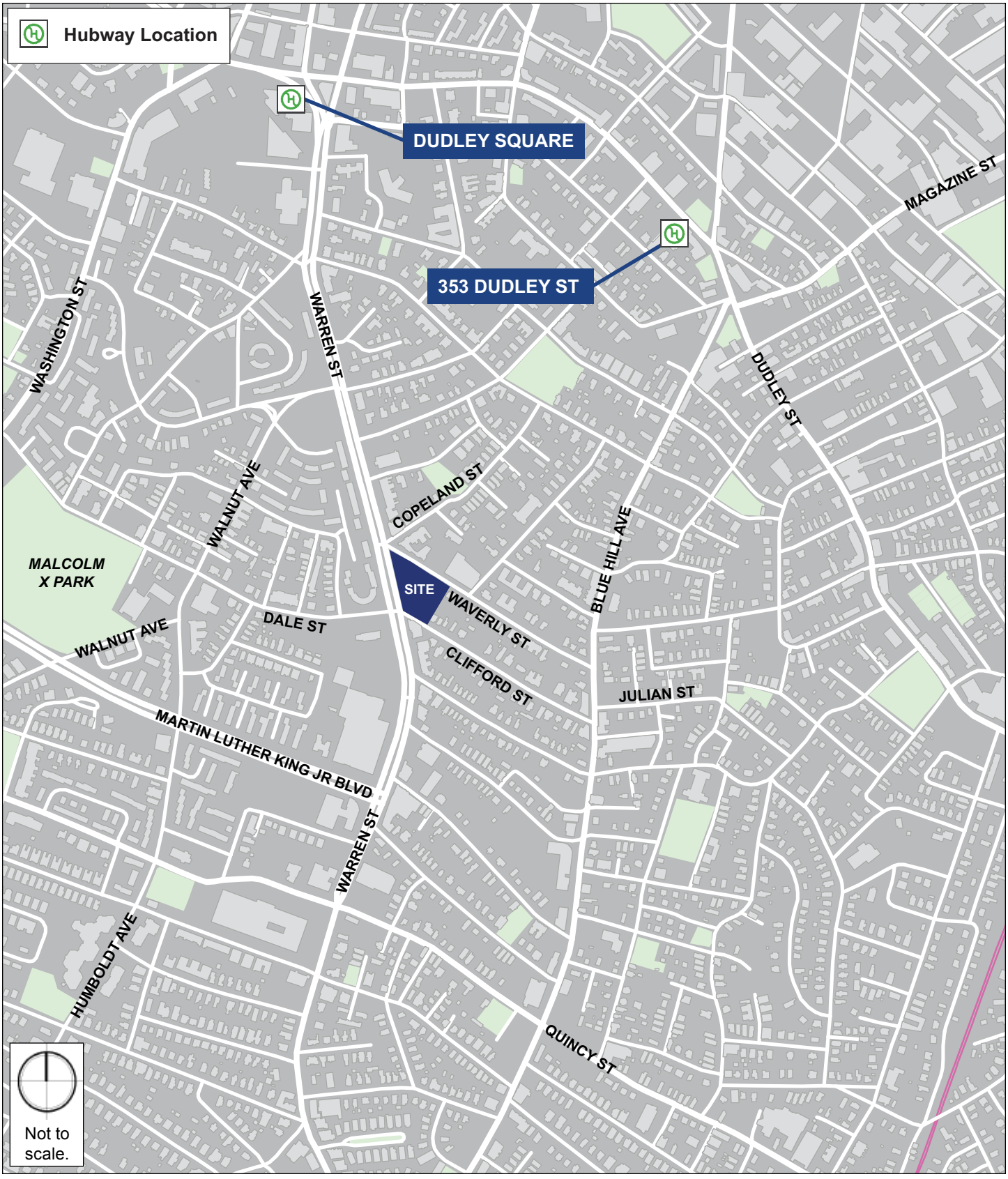


Figure 7-8.
Bicycle Sharing Services

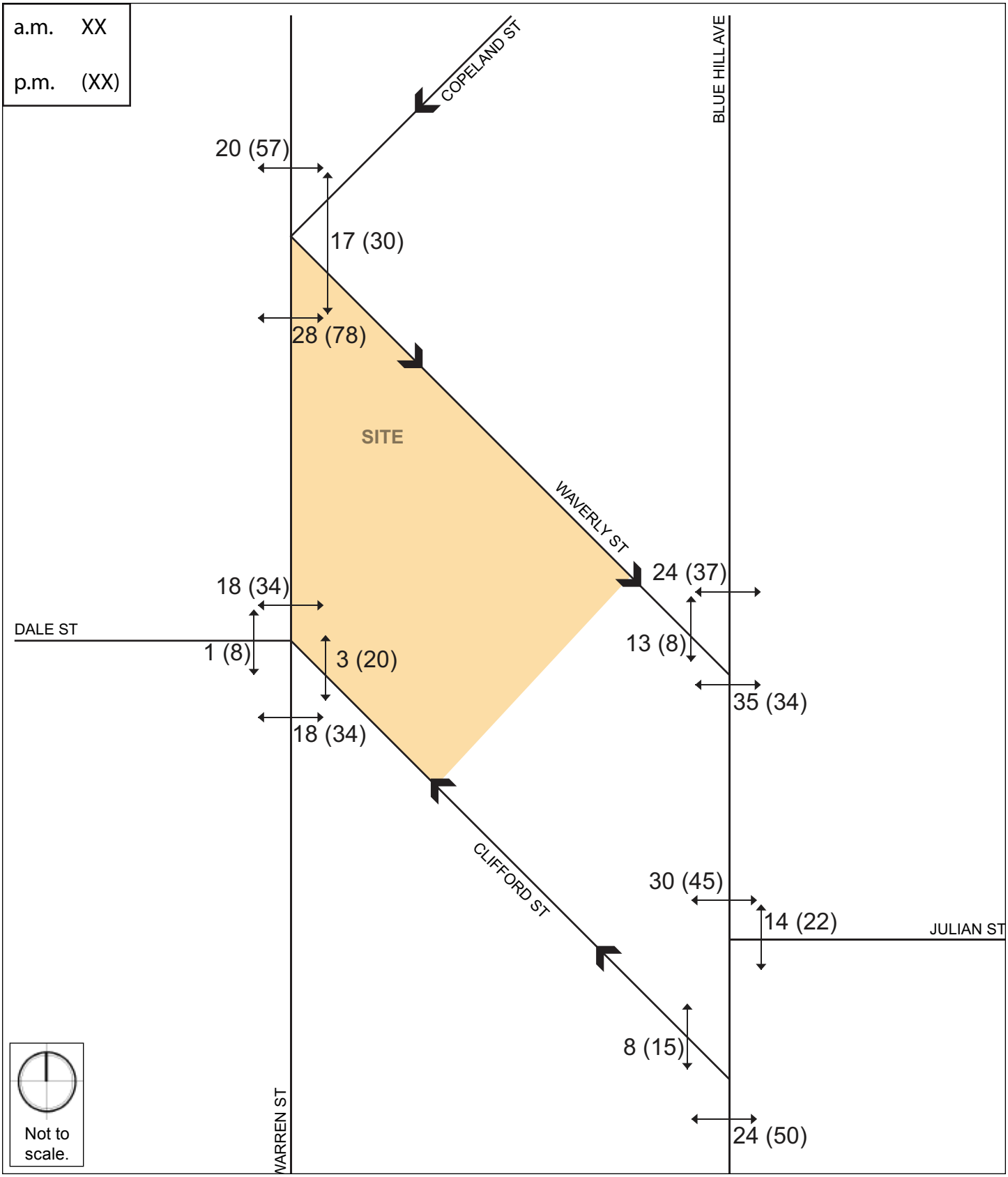


Figure 7-9.
Existing (2016) Condition Pedestrian Volumes, Weekday a.m. and p.m. Peak Hours

7.2.9 Existing (2016) Traffic Operations Analysis

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

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

Table 7-2 Vehicle Level of Service Criteria

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

Source: 2000 Highway Capacity Manual, Transportation Research Board.

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

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

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

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

percentile queue throughout the course of the peak hour. It is also unlikely that the 95th percentile queues for each approach to the intersection will occur simultaneously.

7.2.10 Existing (2016) Condition Traffic Operations Analysis

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

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

Intersection/Approach	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (ft)	95th Percentile Queue (ft)
Signalized Intersections					
Warren Street/Clifford Street/Dale Street	**C**	**21.4**	**-**	**-**	**-**
Dale Street eastbound left/right	C	22.1	0.38	46	86
Clifford Street westbound left/thru/right	D	37.2	0.62	155	250
Warren Street northbound left	B	19.0	0.10	19	44
Warren Street northbound thru | thru	C	22.5	0.54	254	323
Warren Street southbound thru | thru/right	A	8.5	0.26	31	44
Warren Street/Waverly Street/Copeland Street	**A**	**8.3**	**-**	**-**	**-**
Copeland Street westbound hard left/left/right	C	22.5	0.30	17	60
Warren Street northbound thru | thru/hard right	A	5.1	0.56	47	61
Warren Street southbound bear left	B	17.9	0.22	16	42
Warren Street southbound thru | thru	B	13.0	0.21	75	105
Unsignalized Intersections					
Blue Hill Avenue/Waverly Street	**-**	**-**	**-**	**-**	**-**
Waverly Street eastbound left/right	D	27.4	0.49	-	64
Blue Hill Avenue northbound thru	A	0.0	0.44	-	0
Blue Hill Avenue southbound thru	A	0.0	0.27	-	0
Blue Hill Avenue/Clifford Street	-	-	-	-	-
Blue Hill Avenue northbound left/thru	A	1.3	0.05	-	4
Blue Hill Avenue southbound thru/right	A	0.0	0.35	-	0

Grey shading indicates LOS E or F.

Table 7-4 Existing (2015) Condition Capacity Analysis Summary, Weekday p.m. Peak Hour

Intersection/Approach	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (ft)	95th Percentile Queue (ft)
Signalized Intersections					
Warren Street/Clifford Street/Dale Street	**C**	**20.6**	**-**	**-**	**-**
Dale Street eastbound left/right	C	34.5	0.64	125	203
Clifford Street westbound left/thru/right	D	38.9	0.64	147	203
Warren Street northbound left	C	27.2	0.31	25	61
Warren Street northbound thru | thru	C	23.9	0.47	174	226
Warren Street southbound thru | thru/right	A	7.8	0.57	50	62
Warren Street/Waverly Street/Copeland Street	**B**	**17.2**	**-**	**-**	**-**
Copeland Street westbound hard left/left/right	C	23.6	0.30	42	88
Warren Street northbound thru | thru/hard right	A	8.3	0.56	72	92
Warren Street southbound bear left	C	33.4	0.49	47	105
Warren Street southbound thru | thru	C	23.8	0.50	195	251
Unsignalized Intersections					
Blue Hill Avenue/Waverly Street	**-**	**-**	**-**	**-**	**-**
Waverly Street eastbound left/right	E	36.4	0.62	-	97
Blue Hill Avenue northbound thru	A	0.0	0.31	-	0
Blue Hill Avenue southbound thru	A	0.0	0.39	-	0
Blue Hill Avenue/Clifford Street	-	-	-	-	-
Blue Hill Avenue northbound left/thru	A	1.3	0.05	-	4
Blue Hill Avenue southbound thru/right	A	0.0	0.46	-	0

Grey shading indicates LOS E or F.

The **Blue Hill Avenue/Waverly Street** eastbound left/right approach operates at LOS E during the p.m. Peak Hour due to the moderate volume on Blue Hill Avenue and the inconsistent acceptable gaps.

7.3 No-Build (2023) Condition

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

7.3.1 Background Traffic Growth

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

7.3.2 Specific Development Traffic Growth

Traffic volumes associated with the larger or closer known development projects can affect traffic patterns throughout the study area within the future analysis time horizon. One such project, which is shown on **Figure 7-10**, was specifically accounted for in the future traffic.

Bartlett Place – The project will include the demolition of two existing buildings and the construction of a new mixed-use development. The project will consist of approximately 300 residential units, 28,839 square feet of retail space, and 22,153 square feetof commercial/light industrial space. Bartlett Place will be built in two phases and has been approved by the BRA.

7.3.3 Proposed Infrastructure Improvements

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

7.3.4 No-Build (2023) Condition Traffic Volumes

The one-half percent per year annual growth rate was applied to the Existing (2016) Condition traffic volumes, then the traffic volumes associated with the background development project listed above was added to develop the No-Build (2023) Condition traffic volumes. The No-Build (2023) weekday a.m. Peak Hour and weekday p.m. Peak Hour traffic volumes are shown on **Figure 7-11** and **Figure 7-12**, respectively.

Figure 7-10.
Area Development Projects

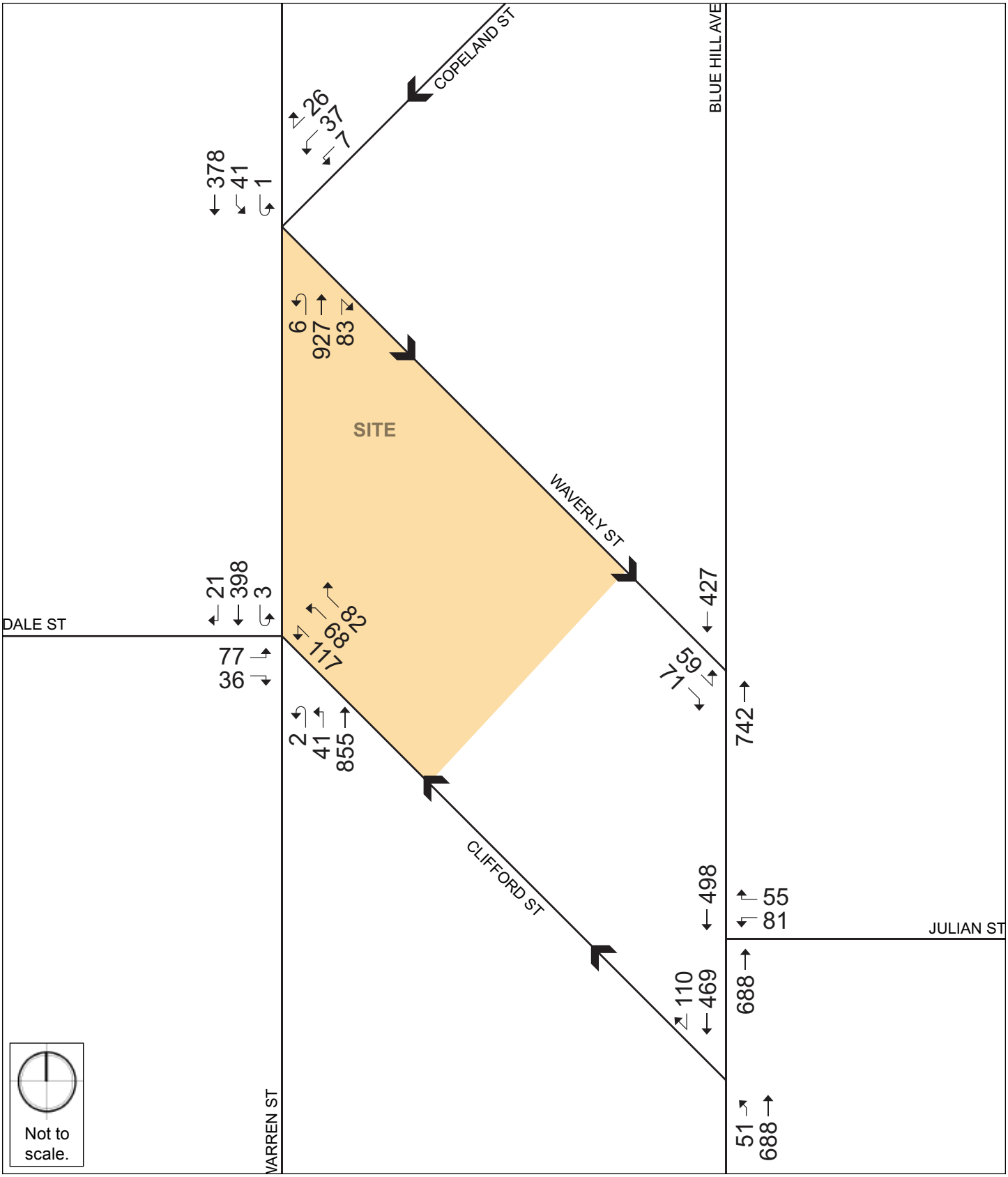


Figure 7-11.
No-Build (2023) Condition Traffic Volumes, Weekday a.m. Peak Hour

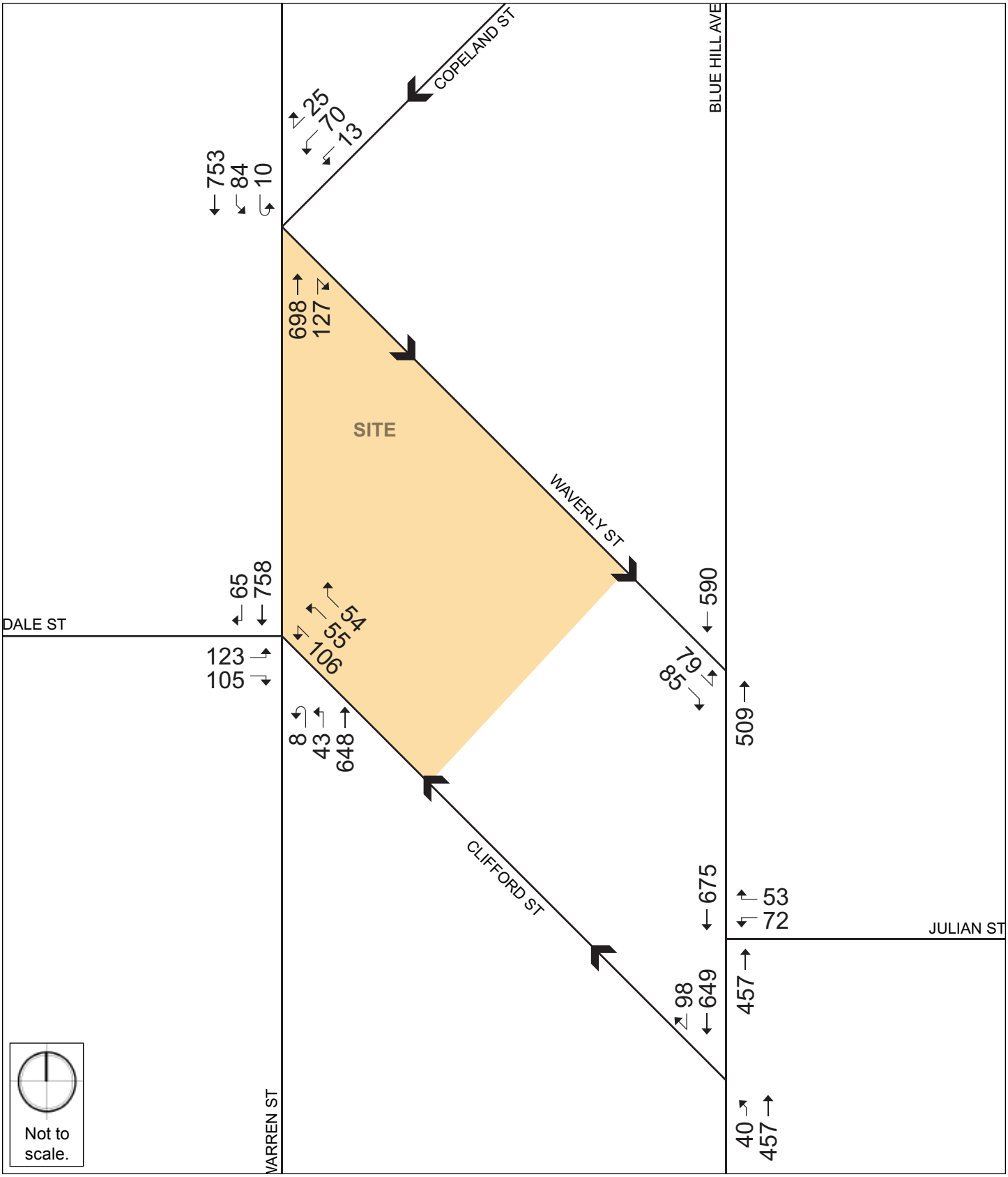


Figure 7-12.
No-Build (2023) Condition Traffic Volumes, Weekday p.m. Peak Hour

7.3.5 No-Build (2023) Condition Traffic Operations Analysis

The No-Build (2023) Condition capacity analysis uses the same methodology as the Existing (2016) Condition capacity analysis. **Table 7-5** and **Table 7-6** present the No-Build (2023) Condition capacity analysis for the a.m. and p.m. peak hours, respectively. The shaded cells in the tables indicate a worsening in LOS between the Existing (2016) Condition and the No-Build (2023) Condition. The detailed analysis sheets are provided in **Appendix D**.

Table 7-5 No-Build (2023) Condition Capacity Analysis Summary, Weekday a.m. Peak Hour

Intersection/Approach	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (ft)	95th Percentile Queue (ft)
Signalized Intersections					
Warren Street/Clifford Street/Dale Street	**C**	**21.9**	**-**	**-**	**-**
Dale Street eastbound left/right	C	22.8	0.39	49	89
Clifford Street westbound left/thru/right	D	38.1	0.64	162	258
Warren Street northbound left	B	19.2	0.11	20	45
Warren Street northbound thru | thru	C	23.0	0.57	272	344
Warren Street southbound thru | thru/right	A	8.5	0.27	33	46
Warren Street/Waverly Street/Copeland Street	**A**	**8.5**	**-**	**-**	**-**
Copeland Street westbound hard left/left/right	C	23.5	0.31	19	62
Warren Street northbound thru | thru/hard right	A	5.2	0.59	50	63
Warren Street southbound bear left	B	19.0	0.25	17	46
Warren Street southbound thru | thru	B	13.1	0.22	78	108
Unsignalized Intersections					
Blue Hill Avenue/Waverly Street	**-**	**-**	**-**	**-**	**-**
Waverly Street eastbound left/right	D	30.2	0.53	-	73
Blue Hill Avenue northbound thru	A	0.0	0.46	-	0
Blue Hill Avenue southbound thru	A	0.0	0.28	-	0
Blue Hill Avenue/Clifford Street	-	-	-	-	-
Blue Hill Avenue northbound left/thru	A	1.4	0.05	-	4
Blue Hill Avenue southbound thru/right	A	0.0	0.36	-	0

Gray shading indicates decrease in LOS from Existing Condition below LOS E or LOS F.

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

Intersection/Approach	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (ft)	95th Percentile Queue (ft)
Signalized Intersections					
Warren Street/Clifford Street/Dale Street	**C**	**21.2**	**-**	**-**	**-**
Dale Street eastbound left/right	D	36.2	0.67	133	214
Clifford Street westbound left/thru/right	D	40.4	0.67	156	214
Warren Street northbound left	C	28.5	0.34	25	64
Warren Street northbound thru | thru	C	24.2	0.49	183	237
Warren Street southbound thru | thru/right	A	7.9	0.59	51	64
Warren Street/Waverly Street/Copeland Street	**B**	**17.6**	**-**	**-**	**-**
Copeland Street westbound hard left/left/right	C	24.0	0.30	44	91
Warren Street northbound thru | thru/hard right	A	8.4	0.58	75	96
Warren Street southbound bear left	D	36.9	0.54	49	114
Warren Street southbound thru | thru	C	24.1	0.52	205	262
Unsignalized Intersections					
Blue Hill Avenue/Waverly Street	**-**	**-**	**-**	**-**	**-**
Waverly Street eastbound left/right	E	42.7	0.69	-	114
Blue Hill Avenue northbound thru	A	0.0	0.32	-	0
Blue Hill Avenue southbound thru	A	0.0	0.40	-	0
Blue Hill Avenue/Clifford Street	-	-	-	-	-
Blue Hill Avenue northbound left/thru	A	1.4	0.05	-	4
Blue Hill Avenue southbound thru/right	A	0.0	0.47	-	0

Gray shading indicates decrease in LOS from Existing Condition below LOS E or LOS F.

7.4 Build (2023) Condition

As previously summarized, the Project site is located in the Roxbury Neighborhood to the South of Dudley Square. The site consists of several parcels located at 280-290 Warren Street and 2-10 Clifford Street. The site consists of two vacant buildings and an active church. The remaining space is currently open space.

The Project will include the construction of approximately 51 residential units, 44 elderly housing units, approximately 9,684 square feet of office space, and approximately 3,177 square feet ground floor retail space. The project will include approximately 104 parking spaces on a two level garage.

7.4.1 Vehicle Site Access and Circulation

As shown in the Project site plan in **Figure 7-13**, vehicular access to the Site will be provided via two curb cuts, one located along Waverly Street, and the other located along Clifford Street. Both driveways will be full access driveways allowing entering and exiting vehicles. The garage will connect both driveways so that it is possible to enter one driveway and exit the other driveway. This driveway and garage configuration is the most convenient for vehicle users to easily enter and exit the site without the need to circle the block, limiting the vehicle traffic on abutting streets.

7.4.2 Parking

As previously mentioned, the Project will contain 104 parking spaces. Both office employees and residents will have access to a parking space in the garage. The office space will utilize approximately 15 to 20 parking spaces, leaving the remaining 84 to 89 spaces for residential use. This results in a residential parking ratio of approximately 0.9 parking spaces per dwelling unit, which is consistent with the BTD maximum parking guidelines for the area.

7.4.3 Loading and Service Accommodations

Loading and service operations will occur on-site from Clifford Street during the Phase 1 operations and relocated to Waverly Street when Phase 2 is completed. The final loading plan will be determined by the completion of the Transportation Access Plan Agreement (TAPA) with the Boston Transportation Department.

In addition to move in/move out operations, residential units and small office spaces primarily generate delivery trips related to small packages and prepared food. Typical residential deliveries that already serving the area would be expected to stop at the Project site.

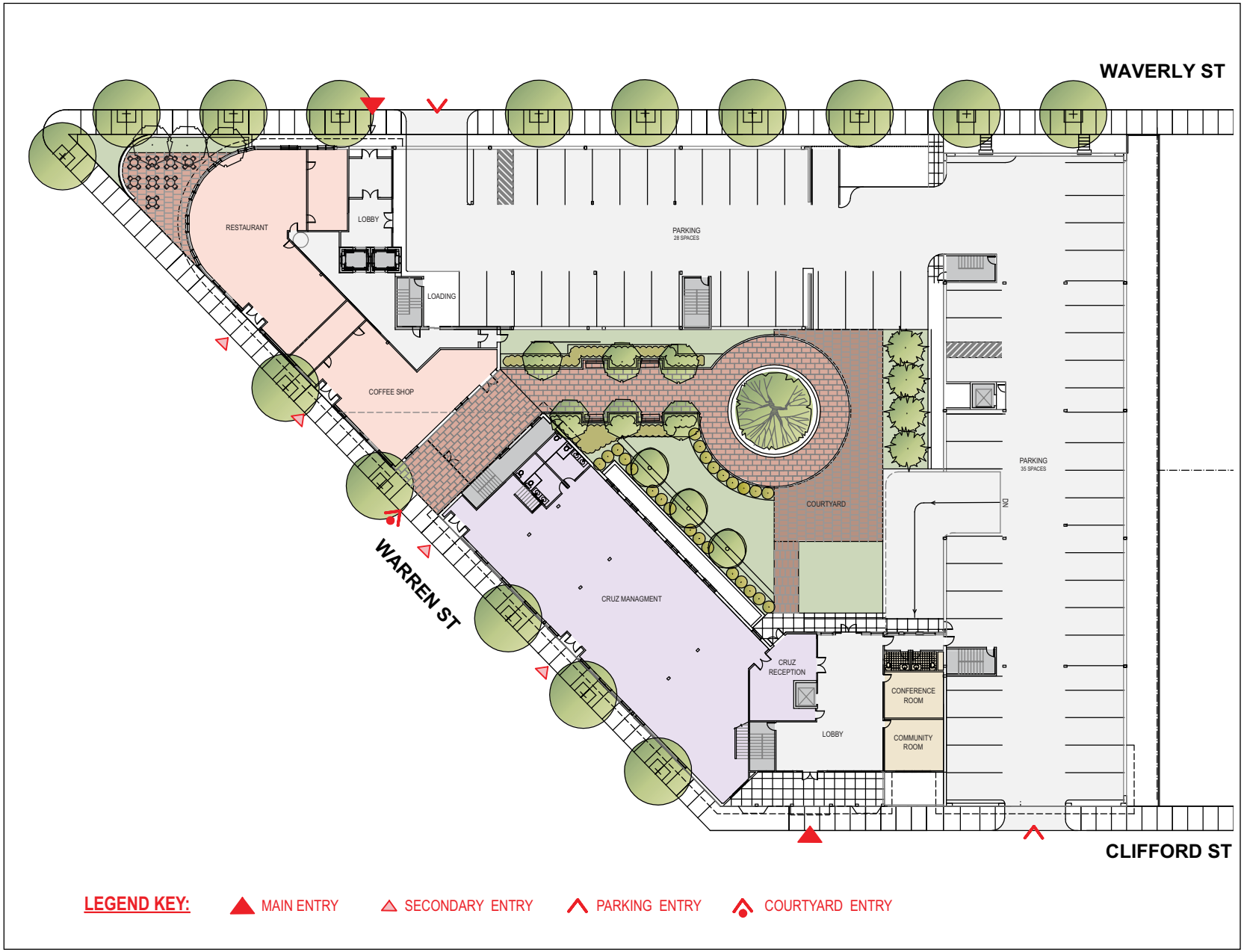


Figure 7-13.
Site Access Plan

7.4.4 Bicycle Accommodations

BTD has established guidelines requiring projects subject to Transportation Access Plan Agreements to provide secure bicycle parking for residents and office employees. Based on BTD guidelines, the Project will supply approximately 100 secure bicycle parking/storage spaces within the parking garage.

7.4.5 Trip Generation Methodology

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

To estimate the number of trips expected to be generated by the Project, data published by the Institute of Transportation Engineers (ITE) in the *Trip Generation Manual*[4] were used. ITE provides data to estimate the total number of unadjusted vehicular trips associated with the Project. In an urban setting well-served by transit, adjustments are necessary to account for other travel mode shares such as walking, bicycling, and transit. To estimate the unadjusted number of vehicular trips for the Project, the following ITE land use code (LUCs) was used:

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

Land Use Code 252 – Senior Adult Housing - Attached. The Senior Adult Housing - Attached land use code is defined as attached independent living developments, including retirement communities, age restricted housing, and active adult communities. These developments may include limited social or recreational services and generally lack centralized dining and on-site medical facilities. Calculation of the number of trips uses ITE's average rate per dwelling unit.

Land Use Code 310 – General Office Building. The General Office Building land use code is defined as an office building containing multiple tenants. An office building typically contains a mixture of professional services. Trip generation estimates are based on average vehicular trip rates per 1,000 square feet of office.

Land Use Code 820 – Shopping Center. The Shopping Center land use code is defined as a commercial establishment that is planned, developed, owned, and managed as a unit. Calculation of the number of trips uses ITE's average rate per 1,000 square feet.

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

7.4.6 Mode Share

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

Table 7-7 Travel Mode Shares

Time Period		Vehicle Occupancy Rate[1]	Walk/Bike Share[2]	Transit Share[2]	Vehicle Share[2]
Daily					
Residential	In	1.13	26%	17%	57%
	Out	1.13	26%	17%	57%
Office	In	1.13	17%	24%	59%
	Out	1.13	17%	24%	59%
Retail	In	1.78	35%	12%	53%
	Out	1.78	35%	12%	53%
a.m. Peak Hour					
Residential	In	1.13	27%	19%	54%
	Out	1.13	27%	29%	44%
Office	In	1.13	18%	27%	55%
	Out	1.13	17%	40%	43%
Retail	In	1.78	36%	13%	51%
	Out	1.78	37%	21%	52%
p.m. Peak Hour					
Residential	In	1.13	27%	29%	44%
	Out	1.13	27%	19%	54%
Office	In	1.13	17%	40%	43%
	Out	1.13	18%	27%	55%
Retail	In	1.78	37%	21%	52%
	Out	1.78	36%	13%	51%

1 2009 National Household Travel Survey.
2 Based on rates published by the Boston Transportation Department for Area 15 – Roxbury.

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

7.4.7 Project Trip Generation

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

Table 7-8 Trip Generation Summary

Time Period		Walk/Bicycle Trips	Transit Trips	Vehicle Trips
Daily				
Apartment[1]	In	50	33	96
	Out	50	33	96
	Total	**100**	**66**	**192**
Senior Housing[2]	In	22	15	43
	Out	22	15	43
	Total	**44**	**30**	**86**
Office[3]	In	16	23	31
	Out	16	23	31
	Total	**32**	**46**	**62**
Retail[4]	In	42	14	35
	Out	42	14	35
	Total	**84**	**28**	**70**
a.m. Peak Hour				
Apartment[1]	In	2	1	3
	Out	6	7	10
	Total	**8**	**8**	**13**
Senior Housing[2]	In	1	0	1
	Out	2	2	4
	Total	**3**	**2**	**5**
Office[3]	In	4	6	7
	Out	1	2	1
	Total	**5**	**8**	**8**
Retail[4]	In	1	1	1
	Out	1	0	1
	Total	**2**	**1**	**2**

Time Period		Walk/Bicycle Trips	Transit Trips	Vehicle Trips
p.m. Peak Hour				
Apartment[1]	In	6	7	10
	Out	3	2	6
	Total	**9**	**9**	**16**
Senior Housing[2]	In	2	2	4
	Out	1	1	3
	Total	**3**	**3**	**7**
Office[3]	In	1	2	1
	Out	4	6	6
	Total	**5**	**8**	**7**
Retail[4]	In	4	2	3
	Out	4	1	3
	Total	**8**	**3**	**6**

1 Based on ITE LUC 220 – 51Apartment units, average rate.
2 Based on ITE LUC 252 – 44 Senior Adult Housing – Attached units, average rate.
3 Based on ITE LUC 710 – 9,684 square feet General Office, average rate.
4 Based on ITE LUC 820 – 3,117 square feet Shopping Center, average rate.

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 illustrated in **Figure 7-14**.

7.4.9 Build (2023) Traffic Volumes

The vehicle trips were distributed through the study area. The project-generated trips for the weekday a.m. Peak Hour and weekday p.m. Peak Hour are shown in **Figure 7-15** and **Figure 7-16**, respectively. The trip assignments were added to the No-Build (2023) Condition vehicular traffic volumes to develop the Build (2023) Condition vehicular traffic volumes. The Build (2023) weekday a.m. Peak Hour and weekday p.m. Peak Hour traffic volumes are shown on **Figure 7-17** and **Figure 7-18**, respectively.

7.4.10 Build (2023) Condition Traffic Operations Analysis

The Build (2023) Condition capacity analysis uses the same methodology as the Existing (2016) Condition capacity analysis and the No-Build (2023) Condition capacity analysis. **Table 7-9** and **Table 7-10** present the Build (2023) Condition capacity analysis for the weekday a.m. Peak Hour and weekday p.m. Peak Hour, respectively. The shaded cells in the tables indicate a worsening of LOS between the No-Build (2023) Condition and the Build (2023) Condition. The detailed analysis sheets are provided in **Appendix D**.

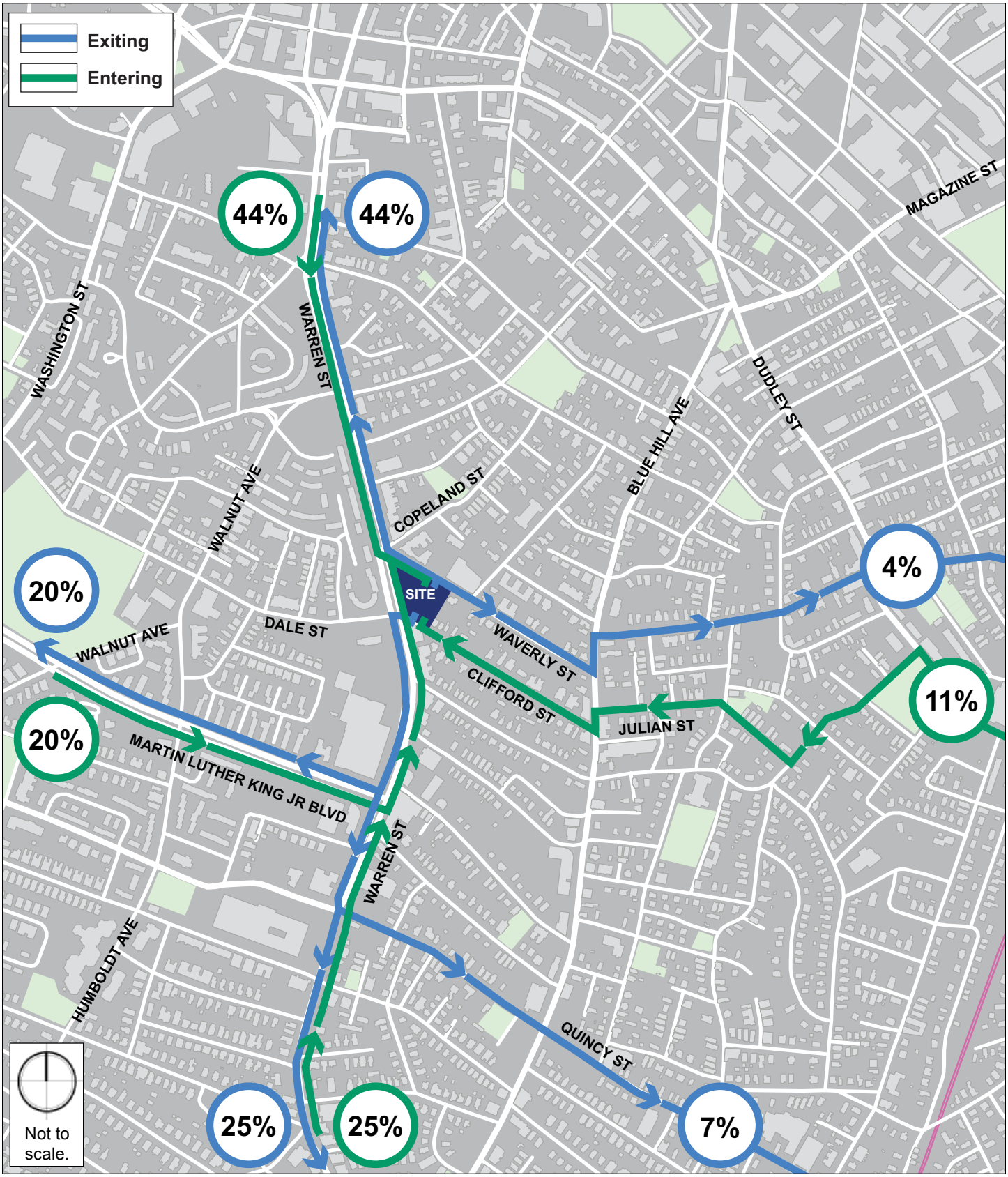


Figure 7-14.
Vehicle Trip Distribution

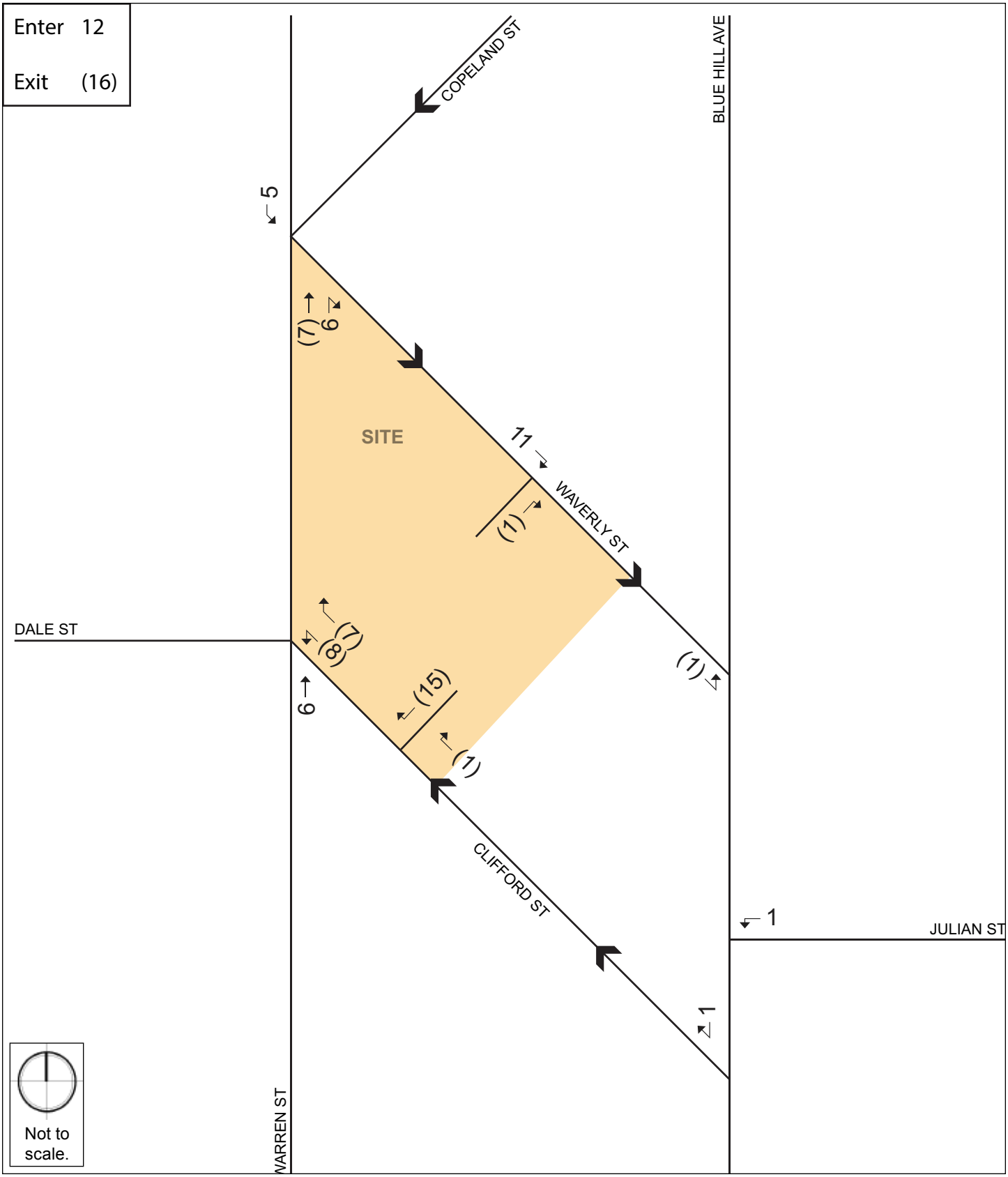


Figure 7-15.
Project-generated Trips, Weekday a.m. Peak Hour

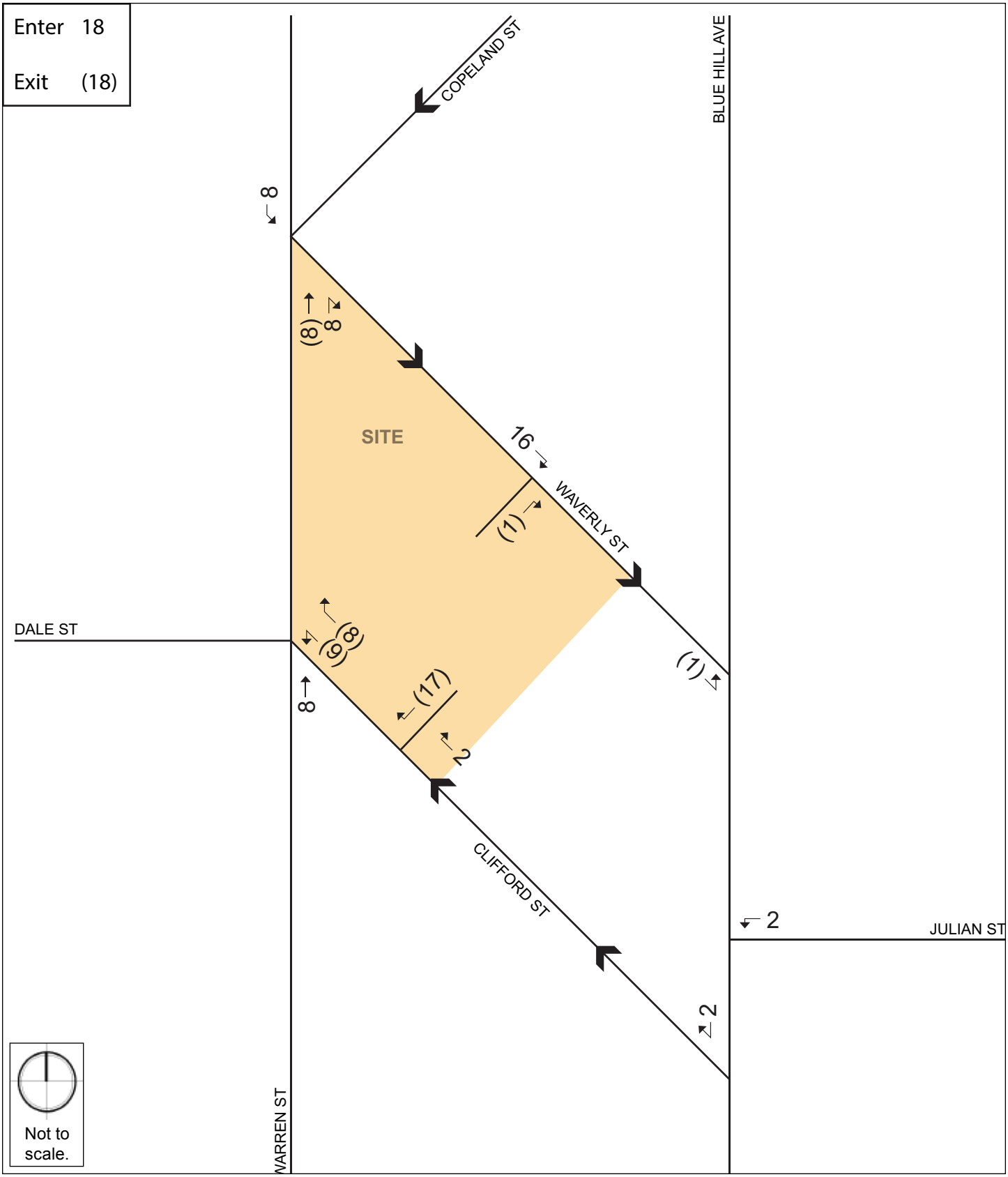


Figure 7-16.
Project-generated Trips, Weekday p.m. Peak Hour

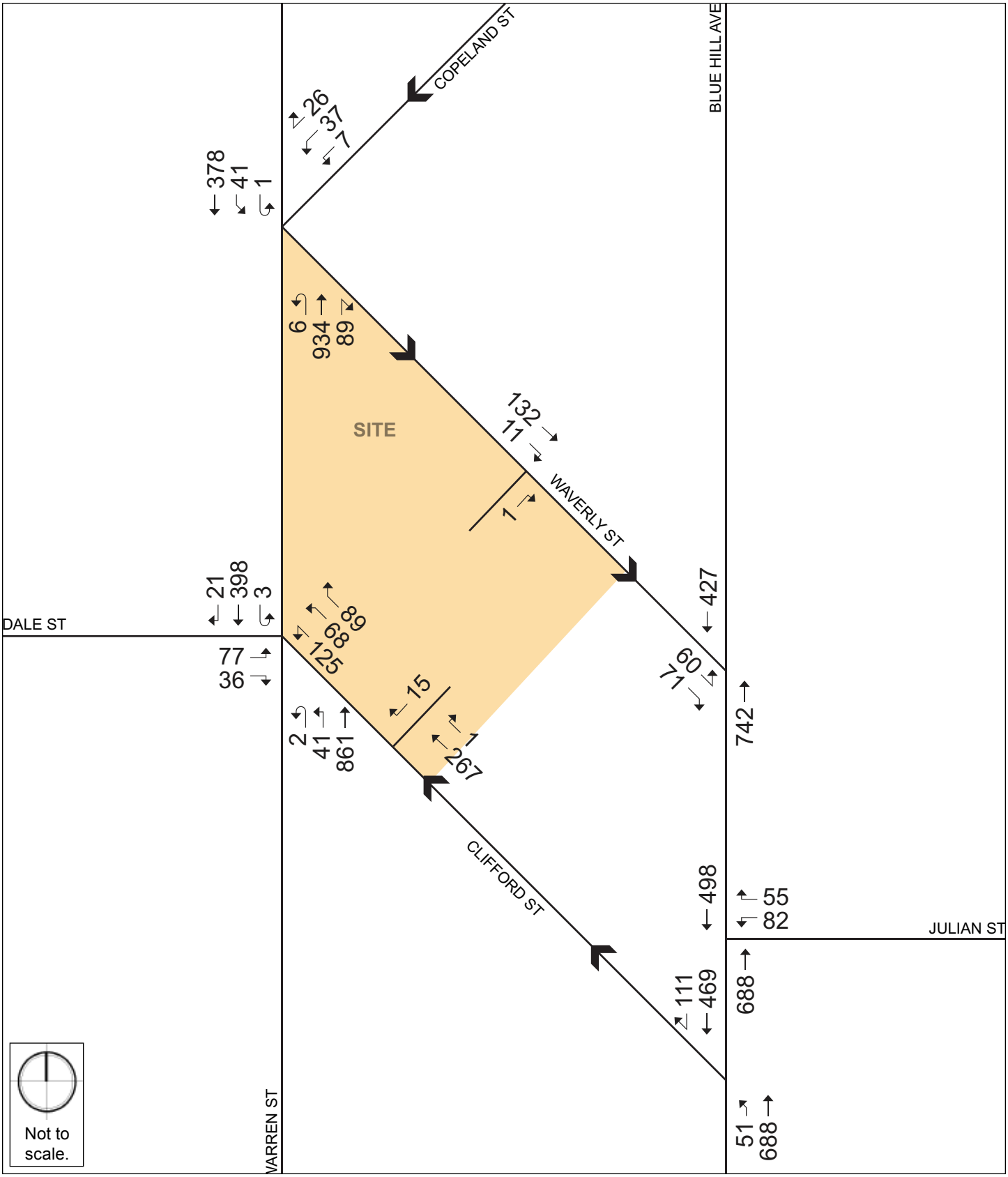


Figure 7-17.
Build (2023) Condition Traffic Volumes, Weekday a.m. Peak Hour

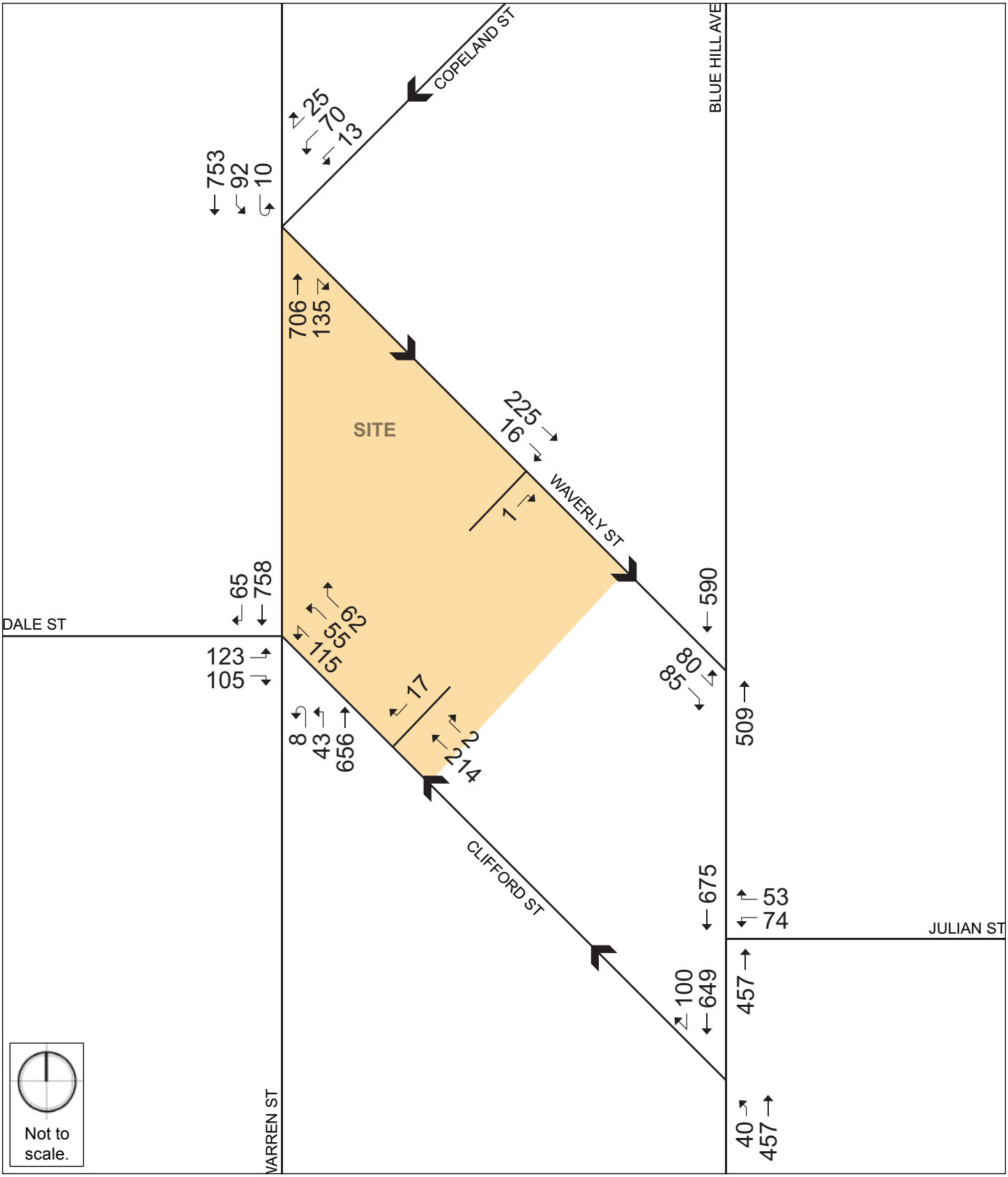


Figure 7-18.
Build (2023) Condition Traffic Volumes, Weekday p.m. Peak Hour

Table 7-9 Build (2023) Condition Capacity Analysis Summary, Weekday a.m. Peak Hour

Intersection/Approach	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (ft)	95th Percentile Queue (ft)
Signalized Intersections					
Warren Street/Clifford Street/Dale Street	**C**	**22.3**	**-**	**-**	**-**
Dale Street eastbound left/right	C	22.9	0.40	49	89
Clifford Street westbound left/thru/right	D	39.8	0.68	174	276
Warren Street northbound left	B	19.2	0.11	20	45
Warren Street northbound thru | thru	C	23.1	0.57	275	347
Warren Street southbound thru | thru/right	A	8.5	0.27	33	46
Warren Street/Waverly Street/Copeland Street	**A**	**8.7**	**-**	**-**	**-**
Copeland Street westbound hard left/left/right	C	23.5	0.31	19	62
Warren Street northbound thru | thru/hard right	A	5.4	0.60	53	64
Warren Street southbound bear left	C	20.3	0.28	20	51
Warren Street southbound thru | thru	B	13.1	0.22	78	108
Unsignalized Intersections					
Blue Hill Avenue/Waverly Street	**-**	**-**	**-**	**-**	**-**
Waverly Street eastbound left/right	D	30.6	0.54	-	74
Blue Hill Avenue northbound thru	A	0.0	0.46	-	0
Blue Hill Avenue southbound thru	A	0.0	0.28	-	0
Blue Hill Avenue/Clifford Street	-	-	-	-	-
Blue Hill Avenue northbound left/thru	A	1.4	0.05	-	4
Blue Hill Avenue southbound thru/right	A	0.0	0.36	-	0

Gray shading indicates decrease in LOS from No-Build Condition below LOS E or LOS F.

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

Intersection/Approach	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (ft)	95th Percentile Queue (ft)
Signalized Intersections					
Warren Street/Clifford Street/Dale Street	**C**	**21.9**	**-**	**-**	**-**
Dale Street eastbound left/right	D	36.6	0.68	133	215
Clifford Street westbound left/thru/right	D	43.4	0.72	172	234
Warren Street northbound left	C	28.5	0.34	25	64
Warren Street northbound thru | thru	C	24.4	0.49	186	241
Warren Street southbound thru | thru/right	A	7.9	0.59	51	64
Warren Street/Waverly Street/Copeland Street	**B**	**17.9**	**-**	**-**	**-**
Copeland Street westbound hard left/left/right	C	24.0	0.30	44	91
Warren Street northbound thru | thru/hard right	A	8.6	0.59	79	100
Warren Street southbound bear left	D	41.6	0.61	56	#139
Warren Street southbound thru | thru	C	24.1	0.52	205	262
Unsignalized Intersections					
Blue Hill Avenue/Waverly Street	**-**	**-**	**-**	**-**	**-**
Waverly Street eastbound left/right	E	43.2	0.69	-	116
Blue Hill Avenue northbound thru	A	0.0	0.32	-	0
Blue Hill Avenue southbound thru	A	0.0	0.40	-	0
Blue Hill Avenue/Clifford Street	-	-	-	-	-
Blue Hill Avenue northbound left/thru	A	1.4	0.05	-	4
Blue Hill Avenue southbound thru/right	A	0.0	0.47	-	0

Gray shading indicates decrease in LOS from No-Build Condition below LOS E or LOS F.

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

7.5 Transportation Demand Management

The Proponent is committed to implementing Transportation Demand Management (TDM) measures to minimize automobile usage and Project-traffic impacts. The TDM program may include an on-site transportation coordinator, transit pass subsidies for employees, secure bicycle parking areas, and distributions of transit maps and schedules to residents, guests, and employees. TDM measures will be described and evaluated in the DPIR and Transportation Access Plan Agreement ("TAPA").

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

The Proponent is prepared to take advantage of good transit access in marketing the Proposed Project to future residents and office tenants by working with them to implement the following TDM measures to encourage the use of non-vehicular modes of travel. The TDM measures for the Proposed Project may include but are not limited to the following:

Alternative Mode Benefits/Tactics

The primary alternative transportation modes to be encouraged will be public transportation, bicycling, and walking.

- The primary alternative transportation modes to be encouraged will be public transportation, bicycling, and walking.
- The Proponent will designate a transportation coordinator to oversee transportation issues, including parking, service and loading, and deliveries;
- On-site management will work with tenants as they move in to help facilitate transportation for new arrivals;
- The Proponent will provide orientation packets to new tenants containing information on available transportation choices, including public transportation routes/schedules, nearby vehicle sharing and bicycle sharing locations, and walking opportunities;
- Provide an annual (or more frequent) newsletter or bulletin summarizing transit, ridesharing, bicycling, alternative work schedules, and other travel options; and
- Provide information on travel alternatives for employees, residents, and visitors via the Internet and in the building lobby.

Bicycle/Pedestrian Trips

Promotions and incentives to encourage bicycle and pedestrian trips include:

- Providing covered, secure bicycle storage for building occupants; and
- Providing on-site external bike racks for visitors.

Public Transportation

The goal of the following promotion and incentive measures are to increase public transit use to and from the site:

- Posting information about public transportation in the lobby;
- Encourage employers to subsidize on-site full-time employees' purchase of monthly transit passes; and
- Promote to commercial tenants that, as employers, they can save on payroll-related taxes and provide employee benefits when they offer transportation benefits such as subsidized public transportation.

Electric Vehicle

The goal of the following promotion and incentive measures are to accommodate tenants traveling to the site in an electric vehicle:

- Provide electric vehicle charging stations to accommodate 5 percent of the total parking and sufficient infrastructure capacity for future accommodation of at least 15% of the total parking spaces.

7.6 Transportation Mitigation Measures

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

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

both the Proponent and the BTD. Because the TAPA must incorporate the results of the technical analysis, it must be executed after these other processes have been completed. The proposed measures listed above and any additional transportation improvements to be undertaken as part of this Project will be defined and documented in the TAPA.

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

7.7 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 to be filed with BTD in accordance with the City's transportation maintenance plan requirements.

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

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

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

8.0 COORDINATION WITH GOVERNMENTAL AGENCIES

8.1 Architectural Access Board Requirements

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

8.2 Massachusetts Environmental Policy Act

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

8.3 Boston Civic Design Commission

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

9.0 PROJECT CERTIFICATION

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

Cruz Development Corporation

Signature of Proponent
Daniel Cruz, Jr., Vice- President

September 26, 2016
Date

Mitchell L. Fischman Consulting LLC

Signature of Preparer
Mitchell L. Fischman, Principal

9/26/16
Date

APPENDIX A - LETTER OF INTENT TO FILE PNF, JULY 13, 2016

MLF CONSULTING LLC

Mitchell L. Fischman
Consulting LLC
41 Brush Hill Road
Newton, MA 02461
www.bostonpermitting.com

July 12, 2016

VIA HAND DELIVERY

Brian Golden, Director
Boston Redevelopment Authority
One City Hall Square, 9th Floor
Boston, MA 02201
Attn: Gary Uter, Senior Project Assistant

RE: Letter of Intent to File Project Notification Form
Article 80 - Large Project Review
270, 280-290 and ES Warren Street, and 2-10 Clifford Street Mixed-Use, Mixed-Income Residential Development, Roxbury

Dear Director Golden:

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

The Proponent's Proposed Project involves the redevelopment of an approximately 67,148 square foot (1.54 acre) site including an existing church along with several vacant structures, in poor condition, and vacant land with a new mixed-use, mixed-income residential development to be developed in two phases, consisting of approximately 95 residential rental units, some of which are for elderly residents, in two 4 - 5 story buildings (the "Buildings") plus approximately 9,684 gsf of ground floor office use, and 3,115 gsf of ground floor retail use, all served by approximately 104 garage parking spaces (the "Proposed Project"). As part of the overall residential units, there would be on-site units to address the City of Boston's Inclusionary Zoning Policy. In addition, the Proposed Project will further the objectives of Mayor Martin J. Walsh's Housing Plan, Housing a Changing City: Boston 2030.

The Site is bordered by Warren Street, Clifford Street, Waverly Street, and properties between Waverly and Clifford Streets (the "Proposed Site"). The existing on-site buildings are proposed to be demolished to enable the new project to be constructed.

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 within one mile of the Site.

By combining the 280-290 Warren Street property, owned by the City of Boston, with abutting privately owned property, Cruz will implement an approximately $47 million development program for the two-phased residential program that meets the specific housing goals of the city and the Roxbury neighborhood. Please see **Figure 1**: Project Locus.

The Phase 1 proposal is to construct, at a minimum, a 51-unit, mixed-income residential development to be named the **Dr. Michael E. Haynes Arms** building, with approximately 85,000 gross square feet of floor area for work-force housing. The Phase 1 proposal will utilize the approximately 9,684 gsf that is under control of the City's Department of Neighborhood Development ("DND") (and for which Cruz has been tentatively designated by DND as the Project Redeveloper) plus abutting property located at 2-10 Clifford Street (for which Cruz has an option to purchase). The Phase 1 ground floor office space will be occupied by offices for the Cruz Companies. The Phase 1 proposal is for the design, development and construction of the Buildings, that will be consistent with the design of many of the existing buildings found on Warren Street, and includes two-levels of parking for a total of approximately 74 garage spaces on two levels. The Phase 1 proposal also provides a substantial new anchor of housing and commercial development at a strategic location between Roxbury's Dudley Street and Blue Hill Avenue.

The Phase 2 proposal will require acquisition of two additional properties located on the same block as the Phase 1 properties. Another mixed-use building, consisting of ground-level commercial uses and 44-units of elderly housing will be constructed on that site. An additional parking garage for approximately 30 spaces will also be provided for this phase of the development with access coordinated with the Phase 1 development.

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 Expanded PNF filing is expected to address many issues normally presented in a Draft Project Impact Report ("DPIR") including transportation, air and noise, shadow, and Infrastructure analyses. In addition, a discussion of historic resources within the project vicinity, and completion of other environmental evaluations that will help explain potential project impacts from the proposed uses, and any needed mitigation measures to reduce these impacts, will be outlined in the Expanded PNF.

The Project Site is located in the MFR/LS subdistrict of the Roxbury Neighborhood Zoning District, Article 50, which permits multi-family dwellings of up to four stories and office uses, although it is expected that the floor area ratio and height may exceed the zoning limitations and some dimensional requirements may not be met by the proposed project under the existing zoning regulations, and certain use variances or conditional permits will be needed for both the residential and non-residential uses.

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 BRA project team being coordinated by Gary Uter, Senior Project Assistant.

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,

MITCHELL L. FISCHMAN ("MLF") CONSULTING LLC
On Behalf of the Project Proponent

Mitchell L. Fischman, Principal

Attachment: Figure 1: Project Locus (270, 280-290 and ES Warren Street and 2-10 Clifford Street, Roxbury)

cc: Jonathan Greeley, BRA, Director of Development Review and Policy
Gary Uter, BRA, Senior Project Assistant
Tito Jackson, District 7 City Councilor
Sonia Chang-Diaz, State Senator - 2nd Suffolk District
Gloria Fox, State Representative - 7th Suffolk District
Kaira Fox, Mayor's Office of Neighborhood Services, Roxbury
John Cruz, Cruz Development Corporation
Daniel Cruz, Cruz Development Corporation
Edgar Carrere, Cruz Development Corporation

Figure 1 Project Locus
270, 280 - 290 and ES Warren St, 2-10 Clifford St, Roxbury

APPENDIX B - AIR QUALITY APPENDIX

APPENDIX B
AIR QUALITY

280-290 WARREN STREET
PROJECT NOTIFICATION FORM

MOVES2014 CO Emission Rates (grams/hour)

Zone ID	Road Type ID	Link Length (miles)	Link Volume (Vehicles/Hr)	Link Avg Speed (Miles/Hr)	Pollutant	Emission Factor (Grams/veh-mi)
250250	5	0.18	19	5	CO	2.976
250250	5	0.06	17	5	CO	2.976

```
INDOOR GARAGE ANALYSIS PROGRAM

  PROJECT:  WAVERLY STREET PARKING GARAGE PEAK AM HOUR


 TOTAL VOLUME:            12 VEH/HOUR

                 CO RATE:     2.976 GRAMS CO/VEH-MI

  VENT CFM:                  6,100 CFM



  TOTAL CO EMISSIONS =   0.61 GRAMS/MIN  =  0.0101 GRAMS/SEC
  TOTAL VENTILATION  =     172 CU. M/MIN


      PEAK 1-HOUR CO CONCENTRATION FROM VEHICLES:   3.08 PPM

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

PROJECT:  WAVERLY STREET PARKING GARAGE PEAK PM HOUR

  TOTAL VOLUME:            17 VEH/HOUR

                 CO RATE:     2.976 GRAMS CO/VEH-MI


  VENT CFM:                  6.100 CFM



  TOTAL CO EMISSIONS =   0.86 GRAMS/MIN  =  0.0143 GRAMS/SEC
  TOTAL VENTILATION  =     172 CU. M/MIN


      PEAK 1-HOUR CO CONCENTRATION FROM VEHICLES:  4.36 PPM
```

```
INDOOR GARAGE ANALYSIS PROGRAM

  PROJECT:  CLIFFORD STREET PARKING GARAGE PEAK AM HOUR


 TOTAL VOLUME:            16 VEH/HOUR

                 CO RATE:     2.976 GRAMS CO/VEH-MI

  VENT CFM:                  28,200 CFM


  TOTAL CO EMISSIONS =   2.71 GRAMS/MIN  =  0.0452 GRAMS/SEC
  TOTAL VENTILATION  =     799 CU. M/MIN


      PEAK 1-HOUR CO CONCENTRATION FROM VEHICLES:   2.97 PPM

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

PROJECT:  CLIFFORD STREET PARKING GARAGE PEAK PM HOUR

  TOTAL VOLUME:            19 VEH/HOUR

                 CO RATE:     2.976 GRAMS CO/VEH-MI


  VENT CFM:                  28,200 CFM


  TOTAL CO EMISSIONS =   3.22 GRAMS/MIN  =  0.0537 GRAMS/SEC
  TOTAL VENTILATION  =     799 CU. M/MIN


      PEAK 1-HOUR CO CONCENTRATION FROM VEHICLES:  3.52 PPM
```

```
*** AERMOD - VERSION  15181 ***   *** Michael Haynes Building                                                    ***        07/12/16
 *** AERMET - VERSION 14134  ***   *** CO 1-hour Screening Modeling                                              ***        14:56:25
                                                                                                                            PAGE   1
 **MODELOPTs:   NonDFAULT CONC      FLAT      FLGPOL    NOCHKD    SCREEN    NODRYDPLT NOWETDPLT URBAN

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

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

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

 **Model Uses URBAN Dispersion Algorithm for the SBL for     2 Source(s),
   for Total of    1 Urban Area(s):
   Urban Population =      7750.0 ;  Urban Roughness Length =  1.000 m

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

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

 **Model Accepts FLAGPOLE Receptor Heights.

 **The User Specified a Pollutant Type of:  CO

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

 **This Run Includes:      2 Source(s);       3 Source Group(s); and     172 Receptor(s)

               with:      0 POINT(s), including
                          0 POINTCAP(s) and      0 POINTHOR(s)
                and:      2 VOLUME source(s)
                and:      0 AREA type source(s)
                and:      0 LINE source(s)
                and:      0 OPENPIT source(s)


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

 **The AERMET Input Meteorological Data Version Date: 14134

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

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

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

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

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

 **File for Summary of Results:   W:\Apps\aermod\4107\CO.SUM
 *** AERMOD - VERSION  15181 ***   *** Michael Haynes Building                                                    ***        07/12/16
 *** AERMET - VERSION 14134  ***   *** CO 1-hour Screening Modeling                                               ***        14:56:25
                                                                                                                             PAGE   2
 **MODELOPTs:   NonDFAULT CONC      FLAT      FLGPOL    NOCHKD    SCREEN    NODRYDPLT NOWETDPLT URBAN

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

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

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


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

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

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

First 24 hours of scalar data

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

First hour of profile data

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

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

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

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

GROUP ID		AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	NETWORK GRID-ID
ALL	HIGH 1ST HIGH VALUE IS	87.37781	ON 10062502:	AT (234506.91, 896746.69, 5.00, 5.00, 9.14)	DC	
WAVERLY	HIGH 1ST HIGH VALUE IS	25.27899	ON 10112401:	AT (234521.59, 896867.43, 5.00, 5.00, 12.20)	DC	
CLIFFORD	HIGH 1ST HIGH VALUE IS	73.74271	ON 10062502:	AT (234506.91, 896746.69, 5.00, 5.00, 9.14)	DC	

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

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

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

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

A Total of   18504 Hours Were Processed

A Total of   0 Calm Hours Identified

A Total of   0 Missing Hours Identified (0.00 Percent)

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

APPENDIX C - NOISE APPENDIX

APPENDIX C
NOISE

280-290 WARREN STREET
PROJECT NOTIFICATION FORM

Figure 1
Sound Monitoring and Modeling Receptor Locations
280-290 Warren Street
Roxbury, MA

TECH environmental
FOCUSED KNOWLEDGE. REAL SOLUTIONS.

Sound Monitoring Results

	S1	S2	S3
Broadband			
Lmax	69.4	77.2	70.4
Leq	53.1	59.5	49.9
L90	44.5	45.7	45.2
Octave Bands L90			
16	50.2	50.0	50.2
31.5	53.4	55.7	53.7
63	53.5	56.2	55.4
125	50.2	52.8	54.4
250	46.7	45.0	48.4
500	42.1	41.8	42.6
1000	38.9	41.1	38.7
2000	36.4	38.2	35.3
4000	37.6	37.6	37.1
8000	40.6	40.5	40.4
16000	43.9	43.9	43.9

Cadna Noise Modeling Results

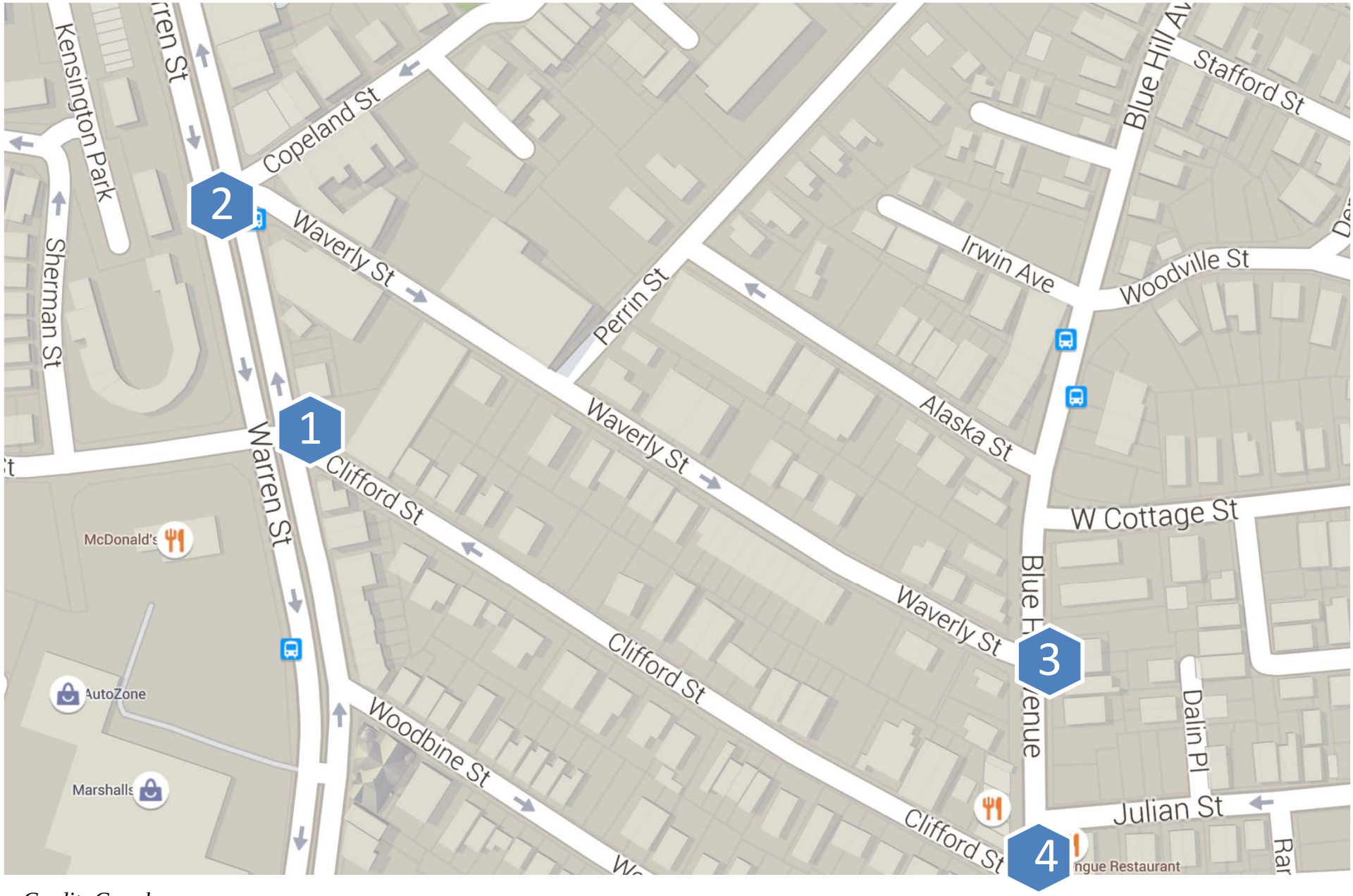
Name	ID	Sound Level (dBA)	Octave Bands 31 (dB)	63 (dB)	125 (dB)	250 (dB)	500 (dB)	1000 (dB)	2000 (dB)	4000 (dB)	8000 (dB)
55-73 Kensington Pk	2nd_Floor	37.7	61	56	46	39	33	31	24	15	2
2 Waverly St	4th_Floor	38.5	63	58	47	39	34	31	23	13	1
6 Waverly St	4th_Floor	41.9	68	62	50	43	37	35	26	17	7
29 Waverly St	3rd_Floor	36.7	61	58	45	37	32	29	18	12	4
16 Clifford St	2nd_Floor	36.4	62	60	43	35	28	27	19	15	10
300-304A Warren St	3rd_Floor	38.6	61	59	47	40	34	31	22	14	4
Boston Limits		50	68	67	61	52	46	40	33	28	26

APPENDIX D - TRANSPORTATION APPENDIX

TRANSPORTATION TECHNICAL APPENDIX

- TRAFFIC COUNTS
- SEASONAL ADJUSTMENT FACTORS
- INTERSECTION CAPACITY ANALYSIS WORKSHEETS
- TRIP GENERATION CALCULATIONS

TRAFFIC COUNTS



Map Credit: Google.com

BOSTON TRAFFIC DATA	BTD ID: 0003_HSH	Boston, MA	# of TMC's: 04	Client: Howard Stein Hudson
		Collected on May 24, 2016	# of ATR's: 00	Contact: Michael Littman

Client:	Littman
Project #:	0003_HSH
Location ID	01
Location:	Boston, MA
Street 1:	Warren St
Street 2:	Clifford/Dale
Count Date:	5/24/2016
Day of Week:	Tuesday
Weather:	Mild and Wet, high of 59F

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TOTAL (CARS & TRUCKS)

	Warren St Northbound				Warren St Southbound				Dale St Eastbound				Clifford St Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	1	8	187	0	1	0	101	1	0	16	0	8	0	32	12	26
7:15 AM	0	9	199	0	1	0	98	6	0	18	0	7	0	30	17	22
7:30 AM	0	11	233	0	0	0	95	8	0	19	0	9	0	27	21	17
7:45 AM	1	12	230	0	1	0	96	5	0	24	0	11	0	24	16	17
8:00 AM	0	13	191	0	0	0	87	3	0	26	0	13	0	20	11	17
8:15 AM	1	15	195	0	0	0	88	9	0	27	0	10	0	20	10	18
8:30 AM	1	15	196	0	1	0	74	10	0	25	0	6	0	19	9	19
8:45 AM	0	14	189	0	0	0	75	8	0	23	0	8	0	17	7	20

	Warren St Northbound				Warren St Southbound				Dale St Eastbound				Clifford St Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	1	8	140	0	0	0	180	12	0	30	0	31	0	29	15	14
4:15 PM	1	7	145	0	0	0	179	14	0	35	0	30	0	32	17	16
4:30 PM	2	10	159	0	0	0	189	18	0	34	0	28	0	27	14	14
4:45 PM	3	13	168	0	0	0	196	19	0	24	0	21	0	22	10	11
5:00 PM	2	12	165	0	0	0	190	14	0	29	0	22	0	21	12	11
5:15 PM	0	10	169	0	0	0	190	9	0	28	0	19	0	19	13	10
5:30 PM	1	12	160	0	0	0	177	16	0	25	0	26	0	19	13	11
5:45 PM	2	11	138	0	0	0	163	19	0	31	0	32	0	18	12	11

AM PEAK HOUR 7:00 AM to 8:00 AM	Warren St Northbound				Warren St Southbound				Dale St Eastbound				Clifford St Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	2	**40**	**849**	**0**	**3**	**0**	**390**	**20**	**0**	**77**	**0**	**35**	**0**	**113**	**66**	**82**
PHF	**0.91**				**0.98**				**0.80**				**0.93**			
HV %	**5.7%**				**12.7%**				**4.3%**				**1.1%**			

PM PEAK HOUR 4:15 PM to 5:15 PM	Warren St Northbound				Warren St Southbound				Dale St Eastbound				Clifford St Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	8	**42**	**637**	**0**	**0**	**0**	**754**	**65**	**0**	**122**	**0**	**101**	**0**	**102**	**53**	**52**
PHF	**0.93**				**0.95**				**0.86**				**0.80**			
HV %	**8.7%**				**3.2%**				**2.4%**				**0.0%**			

Client:	Littman
Project #:	0003_HSH
Location ID	01
Location:	Boston, MA
Street 1:	Warren St
Street 2:	Clifford/Dale
Count Date:	5/24/2016
Day of Week:	Tuesday
Weather:	Mild and Wet, high of 59F

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TRUCKS

	Warren St Northbound				Warren St Southbound				Dale St Eastbound				Clifford St Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	16	0	0	0	7	0	0	1	0	1	0	0	3	2
7:15 AM	0	0	18	0	0	0	6	1	0	1	0	1	0	1	2	2
7:30 AM	0	0	19	0	0	0	5	1	0	0	0	1	0	0	1	2
7:45 AM	1	0	16	0	0	0	8	0	0	1	0	0	0	0	0	0
8:00 AM	0	0	13	0	0	0	11	0	0	1	0	0	0	2	0	0
8:15 AM	0	0	12	0	0	0	11	1	0	2	0	1	0	0	0	0
8:30 AM	1	0	10	0	0	0	11	1	0	2	0	0	0	0	0	0
8:45 AM	0	0	11	0	0	0	10	0	0	0	0	0	0	0	0	0

	Warren St Northbound				Warren St Southbound				Dale St Eastbound				Clifford St Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	7	0	0	0	7	0	0	0	0	0	0	0	0	1
4:15 PM	0	0	4	0	0	0	7	0	0	2	0	2	0	1	0	2
4:30 PM	0	0	11	0	0	0	8	0	0	1	0	1	0	1	0	0
4:45 PM	0	2	18	0	0	0	8	0	0	0	0	0	0	0	0	1
5:00 PM	0	1	19	0	0	0	8	1	0	1	0	1	0	0	0	0
5:15 PM	0	0	19	0	0	0	7	0	0	2	0	1	0	0	0	0
5:30 PM	0	1	13	0	0	0	5	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	6	0	0	0	3	1	0	0	0	0	0	0	0	0

AM PEAK HOUR 7:00 AM to 8:00 AM	Warren St Northbound				Warren St Southbound				Dale St Eastbound				Clifford St Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	1	**0**	**69**	**0**	**0**	**0**	**26**	**2**	**0**	**3**	**0**	**3**	**0**	**1**	**6**	**6**
PHF	**0.92**				**0.88**				**0.75**				**0.65**			

PM PEAK HOUR 4:30 PM to 5:30 PM	Warren St Northbound				Warren St Southbound				Dale St Eastbound				Clifford St Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**3**	**67**	**0**	**0**	**0**	**31**	**1**	**0**	**4**	**0**	**3**	**0**	**1**	**0**	**1**
PHF	**0.88**				**0.89**				**0.58**				**0.50**			

Client:	Littman
Project #:	0003_HSH
Location ID	01
Location:	Boston, MA
Street 1:	Warren St
Street 2:	Clifford/Dale
Count Date:	5/24/2016
Day of Week:	Tuesday
Weather:	Mild and Wet, high of 59F

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PEDESTRIANS & BICYCLES

	Warren St Northbound					Warren St Southbound					Dale St Eastbound					Clifford St Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
7:00 AM	0	0	0	1		0	1	0	1		0	0	0	0		0	0	0	0	
7:15 AM	0	0	0	2		0	0	0	1		0	0	0	0		0	0	0	0	
7:30 AM	0	5	0	0		0	0	0	0		0	0	0	0		0	0	0	0	
7:45 AM	0	0	0	3		0	0	0	3		0	0	0	0		0	0	0	2	
8:00 AM	0	0	0	3		0	0	0	2		0	0	0	1		0	0	0	1	
8:15 AM	0	0	0	4		0	0	0	4		0	0	0	0		0	0	0	1	
8:30 AM	0	0	0	5		0	0	0	5		0	1	0	0		0	0	0	1	
8:45 AM	0	0	0	6		0	0	0	7		0	0	0	0		0	0	0	0	

	Warren St Northbound					Warren St Southbound					Dale St Eastbound					Clifford St Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
4:00 PM	0	3	0	7		0	0	0	6		0	0	0	3		0	0	0	3	
4:15 PM	0	4	0	5		0	0	0	5		1	0	0	4		0	0	0	4	
4:30 PM	0	4	0	8		0	0	0	8		0	0	0	4		0	0	0	5	
4:45 PM	0	3	0	11		0	1	0	11		0	0	0	3		0	0	0	5	
5:00 PM	0	2	0	10		0	0	0	10		0	0	0	3		0	0	0	5	
5:15 PM	0	1	0	9		0	0	0	9		0	0	0	2		0	0	0	4	
5:30 PM	0	2	0	8		0	0	0	8		0	0	0	2		0	0	0	5	
5:45 PM	1	2	0	7		0	2	0	7		0	0	0	1		0	0	0	6	

AM PEAK HOUR[1]	Warren St Northbound					Warren St Southbound					Dale St Eastbound					Clifford St Westbound				
7:00 AM																				
to	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
8:00 AM	0	0	0	18		0	0	0	18		0	1	0	1		0	0	0	3	

PM PEAK HOUR[1]	Warren St Northbound					Warren St Southbound					Dale St Eastbound					Clifford St Westbound				
4:15 PM																				
to	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
5:15 PM	1	7	0	34		0	2	0	34		0	0	0	8		0	0	0	20	

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

Client:	Littman
Project #:	0003_HSH
Location ID	02
Location:	Boston, MA
Street 1:	Warren St
Street 2:	Waverly/Copeland
Count Date:	5/24/2016
Day of Week:	Tuesday
Weather:	Mild and Wet, high of 59F

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TOTAL (CARS & TRUCKS)

	Warren St Northbound				Warren St Southbound				Eastbound				Copeland St Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Hard Left	Left	Thru	Right
7:00 AM	1	0	200	14	0	10	99	0	0	0	0	0	2	10	0	4
7:15 AM	2	0	205	18	0	9	90	0	0	0	0	0	2	9	0	6
7:30 AM	2	0	220	22	0	10	85	0	0	0	0	0	0	7	0	8
7:45 AM	1	0	223	23	1	11	86	0	0	0	0	0	3	9	0	7
8:00 AM	0	0	196	22	1	8	82	0	0	0	0	0	2	8	0	2
8:15 AM	0	0	200	24	2	10	80	0	0	0	0	0	4	9	0	5
8:30 AM	0	0	203	25	3	11	74	0	0	0	0	0	5	7	0	4
8:45 AM	0	0	202	26	1	10	78	0	0	0	0	0	3	8	0	3

	Warren St Northbound				Warren St Southbound				Eastbound				Copeland St Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Hard Left	Left	Thru	Right
4:00 PM	0	0	160	30	2	18	180	0	0	0	0	0	3	11	0	8
4:15 PM	0	0	159	36	3	19	170	0	0	0	0	0	2	14	0	7
4:30 PM	0	0	165	32	3	21	175	0	0	0	0	0	3	19	0	6
4:45 PM	0	0	168	22	2	23	179	0	0	0	0	0	5	22	0	3
5:00 PM	1	0	169	25	4	19	169	0	0	0	0	0	3	18	0	3
5:15 PM	1	0	170	24	5	15	168	0	0	0	0	0	2	19	0	1
5:30 PM	0	0	155	29	3	14	167	0	0	0	0	0	2	16	0	5
5:45 PM	0	0	151	34	0	11	162	0	0	0	0	0	3	9	0	4

AM PEAK HOUR 7:00 AM to 8:00 AM	Warren St Northbound				Warren St Southbound				Eastbound				Copeland St Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Hard Left	Left	Thru	Right
	6	**0**	**848**	**77**	**1**	**40**	**360**	**0**	**0**	**0**	**0**	**0**	**7**	**35**	**0**	**25**
PHF	**0.94**				**0.92**								**0.88**			
HV %	**7.5%**				**13.6%**								**1.7%**			

PM PEAK HOUR 4:00 PM to 5:00 PM	Warren St Northbound				Warren St Southbound				Eastbound				Copeland St Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Hard Left	Left	Thru	Right
	0	**0**	**652**	**120**	**10**	**81**	**704**	**0**	**0**	**0**	**0**	**0**	**13**	**66**	**0**	**24**
PHF	**0.98**				**0.97**								**0.86**			
HV %	**8.8%**				**4.2%**								**4.7%**			

Client:	Littman
Project #:	0003_HSH
Location ID	02
Location:	Boston, MA
Street 1:	Warren St
Street 2:	Waverly/Copeland
Count Date:	5/24/2016
Day of Week:	Tuesday
Weather:	Mild and Wet, high of 59F

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TRUCKS

	Warren St Northbound				Warren St Southbound				Eastbound				Copeland St Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Hard Left	Left	Thru	Right
7:00 AM	0	0	16	1	0	1	11	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	19	1	0	2	6	0	0	0	0	0	0	0	0	1
7:30 AM	0	0	21	0	0	2	5	0	0	0	0	0	0	0	0	1
7:45 AM	0	0	20	2	0	1	9	0	0	0	0	0	0	1	0	0
8:00 AM	0	0	14	2	0	1	13	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	15	3	0	2	8	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	14	4	0	1	13	0	0	0	0	0	0	1	0	0
8:45 AM	0	0	13	2	0	1	10	0	0	0	0	0	0	0	0	0

	Warren St Northbound				Warren St Southbound				Eastbound				Copeland St Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Hard Left	Left	Thru	Right
4:00 PM	0	0	10	1	0	1	10	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	11	2	0	0	11	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	17	2	0	2	9	0	0	0	0	0	0	1	0	1
4:45 PM	0	0	18	0	0	3	8	0	0	0	0	0	0	1	0	1
5:00 PM	0	0	19	1	0	1	7	0	0	0	0	0	0	1	0	1
5:15 PM	0	0	18	3	0	0	5	0	0	0	0	0	1	1	0	0
5:30 PM	0	0	16	2	0	1	6	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	8	0	0	0	11	0	0	0	0	0	0	0	0	0

AM PEAK HOUR 7:45 AM to 8:45 AM	Warren St Northbound				Warren St Southbound				Eastbound				Copeland St Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Hard Left	Left	Thru	Right
	0	**0**	**63**	**11**	**0**	**5**	**43**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**
PHF	**0.84**				**0.86**								**0.50**			

PM PEAK HOUR 4:30 PM to 5:30 PM	Warren St Northbound				Warren St Southbound				Eastbound				Copeland St Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Hard Left	Left	Thru	Right
	0	**0**	**72**	**6**	**0**	**6**	**29**	**0**	**0**	**0**	**0**	**0**	**1**	**4**	**0**	**3**
PHF	**0.93**				**0.80**								**1.00**			

Client:	Littman
Project #:	0003_HSH
Location ID	02
Location:	Boston, MA
Street 1:	Warren St
Street 2:	Waverly/Copeland
Count Date:	5/24/2016
Day of Week:	Tuesday
Weather:	Mild and Wet, high of 59F

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PEDESTRIANS & BICYCLES

	Warren St Northbound					Warren St Southbound					Eastbound					Copeland St Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Hard Left	Left	Right	PED	
7:00 AM	0	0	0	6		0	1	0	8		0	0	0	0		0	0	0	5	
7:15 AM	0	0	0	5		0	1	0	5		0	0	0	0		0	0	0	8	
7:30 AM	0	0	0	4		0	0	0	7		0	0	0	0		0	0	0	6	
7:45 AM	0	0	0	7		0	0	0	8		0	0	0	0		0	0	0	7	
8:00 AM	0	0	0	8		0	0	0	2		0	0	0	0		0	0	0	2	
8:15 AM	0	2	0	7		0	0	0	7		0	0	0	0		0	0	0	5	
8:30 AM	0	1	0	7		0	0	0	6		0	0	0	0		0	0	0	6	
8:45 AM	0	0	0	6		0	0	0	5		0	0	0	0		0	0	0	4	

	Warren St Northbound					Warren St Southbound					Eastbound					Copeland St Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Hard Left	Left	Right	PED	
4:00 PM	0	0	0	15		0	0	0	11		0	0	0	0		0	0	0	10	
4:15 PM	0	0	1	13		0	0	0	17		0	0	0	0		0	1	0	11	
4:30 PM	0	0	0	19		0	1	0	18		0	0	0	0		0	1	0	8	
4:45 PM	0	0	0	23		0	1	0	16		0	0	0	0		0	0	0	6	
5:00 PM	0	0	0	20		0	2	0	17		0	0	0	0		0	0	0	9	
5:15 PM	0	0	0	18		0	1	0	16		0	0	0	0		0	0	0	7	
5:30 PM	0	0	1	21		0	1	0	16		0	0	0	0		0	0	0	8	
5:45 PM	0	0	1	19		0	1	0	8		0	0	0	0		0	0	0	6	

AM PEAK HOUR[1]	Warren St Northbound					Warren St Southbound					Eastbound					Copeland St Westbound				
7:00 AM																				
to	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
8:00 AM	0	3	0	28		0	0	0	20		0	0	0	0		0	0	0	17	

PM PEAK HOUR[1]	Warren St Northbound					Warren St Southbound					Eastbound					Copeland St Westbound				
4:00 PM																				
to	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
5:00 PM	0	0	2	78		0	5	0	57		0	0	0	0		0	0	0	30	

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

Client:	Littman
Project #:	0003_HSH
Location ID	03
Location:	Boston, MA
Street 1:	Blue Hill
Street 2:	Waverly
Count Date:	5/24/2016
Day of Week:	Tuesday
Weather:	Mild and Wet, high of 59F

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TOTAL (CARS & TRUCKS)

	Blue Hill Ave Northbound				Blue Hill Ave Southbound				Waverly St Eastbound				Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	180	0	0	0	92	0	0	10	0	13	0	0	0	0
7:15 AM	0	0	185	0	0	0	100	0	0	11	0	12	0	0	0	0
7:30 AM	0	0	186	0	0	0	102	0	0	13	0	17	0	0	0	0
7:45 AM	0	0	187	0	0	0	105	0	0	12	0	18	0	0	0	0
8:00 AM	0	0	184	0	0	0	104	0	0	13	0	14	0	0	0	0
8:15 AM	0	0	180	0	0	0	108	0	0	15	0	16	0	0	0	0
8:30 AM	0	0	162	0	0	0	122	0	0	17	0	21	0	0	0	0
8:45 AM	0	0	165	0	0	0	111	0	0	16	0	20	0	0	0	0

	Blue Hill Ave Northbound				Blue Hill Ave Southbound				Waverly St Eastbound				Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	120	0	0	0	119	0	0	14	0	20	0	0	0	0
4:15 PM	0	0	117	0	0	0	118	0	0	15	0	19	0	0	0	0
4:30 PM	0	0	125	0	0	0	122	0	0	20	0	22	0	0	0	0
4:45 PM	0	0	128	0	0	0	120	0	0	23	0	24	0	0	0	0
5:00 PM	0	0	115	0	0	0	139	0	0	19	0	20	0	0	0	0
5:15 PM	0	0	119	0	0	0	172	0	0	17	0	18	0	0	0	0
5:30 PM	0	0	116	0	0	0	145	0	0	18	0	21	0	0	0	0
5:45 PM	0	0	128	0	0	0	142	0	0	22	0	23	0	0	0	0

AM PEAK HOUR 7:45 AM to 8:45 AM	Blue Hill Ave Northbound				Blue Hill Ave Southbound				Waverly St Eastbound				Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**713**	**0**	**0**	**0**	**439**	**0**	**0**	**57**	**0**	**69**	**0**	**0**	**0**	**0**
PHF	**0.95**				**0.90**				**0.83**							
HV %	**4.8%**				**9.3%**				**6.3%**							

PM PEAK HOUR 5:00 PM to 6:00 PM	Blue Hill Ave Northbound				Blue Hill Ave Southbound				Waverly St Eastbound				Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**478**	**0**	**0**	**0**	**598**	**0**	**0**	**76**	**0**	**82**	**0**	**0**	**0**	**0**
PHF	**0.93**				**0.87**				**0.88**							
HV %	**5.2%**				**6.0%**				**9.5%**							

Client:	Littman
Project #:	0003_HSH
Location ID	03
Location:	Boston, MA
Street 1:	Blue Hill
Street 2:	Waverly
Count Date:	5/24/2016
Day of Week:	Tuesday
Weather:	Mild and Wet, high of 59F

BOSTON TRAFFIC DATA
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TRUCKS

	Blue Hill Ave Northbound				Blue Hill Ave Southbound				Waverly St Eastbound				Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	17	0	0	0	9	0	0	1	0	0	0	0	0	0
7:15 AM	0	0	11	0	0	0	10	0	0	2	0	1	0	0	0	0
7:30 AM	0	0	8	0	0	0	5	0	0	0	0	1	0	0	0	0
7:45 AM	0	0	10	0	0	0	9	0	0	1	0	0	0	0	0	0
8:00 AM	0	0	8	0	0	0	11	0	0	3	0	0	0	0	0	0
8:15 AM	0	0	9	0	0	0	10	0	0	0	0	2	0	0	0	0
8:30 AM	0	0	7	0	0	0	11	0	0	0	0	2	0	0	0	0
8:45 AM	0	0	7	0	0	0	9	0	0	0	0	0	0	0	0	0

	Blue Hill Ave Northbound				Blue Hill Ave Southbound				Waverly St Eastbound				Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	4	0	0	0	5	0	0	2	0	1	0	0	0	0
4:15 PM	0	0	2	0	0	0	4	0	0	1	0	0	0	0	0	0
4:30 PM	0	0	8	0	0	0	6	0	0	0	0	2	0	0	0	0
4:45 PM	0	0	10	0	0	0	7	0	0	0	0	2	0	0	0	0
5:00 PM	0	0	7	0	0	0	8	0	0	1	0	3	0	0	0	0
5:15 PM	0	0	6	0	0	0	9	0	0	1	0	5	0	0	0	0
5:30 PM	0	0	7	0	0	0	10	0	0	0	0	3	0	0	0	0
5:45 PM	0	0	5	0	0	0	9	0	0	1	0	1	0	0	0	0

AM PEAK HOUR	Blue Hill Ave Northbound				Blue Hill Ave Southbound				Waverly St Eastbound				Westbound			
7:00 AM to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
8:00 AM	**0**	**0**	**46**	**0**	**0**	**0**	**33**	**0**	**0**	**4**	**0**	**2**	**0**	**0**	**0**	**0**
PHF	**0.68**				**0.83**				**0.50**							

PM PEAK HOUR	Blue Hill Ave Northbound				Blue Hill Ave Southbound				Waverly St Eastbound				Westbound			
4:45 PM to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
5:45 PM	**0**	**0**	**30**	**0**	**0**	**0**	**34**	**0**	**0**	**2**	**0**	**13**	**0**	**0**	**0**	**0**
PHF	**0.75**				**0.85**				**0.63**							

Client:	Littman
Project #:	0003_HSH
Location ID	03
Location:	Boston, MA
Street 1:	Blue Hill
Street 2:	Waverly
Count Date:	5/24/2016
Day of Week:	Tuesday
Weather:	Mild and Wet, high of 59F

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PEDESTRIANS & BICYCLES

	Blue Hill Ave Northbound					Blue Hill Ave Southbound					Waverly St Eastbound					Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
7:00 AM	0	1	0	11		0	0	0	6		0	0	0	1		0	0	0	0	
7:15 AM	0	1	0	10		0	0	0	5		0	0	0	2		0	0	0	0	
7:30 AM	0	0	0	5		0	0	0	3		0	0	0	1		0	0	0	0	
7:45 AM	0	2	0	9		0	0	0	7		1	0	0	2		0	0	0	0	
8:00 AM	0	2	0	7		0	0	0	8		0	0	0	3		0	0	0	0	
8:15 AM	0	1	0	9		0	0	0	6		0	0	0	3		0	0	0	0	
8:30 AM	0	0	0	10		0	0	0	3		1	0	0	5		0	0	0	0	
8:45 AM	0	1	0	8		0	0	0	4		0	0	0	3		0	0	0	0	

	Blue Hill Ave Northbound					Blue Hill Ave Southbound					Waverly St Eastbound					Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
4:00 PM	0	1	0	10		0	0	0	11		0	0	0	4		0	0	0	0	
4:15 PM	0	1	0	16		0	1	0	13		0	0	0	5		0	0	0	0	
4:30 PM	0	0	0	15		0	0	0	12		0	0	0	3		0	0	0	0	
4:45 PM	0	0	0	9		0	0	0	12		0	0	0	1		0	0	0	0	
5:00 PM	0	1	0	8		0	1	0	11		0	0	0	2		0	0	0	0	
5:15 PM	0	1	0	7		0	0	0	10		0	0	0	1		0	0	0	0	
5:30 PM	0	1	0	9		0	0	0	9		0	0	0	2		0	0	0	0	
5:45 PM	0	0	0	10		0	0	0	7		0	0	0	3		0	0	0	0	

AM PEAK HOUR[1]	Blue Hill Ave Northbound					Blue Hill Ave Southbound					Waverly St Eastbound					Westbound				
7:45 AM to 8:45 AM	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	5	0	35		0	0	0	24		2	0	0	13		0	0	0	0	

PM PEAK HOUR[1]	Blue Hill Ave Northbound					Blue Hill Ave Southbound					Waverly St Eastbound					Westbound				
5:00 PM to 6:00 PM	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	3	0	34		0	1	0	37		0	0	0	8		0	0	0	0	

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

Client:	Littman
Project #:	0003_HSH
Location ID	04
Location:	Boston, MA
Street 1:	Blue Hill
Street 2:	Clifford/Julian St
Count Date:	5/24/2016
Day of Week:	Tuesday
Weather:	Mild and Wet, high of 59F

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TOTAL (CARS & TRUCKS)

	Blue Hill Ave Northbound				Blue Hill Ave Southbound				Clifford St Eastbound				Julian St Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	19	160	0	0	0	89	18	0	0	0	0	0	21	0	11
7:15 AM	0	15	161	0	0	0	99	25	0	0	0	0	0	23	0	12
7:30 AM	0	11	162	0	0	0	98	27	0	0	0	0	0	22	0	11
7:45 AM	0	12	165	0	0	0	100	24	0	0	0	0	0	20	0	14
8:00 AM	0	11	176	0	0	0	104	25	0	0	0	0	0	18	0	15
8:15 AM	0	14	169	0	0	0	109	28	0	0	0	0	0	19	0	13
8:30 AM	0	12	158	0	0	0	112	29	0	0	0	0	0	21	0	11
8:45 AM	0	10	155	0	0	0	110	25	0	0	0	0	0	22	0	12

	Blue Hill Ave Northbound				Blue Hill Ave Southbound				Clifford St Eastbound				Julian St Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	16	119	0	0	0	128	22	0	0	0	0	0	11	0	8
4:15 PM	0	18	118	0	0	0	117	23	0	0	0	0	0	13	0	7
4:30 PM	0	17	117	0	0	0	135	24	0	0	0	0	0	10	0	15
4:45 PM	0	16	107	0	0	0	119	25	0	0	0	0	0	9	0	19
5:00 PM	0	15	108	0	0	0	128	26	0	0	0	0	0	16	0	16
5:15 PM	0	9	115	0	0	0	162	24	0	0	0	0	0	22	0	12
5:30 PM	0	8	114	0	0	0	159	25	0	0	0	0	0	19	0	12
5:45 PM	0	7	117	0	0	0	150	20	0	0	0	0	0	13	0	11

AM PEAK HOUR 7:45 AM to 8:45 AM	Blue Hill Ave Northbound				Blue Hill Ave Southbound				Clifford St Eastbound				Julian St Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**49**	**668**	**0**	**0**	**0**	**425**	**106**	**0**	**0**	**0**	**0**	**0**	**78**	**0**	**53**
PHF	**0.96**				**0.94**								**0.96**			
HV %	**4.6%**				**10.7%**								**3.1%**			

PM PEAK HOUR 5:00 PM to 6:00 PM	Blue Hill Ave Northbound				Blue Hill Ave Southbound				Clifford St Eastbound				Julian St Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**39**	**454**	**0**	**0**	**0**	**599**	**95**	**0**	**0**	**0**	**0**	**0**	**70**	**0**	**51**
PHF	**0.99**				**0.93**								**0.89**			
HV %	**4.1%**				**4.3%**								**1.7%**			

Client:	Littman
Project #:	0003_HSH
Location ID	04
Location:	Boston, MA
Street 1:	Blue Hill
Street 2:	Clifford/Julian St
Count Date:	5/24/2016
Day of Week:	Tuesday
Weather:	Mild and Wet, high of 59F

BOSTON TRAFFIC DATA
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TRUCKS

	Blue Hill Ave Northbound				Blue Hill Ave Southbound				Clifford St Eastbound				Julian St Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	15	0	0	0	9	1	0	0	0	0	0	0	0	0
7:15 AM	0	0	11	0	0	0	7	2	0	0	0	0	0	0	0	0
7:30 AM	0	0	12	0	0	0	3	1	0	0	0	0	0	1	0	0
7:45 AM	0	0	9	0	0	0	8	4	0	0	0	0	0	1	0	0
8:00 AM	0	0	8	0	0	0	9	6	0	0	0	0	0	1	0	0
8:15 AM	0	0	7	0	0	0	10	5	0	0	0	0	0	1	0	0
8:30 AM	0	0	9	0	0	0	11	4	0	0	0	0	0	1	0	0
8:45 AM	0	0	7	0	0	0	10	3	0	0	0	0	0	1	0	0

	Blue Hill Ave Northbound				Blue Hill Ave Southbound				Clifford St Eastbound				Julian St Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	1	7	0	0	0	4	1	0	0	0	0	0	0	0	0
4:15 PM	0	1	7	0	0	0	5	1	0	0	0	0	0	0	0	0
4:30 PM	0	0	8	0	0	0	6	0	0	0	0	0	0	0	0	0
4:45 PM	0	4	9	0	0	0	5	0	0	0	0	0	0	0	0	0
5:00 PM	0	2	6	0	0	0	7	1	0	0	0	0	0	0	0	1
5:15 PM	0	0	5	0	0	0	8	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	4	0	0	0	7	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	3	0	0	0	7	0	0	0	0	0	0	0	0	1

AM PEAK HOUR 7:45 AM to 8:45 AM	Blue Hill Ave Northbound				Blue Hill Ave Southbound				Clifford St Eastbound				Julian St Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**33**	**0**	**0**	**0**	**38**	**19**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**0**
PHF	**0.92**				**0.95**								**1.00**			

PM PEAK HOUR 4:15 PM to 5:15 PM	Blue Hill Ave Northbound				Blue Hill Ave Southbound				Clifford St Eastbound				Julian St Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**7**	**30**	**0**	**0**	**0**	**23**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**
PHF	**0.71**				**0.78**								**0.25**			

Client:	Littman
Project #:	0003_HSH
Location ID	04
Location:	Boston, MA
Street 1:	Blue Hill
Street 2:	Clifford/Julian St
Count Date:	5/24/2016
Day of Week:	Tuesday
Weather:	Mild and Wet, high of 59F

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PEDESTRIANS & BICYCLES

	Blue Hill Ave Northbound					Blue Hill Ave Southbound					Clifford St Eastbound					Julian St Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
7:00 AM	0	2	0	6		0	0	0	9		0	0	0	1		0	0	0	2	
7:15 AM	0	1	0	4		0	0	0	6		0	0	0	2		0	0	0	3	
7:30 AM	0	0	0	5		0	0	0	1		0	0	0	3		0	0	0	2	
7:45 AM	0	1	0	4		0	0	0	7		0	0	0	2		0	0	0	3	
8:00 AM	0	3	0	5		0	0	0	8		0	0	0	3		0	0	0	5	
8:15 AM	0	0	0	7		0	0	0	6		0	0	0	2		0	0	0	4	
8:30 AM	0	0	0	8		0	0	0	9		0	0	0	1		0	0	0	2	
8:45 AM	0	1	0	6		0	0	0	9		0	0	0	2		0	0	0	2	

	Blue Hill Ave Northbound					Blue Hill Ave Southbound					Clifford St Eastbound					Julian St Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
4:00 PM	0	0	0	12		0	0	0	12		0	0	0	3		0	0	0	5	
4:15 PM	0	0	0	15		0	1	1	16		0	0	0	4		0	0	0	7	
4:30 PM	0	1	0	12		0	0	1	14		0	0	0	4		0	0	0	5	
4:45 PM	0	0	0	10		0	0	0	12		0	0	0	6		0	0	0	6	
5:00 PM	0	0	0	9		0	1	0	15		0	0	0	4		0	0	0	6	
5:15 PM	0	1	0	7		0	0	0	12		0	0	0	4		0	0	0	7	
5:30 PM	0	0	0	15		0	0	0	11		0	0	0	5		0	0	0	4	
5:45 PM	0	0	0	19		0	0	0	7		0	0	0	2		0	0	0	5	

AM PEAK HOUR[1]	Blue Hill Ave Northbound					Blue Hill Ave Southbound					Clifford St Eastbound					Julian St Westbound				
7:45 AM to 8:45 AM	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	4	0	24		0	0	0	30		0	0	0	8		0	0	0	14	

PM PEAK HOUR[1]	Blue Hill Ave Northbound					Blue Hill Ave Southbound					Clifford St Eastbound					Julian St Westbound				
5:00 PM to 6:00 PM	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	1	0	50		0	1	0	45		0	0	0	15		0	0	0	22	

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

SEASONAL ADJUSTMENT FACTORS

MASSACHUSETTS HIGHWAY DEPARTMENT - STATEWIDE TRAFFIC DATA COLLECTION

2011 WEEKDAY SEASONAL FACTORS *

* Note: These are weekday factors. The average of the factors for the year will not equal 1, as weekend data are not considered.

FACTOR GROUP	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
GROUP 1 - WEST INTERSTATE	0.98	0.93	0.90	0.89	0.90	0.88	0.91	0.90	0.89	0.89	0.93	0.95
Use group 2 for R5, R6, & R0 GROUP 2 - **RURAL MAJOR COLLECTOR (R-5)**	1.12	1.12	1.07	0.99	0.91	0.90	0.86	0.86	0.92	0.93	1.01	1.05
GROUP 3A - RECREATIONAL **(1-4) See below	1.26	1.25	1.20	1.06	0.96	0.89	0.76	0.76	0.92	0.99	1.08	1.14
GROUP 3B - RECREATIONAL ***(5) See below	1.22	1.26	1.22	1.06	0.96	0.90	0.72	0.74	0.97	1.02	1.14	1.15
GROUP 4 - I-495 INTERSTATE	1.02	1.00	1.00	0.96	0.92	0.89	0.85	0.83	0.93	0.96	1.01	1.03
GROUP 5 - EAST INTERSTATE	1.04	1.00	0.96	0.93	0.92	0.91	0.91	0.89	0.93	0.93	0.96	1.01
GROUP 6: Use group 6 for U2, U3, U5, U6, U0, R2, & R3 **URBAN ARTERIALS, COLLECTORS & RURAL ARTERIALS (R-2, R-3)**	1.03	1.01	0.96	0.92	0.91	0.90	0.92	0.92	0.93	0.92	0.97	0.97
GROUP 7 - I-84 PROXIMITY (STA. 17, 3921)	1.24	1.24	1.15	1.04	0.99	1.00	0.93	0.89	1.05	1.05	1.05	1.12
GROUP 8 - I-295 PROXIMITY (STA. 6590)	1.00	0.99	0.95	0.92	0.94	0.91	0.93	0.92	0.95	0.94	0.97	0.95
GROUP 9 - I-195 PROXIMITY (STA. 7)	1.13	1.05	1.03	0.95	0.89	0.87	0.86	0.79	0.88	0.91	0.99	1.03

RECREATIONAL: (ALL YEARS)

**GROUP 3A:

1. CAPE COD (ALL TOWNS)

2.PLYMOUTH(SOUTH OF RTE.3A)

7014, 7079,7080,7090,7091,7092,7093,7094,7095,7096,7097,7108,7178

3.MARTHA'S VINEYARD

4.NANTUCKET

***GROUP 3B:

5.PERMANENTS 2 & 189

1066,1067,1083,1084,1085,1086,1087,1088,1089,1090,1091,1092,

1093,1094,1095,1096,1097,1098,1099,1100,1101,1102,1103,1104,

1105,1106,1107,1108,1113,1114,1116,2196,2197,2198

2011 AXLE CORRECTION FACTORS

ROAD INVENTORY FUNCTIONAL CLASSIFICATION	AXLE CORRECTION FACTOR
RURAL	
1	0.95
2	0.97
3	0.98
0,5,6	0.98
URBAN	
1	0.96
2,3	0.98
5	0.98
0,6	0.99
I-84	0.90

ROUND OFF

0 - 999.....10

> 1,000.....100

Apply I-84 factor to stations:

3290, 3921, 3929

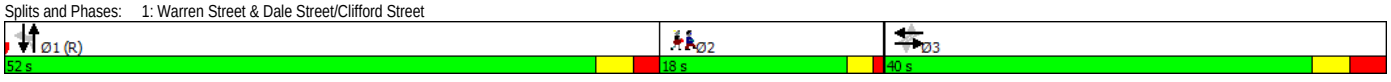
INTERSECTION CAPACITY ANALYSIS WORKSHEETS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	Ø2
Lane Configurations															
Traffic Volume (vph)	74	0	35	113	66	79	2	40	815	0	3	0	384	20	
Future Volume (vph)	74	0	35	113	66	79	2	40	815	0	3	0	384	20	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		0	0		0		150		0		0		115	
Storage Lanes	0		0	0		0		1		0		0		0	
Taper Length (ft)	25			25				100				25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	0.95	
Frt		0.957			0.959								0.993		
Flt Protected		0.967			0.979			0.950							
Satd. Flow (prot)	0	1665	0	0	1701	0	0	1767	3343	0	0	0	3347	0	
Flt Permitted		0.617			0.804			0.481					0.951		
Satd. Flow (perm)	0	1062	0	0	1397	0	0	894	3343	0	0	0	3183	0	
Right Turn on Red			Yes			Yes				Yes				Yes	
Satd. Flow (RTOR)		50			21								6		
Link Speed (mph)		30			30				30				30		
Link Distance (ft)		754			1244				349				353		
Travel Time (s)		17.1			28.3				7.9				8.0		
Peak Hour Factor	0.80	0.80	0.80	0.93	0.93	0.93	0.91	0.91	0.91	0.91	0.98	0.98	0.98	0.98	
Heavy Vehicles (%)	4%	0%	9%	1%	9%	7%	50%	0%	8%	0%	0%	0%	7%	10%	
Adj. Flow (vph)	93	0	44	122	71	85	2	44	896	0	3	0	392	20	
Shared Lane Traffic (%)															
Lane Group Flow (vph)	0	137	0	0	278	0	0	46	896	0	0	0	415	0	
Turn Type	Perm	NA		Perm	NA		Perm	Perm	NA		Perm		NA		
Protected Phases		3			3				1				1		2
Permitted Phases	3			3			1	1			1				
Detector Phase	3	3		3	3		1	1	1		1		1		
Switch Phase															
Minimum Initial (s)	6.0	6.0		6.0	6.0		10.0	10.0	10.0		10.0		10.0		1.0
Minimum Split (s)	20.0	20.0		20.0	20.0		15.0	15.0	15.0		15.0		15.0		18.0
Total Split (s)	40.0	40.0		40.0	40.0		52.0	52.0	52.0		52.0		52.0		18.0
Total Split (%)	36.4%	36.4%		36.4%	36.4%		47.3%	47.3%	47.3%		47.3%		47.3%		16%
Maximum Green (s)	34.0	34.0		34.0	34.0		47.0	47.0	47.0		47.0		47.0		15.0
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0		3.0		2.0
All-Red Time (s)	3.0	3.0		3.0	3.0		2.0	2.0	2.0		2.0		2.0		1.0
Lost Time Adjust (s)		0.0			0.0			0.0	0.0				0.0		
Total Lost Time (s)		6.0			6.0			5.0	5.0				5.0		
Lead/Lag							Lead	Lead	Lead		Lead		Lead		Lag
Lead-Lag Optimize?							Yes	Yes	Yes		Yes		Yes		Yes
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0		2.0		2.0		2.0
Recall Mode	Max	Max		Max	Max		C-Max	C-Max	C-Max		C-Max		C-Max		None
Walk Time (s)	7.0	7.0		7.0	7.0										7.0
Flash Dont Walk (s)	7.0	7.0		7.0	7.0										8.0
Pedestrian Calls (#/hr)	0	0		0	0										40
Act Effct Green (s)		34.0			34.0			54.2	54.2				54.2		
Actuated g/C Ratio		0.31			0.31			0.49	0.49				0.49		
v/c Ratio		0.38			0.62			0.10	0.54				0.26		
Control Delay		22.1			37.2			19.0	22.5				8.5		
Queue Delay		0.0			0.0			0.0	0.0				0.0		
Total Delay		22.1			37.2			19.0	22.5				8.5		
LOS		C			D			B	C				A		
Approach Delay		22.1			37.2				22.3				8.5		
Approach LOS		C			D				C				A		
Queue Length 50th (ft)		46			155			19	254				31		
Queue Length 95th (ft)		86			250			44	323				44		
Internal Link Dist (ft)		674			1164				269				273		
Turn Bay Length (ft)								150							
Base Capacity (vph)		362			446			440	1647				1571		
Starvation Cap Reductn		0			0			0	0				0		
Spillback Cap Reductn		0			0			0	0				0		
Storage Cap Reductn		0			0			0	0				0		
Reduced v/c Ratio		0.38			0.62			0.10	0.54				0.26		

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 51 (46%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.62
Intersection Signal Delay: 21.4 Intersection LOS: C
Intersection Capacity Utilization 59.2% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 1: Warren Street & Dale Street/Clifford Street



Lane Group	WBL2	WBL	WBR	NBU	NBT	NBR	NBR2	SBU	SBL	SBT	NWL	NWR	Ø2
Lane Configurations													
Traffic Volume (vph)	7	36	25	6	885	0	80	1	40	365	0	0	
Future Volume (vph)	7	36	25	6	885	0	80	1	40	365	0	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)		0	0	0		115			150		0	0	
Storage Lanes		1	0	0		0			1		0	0	
Taper Length (ft)		25		25					100		25		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	1.00	0.95	1.00	1.00	
Frt		0.951			0.988								
Flt Protected		0.969							0.950				
Satd. Flow (prot)	0	1675	0	0	3284	0	0	0	1574	3312	0	0	
Flt Permitted		0.969			0.953				0.210				
Satd. Flow (perm)	0	1675	0	0	3129	0	0	0	348	3312	0	0	
Right Turn on Red			Yes				Yes						
Satd. Flow (RTOR)		50			60								
Link Speed (mph)		30			30					30	30		
Link Distance (ft)		490			353					805	1318		
Travel Time (s)		11.1			8.0					18.3	30.0		
Peak Hour Factor	0.88	0.88	0.88	0.94	0.94	0.94	0.94	0.92	0.92	0.92	0.25	0.25	
Heavy Vehicles (%)	0%	3%	8%	0%	9%	0%	5%	0%	15%	9%	0%	0%	
Adj. Flow (vph)	8	41	28	6	941	0	85	1	43	397	0	0	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	77	0	0	1032	0	0	0	44	397	0	0	
Turn Type	Perm	Prot		Perm	NA			Perm	Perm	NA			
Protected Phases		3			1					1			2
Permitted Phases	3			1				1	1				
Detector Phase	3	3		1	1			1	1	1			
Switch Phase													
Minimum Initial (s)	6.0	6.0		10.0	10.0			10.0	10.0	10.0			1.0
Minimum Split (s)	12.0	12.0		15.0	15.0			15.0	15.0	15.0			27.0
Total Split (s)	20.0	20.0		63.0	63.0			63.0	63.0	63.0			27.0
Total Split (%)	18.2%	18.2%		57.3%	57.3%			57.3%	57.3%	57.3%			25%
Maximum Green (s)	14.0	14.0		58.0	58.0			58.0	58.0	58.0			24.0
Yellow Time (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0			2.0
All-Red Time (s)	3.0	3.0		2.0	2.0			2.0	2.0	2.0			1.0
Lost Time Adjust (s)		0.0			0.0				0.0	0.0			
Total Lost Time (s)		6.0			5.0				5.0	5.0			
Lead/Lag				Lead	Lead			Lead	Lead	Lead			Lag
Lead-Lag Optimize?				Yes	Yes			Yes	Yes	Yes			Yes
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0	2.0	2.0			2.0
Recall Mode	Max	Max		C-Max	C-Max			C-Max	C-Max	C-Max			None
Walk Time (s)													8.0
Flash Dont Walk (s)													16.0
Pedestrian Calls (#/hr)													65
Act Effct Green (s)		14.0			63.4				63.4	63.4			
Actuated g/C Ratio		0.13			0.58				0.58	0.58			
v/c Ratio		0.30			0.56				0.22	0.21			
Control Delay		22.5			5.1				17.9	13.0			
Queue Delay		0.0			0.0				0.0	0.0			
Total Delay		22.5			5.1				17.9	13.0			
LOS		C			A				B	B			
Approach Delay		22.5			5.1					13.5			
Approach LOS		C			A					B			
Queue Length 50th (ft)		17			47				16	75			
Queue Length 95th (ft)		60			61				42	105			
Internal Link Dist (ft)		410			273					725	1238		
Turn Bay Length (ft)									150				
Base Capacity (vph)		256			1829				200	1909			
Starvation Cap Reductn		0			5				0	0			
Spillback Cap Reductn		0			0				0	0			
Storage Cap Reductn		0			0				0	0			
Reduced v/c Ratio		0.30			0.57				0.22	0.21			

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 48 (44%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.56
Intersection Signal Delay: 8.3 Intersection LOS: A
Intersection Capacity Utilization 48.2% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Warren Street & Waverly Street & Copeland Street

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	57	69	0	717	412	0
Future Volume (Veh/h)	57	69	0	717	412	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.83	0.83	0.95	0.95	0.90	0.90
Hourly flow rate (vph)	69	83	0	755	458	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1213	458	458			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1213	458	458			
tC, single (s)	6.5	6.3	4.1			
tC, 2 stage (s)						
tF (s)	3.6	3.4	2.2			
p0 queue free %	65	86	100			
cM capacity (veh/h)	196	595	1114			

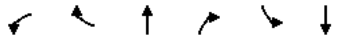
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	152	755	458
Volume Left	69	0	0
Volume Right	83	0	0
cSH	309	1700	1700
Volume to Capacity	0.49	0.44	0.27
Queue Length 95th (ft)	64	0	0
Control Delay (s)	27.4	0.0	0.0
Lane LOS	D		
Approach Delay (s)	27.4	0.0	0.0
Approach LOS	D		

Intersection Summary				
Average Delay		3.0		
Intersection Capacity Utilization		51.8%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	49	664	453	106
Future Volume (Veh/h)	0	0	49	664	453	106
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.25	0.25	0.96	0.96	0.94	0.94
Hourly flow rate (vph)	0	0	51	692	482	113
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1332	538	595			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1332	538	595			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	95			
cM capacity (veh/h)	161	543	991			

Direction, Lane #	NB 1	SB 1
Volume Total	743	595
Volume Left	51	0
Volume Right	0	113
cSH	991	1700
Volume to Capacity	0.05	0.35
Queue Length 95th (ft)	4	0
Control Delay (s)	1.3	0.0
Lane LOS	A	
Approach Delay (s)	1.3	0.0
Approach LOS		

Intersection Summary				
Average Delay	0.7			
Intersection Capacity Utilization	74.6%	ICU Level of Service	D	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	78	53	664	0	0	481
Future Volume (Veh/h)	78	53	664	0	0	481
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.96	0.96	0.96	0.96	0.94	0.94
Hourly flow rate (vph)	81	55	692	0	0	512
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1204	692			692	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1204	692			692	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	60	88			100	
cM capacity (veh/h)	201	447			912	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	136	692	512
Volume Left	81	0	0
Volume Right	55	0	0
cSH	258	1700	1700
Volume to Capacity	0.53	0.41	0.30
Queue Length 95th (ft)	71	0	0
Control Delay (s)	33.5	0.0	0.0
Lane LOS	D		
Approach Delay (s)	33.5	0.0	0.0
Approach LOS	D		

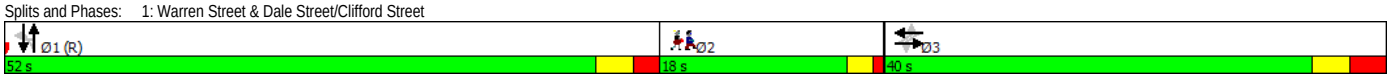
Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	49.2%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT	SBR	Ø2
Lane Configurations														
Traffic Volume (vph)	119	0	101	102	53	52	8	42	621	0	0	732	63	
Future Volume (vph)	119	0	101	102	53	52	8	42	621	0	0	732	63	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		0	0		0		150		0	0		115	
Storage Lanes	0		0	0		0		1		0	0		0	
Taper Length (ft)	25			25				100			25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	1.00	0.95	0.95	
Frt		0.938			0.966							0.988		
Flt Protected		0.974			0.976			0.950						
Satd. Flow (prot)	0	1678	0	0	1748	0	0	1706	3343	0	0	3435	0	
Flt Permitted		0.685			0.716			0.226						
Satd. Flow (perm)	0	1180	0	0	1282	0	0	406	3343	0	0	3435	0	
Right Turn on Red			Yes			Yes				Yes			Yes	
Satd. Flow (RTOR)		50			16							10		
Link Speed (mph)		30			30				30			30		
Link Distance (ft)		754			1244				349			353		
Travel Time (s)		17.1			28.3				7.9			8.0		
Peak Hour Factor	0.86	0.86	0.86	0.80	0.80	0.80	0.93	0.93	0.93	0.93	0.95	0.95	0.95	
Heavy Vehicles (%)	3%	0%	4%	2%	0%	6%	0%	7%	8%	0%	0%	4%	2%	
Adj. Flow (vph)	138	0	117	128	66	65	9	45	668	0	0	771	66	
Shared Lane Traffic (%)														
Lane Group Flow (vph)	0	255	0	0	259	0	0	54	668	0	0	837	0	
Turn Type	Perm	NA		Perm	NA		Perm	Perm	NA			NA		
Protected Phases		3			3				1			1		2
Permitted Phases	3			3			1	1						
Detector Phase	3	3		3	3		1	1	1			1		
Switch Phase														
Minimum Initial (s)	6.0	6.0		6.0	6.0		10.0	10.0	10.0			10.0		1.0
Minimum Split (s)	20.0	20.0		20.0	20.0		15.0	15.0	15.0			15.0		18.0
Total Split (s)	40.0	40.0		40.0	40.0		52.0	52.0	52.0			52.0		18.0
Total Split (%)	36.4%	36.4%		36.4%	36.4%		47.3%	47.3%	47.3%			47.3%		16%
Maximum Green (s)	34.0	34.0		34.0	34.0		47.0	47.0	47.0			47.0		15.0
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0			3.0		2.0
All-Red Time (s)	3.0	3.0		3.0	3.0		2.0	2.0	2.0			2.0		1.0
Lost Time Adjust (s)		0.0			0.0			0.0	0.0			0.0		
Total Lost Time (s)		6.0			6.0			5.0	5.0			5.0		
Lead/Lag							Lead	Lead	Lead			Lead		Lag
Lead-Lag Optimize?							Yes	Yes	Yes			Yes		Yes
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0			2.0		2.0
Recall Mode	Max	Max		Max	Max		C-Max	C-Max	C-Max			C-Max		None
Walk Time (s)	7.0	7.0		7.0	7.0									7.0
Flash Dont Walk (s)	7.0	7.0		7.0	7.0									8.0
Pedestrian Calls (#/hr)	0	0		0	0									96
Act Effct Green (s)		34.0			34.0			47.0	47.0			47.0		
Actuated g/C Ratio		0.31			0.31			0.43	0.43			0.43		
v/c Ratio		0.64			0.64			0.31	0.47			0.57		
Control Delay		34.5			38.9			27.2	23.9			7.8		
Queue Delay		0.0			0.0			0.0	0.0			0.0		
Total Delay		34.5			38.9			27.2	23.9			7.8		
LOS		C			D			C	C			A		
Approach Delay		34.5			38.9				24.1			7.8		
Approach LOS		C			D				C			A		
Queue Length 50th (ft)		125			147			25	174			50		
Queue Length 95th (ft)		203			203			61	226			62		
Internal Link Dist (ft)		674			1164				269			273		
Turn Bay Length (ft)								150						
Base Capacity (vph)		399			407			173	1428			1473		
Starvation Cap Reductn		0			0			0	0			1		
Spillback Cap Reductn		0			0			0	0			0		
Storage Cap Reductn		0			0			0	0			0		
Reduced v/c Ratio		0.64			0.64			0.31	0.47			0.57		

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 5 (5%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.64
Intersection Signal Delay: 20.6 Intersection LOS: C
Intersection Capacity Utilization 60.5% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 1: Warren Street & Dale Street/Clifford Street

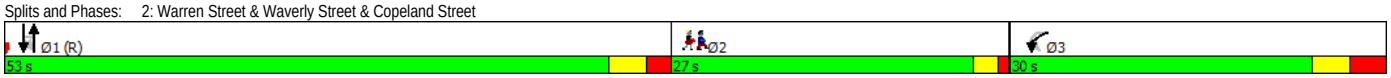


Lane Group	WBL2	WBL	WBR	NBT	NBR	NBR2	SBU	SBL	SBT	NWL	NWR	Ø2
Lane Configurations												
Traffic Volume (vph)	13	68	24	669	0	123	10	81	727	0	0	
Future Volume (vph)	13	68	24	669	0	123	10	81	727	0	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)		0	0		115			150		0	0	
Storage Lanes		1	0		0			1		0	0	
Taper Length (ft)		25						100		25		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	0.95	1.00	0.95	1.00	1.00	
Frt		0.969		0.977								
Flt Protected		0.963						0.950				
Satd. Flow (prot)	0	1708	0	3259	0	0	0	1699	3438	0	0	
Flt Permitted		0.963						0.244				
Satd. Flow (perm)	0	1708	0	3259	0	0	0	436	3438	0	0	
Right Turn on Red			Yes			Yes						
Satd. Flow (RTOR)		50		60								
Link Speed (mph)		30		30					30	30		
Link Distance (ft)		490		353					805	1318		
Travel Time (s)		11.1		8.0					18.3	30.0		
Peak Hour Factor	0.86	0.86	0.86	0.98	0.98	0.98	0.97	0.97	0.97	0.25	0.25	
Heavy Vehicles (%)	0%	3%	8%	9%	0%	4%	0%	7%	5%	0%	0%	
Adj. Flow (vph)	15	79	28	683	0	126	10	84	749	0	0	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	122	0	809	0	0	0	94	749	0	0	
Turn Type	Perm	Prot		NA			Perm	Perm	NA			
Protected Phases		3		1					1			2
Permitted Phases	3						1	1				
Detector Phase	3	3		1			1	1	1			
Switch Phase												
Minimum Initial (s)	6.0	6.0		10.0			10.0	10.0	10.0			1.0
Minimum Split (s)	12.0	12.0		15.0			15.0	15.0	15.0			27.0
Total Split (s)	30.0	30.0		53.0			53.0	53.0	53.0			27.0
Total Split (%)	27.3%	27.3%		48.2%			48.2%	48.2%	48.2%			25%
Maximum Green (s)	24.0	24.0		48.0			48.0	48.0	48.0			24.0
Yellow Time (s)	3.0	3.0		3.0			3.0	3.0	3.0			2.0
All-Red Time (s)	3.0	3.0		2.0			2.0	2.0	2.0			1.0
Lost Time Adjust (s)		0.0		0.0				0.0	0.0			
Total Lost Time (s)		6.0		5.0				5.0	5.0			
Lead/Lag				Lead			Lead	Lead	Lead			Lag
Lead-Lag Optimize?				Yes			Yes	Yes	Yes			Yes
Vehicle Extension (s)	2.0	2.0		2.0			2.0	2.0	2.0			2.0
Recall Mode	Max	Max		C-Max			C-Max	C-Max	C-Max			None
Walk Time (s)												8.0
Flash Dont Walk (s)												16.0
Pedestrian Calls (#/hr)												165
Act Effct Green (s)		24.0		48.0				48.0	48.0			
Actuated g/C Ratio		0.22		0.44				0.44	0.44			
v/c Ratio		0.30		0.56				0.49	0.50			
Control Delay		23.6		8.2				33.4	23.8			
Queue Delay		0.0		0.1				0.0	0.0			
Total Delay		23.6		8.3				33.4	23.8			
LOS		C		A				C	C			
Approach Delay		23.6		8.3					24.8			
Approach LOS		C		A					C			
Queue Length 50th (ft)		42		72				47	195			
Queue Length 95th (ft)		88		92				105	251			
Internal Link Dist (ft)		410		273					725	1238		
Turn Bay Length (ft)								150				
Base Capacity (vph)		411		1455				190	1500			
Starvation Cap Reductn		0		88				0	0			
Spillback Cap Reductn		0		0				0	0			
Storage Cap Reductn		0		0				0	0			
Reduced v/c Ratio		0.30		0.59				0.49	0.50			

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 5 (5%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.56
Intersection Signal Delay: 17.2 Intersection LOS: B
Intersection Capacity Utilization 50.0% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Warren Street & Waverly Street & Copeland Street



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	76	82	0	492	570	0
Future Volume (Veh/h)	76	82	0	492	570	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.88	0.88	0.93	0.93	0.87	0.87
Hourly flow rate (vph)	86	93	0	529	655	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1184	655	655			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1184	655	655			
tC, single (s)	6.4	6.4	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.4	2.2			
p0 queue free %	58	79	100			
cM capacity (veh/h)	207	444	942			

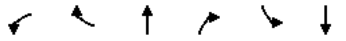
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	179	529	655
Volume Left	86	0	0
Volume Right	93	0	0
cSH	287	1700	1700
Volume to Capacity	0.62	0.31	0.39
Queue Length 95th (ft)	97	0	0
Control Delay (s)	36.4	0.0	0.0
Lane LOS	E		
Approach Delay (s)	36.4	0.0	0.0
Approach LOS	E		

Intersection Summary				
Average Delay		4.8		
Intersection Capacity Utilization		45.9%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	39	441	627	95
Future Volume (Veh/h)	0	0	39	441	627	95
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.25	0.25	0.99	0.99	0.93	0.93
Hourly flow rate (vph)	0	0	39	445	674	102
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1248	725	776			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1248	725	776			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	95			
cM capacity (veh/h)	184	428	827			

Direction, Lane #	NB 1	SB 1
Volume Total	484	776
Volume Left	39	0
Volume Right	0	102
cSH	827	1700
Volume to Capacity	0.05	0.46
Queue Length 95th (ft)	4	0
Control Delay (s)	1.3	0.0
Lane LOS	A	
Approach Delay (s)	1.3	0.0
Approach LOS		

Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	58.8%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	70	51	441	0	0	652
Future Volume (Veh/h)	70	51	441	0	0	652
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.89	0.89	0.99	0.99	0.93	0.93
Hourly flow rate (vph)	79	57	445	0	0	701
Pedestrians	3					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	0					
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1149	448			448	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1149	448			448	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	64	91			100	
cM capacity (veh/h)	221	613			1120	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	136	445	701
Volume Left	79	0	0
Volume Right	57	0	0
cSH	302	1700	1700
Volume to Capacity	0.45	0.26	0.41
Queue Length 95th (ft)	56	0	0
Control Delay (s)	26.4	0.0	0.0
Lane LOS	D		
Approach Delay (s)	26.4	0.0	0.0
Approach LOS	D		

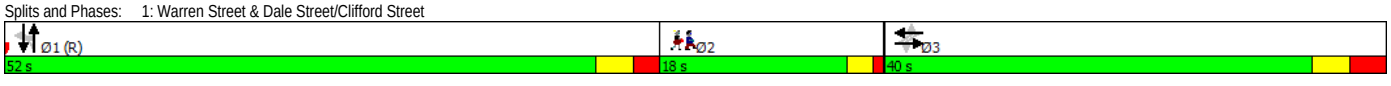
Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	48.0%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	Ø2
Lane Configurations															
Traffic Volume (vph)	77	0	36	117	68	82	2	41	855	0	3	0	398	21	
Future Volume (vph)	77	0	36	117	68	82	2	41	855	0	3	0	398	21	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		0	0		0		150		0		0		115	
Storage Lanes	0		0	0		0		1		0		0		0	
Taper Length (ft)	25			25				100				25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	0.95	
Frt		0.957			0.959								0.993		
Flt Protected		0.967			0.979			0.950							
Satd. Flow (prot)	0	1665	0	0	1701	0	0	1767	3343	0	0	0	3347	0	
Flt Permitted		0.608			0.802			0.471					0.950		
Satd. Flow (perm)	0	1047	0	0	1393	0	0	876	3343	0	0	0	3180	0	
Right Turn on Red			Yes			Yes				Yes				Yes	
Satd. Flow (RTOR)		50			21								6		
Link Speed (mph)		30			30				30				30		
Link Distance (ft)		754			1244				349				353		
Travel Time (s)		17.1			28.3				7.9				8.0		
Peak Hour Factor	0.80	0.80	0.80	0.93	0.93	0.93	0.91	0.91	0.91	0.91	0.98	0.98	0.98	0.98	
Heavy Vehicles (%)	4%	0%	9%	1%	9%	7%	50%	0%	8%	0%	0%	0%	7%	10%	
Adj. Flow (vph)	96	0	45	126	73	88	2	45	940	0	3	0	406	21	
Shared Lane Traffic (%)															
Lane Group Flow (vph)	0	141	0	0	287	0	0	47	940	0	0	0	430	0	
Turn Type	Perm	NA		Perm	NA		Perm	Perm	NA		Perm		NA		
Protected Phases		3			3				1				1		2
Permitted Phases	3			3			1	1			1				
Detector Phase	3	3		3	3		1	1	1		1		1		
Switch Phase															
Minimum Initial (s)	6.0	6.0		6.0	6.0		10.0	10.0	10.0		10.0		10.0		1.0
Minimum Split (s)	20.0	20.0		20.0	20.0		15.0	15.0	15.0		15.0		15.0		18.0
Total Split (s)	40.0	40.0		40.0	40.0		52.0	52.0	52.0		52.0		52.0		18.0
Total Split (%)	36.4%	36.4%		36.4%	36.4%		47.3%	47.3%	47.3%		47.3%		47.3%		16%
Maximum Green (s)	34.0	34.0		34.0	34.0		47.0	47.0	47.0		47.0		47.0		15.0
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0		3.0		2.0
All-Red Time (s)	3.0	3.0		3.0	3.0		2.0	2.0	2.0		2.0		2.0		1.0
Lost Time Adjust (s)		0.0			0.0			0.0	0.0				0.0		
Total Lost Time (s)		6.0			6.0			5.0	5.0				5.0		
Lead/Lag							Lead	Lead	Lead		Lead		Lead		Lag
Lead-Lag Optimize?							Yes	Yes	Yes		Yes		Yes		Yes
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0		2.0		2.0		2.0
Recall Mode	Max	Max		Max	Max		C-Max	C-Max	C-Max		C-Max		C-Max		None
Walk Time (s)	7.0	7.0		7.0	7.0										7.0
Flash Dont Walk (s)	7.0	7.0		7.0	7.0										8.0
Pedestrian Calls (#/hr)	0	0		0	0										40
Act Effct Green (s)		34.0			34.0			54.2	54.2				54.2		
Actuated g/C Ratio		0.31			0.31			0.49	0.49				0.49		
v/c Ratio		0.39			0.64			0.11	0.57				0.27		
Control Delay		22.8			38.1			19.2	23.0				8.5		
Queue Delay		0.0			0.0			0.0	0.0				0.0		
Total Delay		22.8			38.1			19.2	23.0				8.5		
LOS		C			D			B	C				A		
Approach Delay		22.8			38.1				22.9				8.5		
Approach LOS		C			D				C				A		
Queue Length 50th (ft)		49			162			20	272				33		
Queue Length 95th (ft)		89			258			45	344				46		
Internal Link Dist (ft)		674			1164				269				273		
Turn Bay Length (ft)								150							
Base Capacity (vph)		358			445			431	1647				1570		
Starvation Cap Reductn		0			0			0	0				0		
Spillback Cap Reductn		0			0			0	0				0		
Storage Cap Reductn		0			0			0	0				0		
Reduced v/c Ratio		0.39			0.64			0.11	0.57				0.27		

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 51 (46%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.64
Intersection Signal Delay: 21.9 Intersection LOS: C
Intersection Capacity Utilization 60.5% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 1: Warren Street & Dale Street/Clifford Street

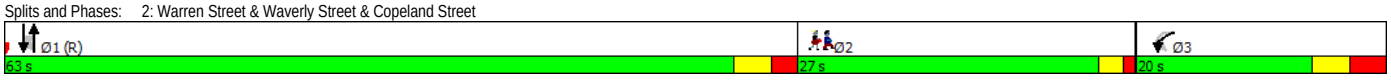


Lane Group	WBL2	WBL	WBR	NBU	NBT	NBR	NBR2	SBU	SBL	SBT	NWL	NWR	Ø2
Lane Configurations													
Traffic Volume (vph)	7	37	26	6	927	0	83	1	41	378	0	0	
Future Volume (vph)	7	37	26	6	927	0	83	1	41	378	0	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)		0	0	0		115			150		0	0	
Storage Lanes		1	0	0		0			1		0	0	
Taper Length (ft)		25		25					100		25		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	1.00	0.95	1.00	1.00	
Frt		0.949			0.988								
Flt Protected		0.970							0.950				
Satd. Flow (prot)	0	1672	0	0	3284	0	0	0	1574	3312	0	0	
Flt Permitted		0.970			0.953				0.194				
Satd. Flow (perm)	0	1672	0	0	3129	0	0	0	321	3312	0	0	
Right Turn on Red			Yes				Yes						
Satd. Flow (RTOR)		50			60								
Link Speed (mph)		30			30					30	30		
Link Distance (ft)		490			353					805	1318		
Travel Time (s)		11.1			8.0					18.3	30.0		
Peak Hour Factor	0.88	0.88	0.88	0.94	0.94	0.94	0.94	0.92	0.92	0.92	0.25	0.25	
Heavy Vehicles (%)	0%	3%	8%	0%	9%	0%	5%	0%	15%	9%	0%	0%	
Adj. Flow (vph)	8	42	30	6	986	0	88	1	45	411	0	0	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	80	0	0	1080	0	0	0	46	411	0	0	
Turn Type	Perm	Prot		Perm	NA			Perm	Perm	NA			
Protected Phases		3			1					1			2
Permitted Phases	3			1				1	1				
Detector Phase	3	3		1	1			1	1	1			
Switch Phase													
Minimum Initial (s)	6.0	6.0		10.0	10.0			10.0	10.0	10.0			1.0
Minimum Split (s)	12.0	12.0		15.0	15.0			15.0	15.0	15.0			27.0
Total Split (s)	20.0	20.0		63.0	63.0			63.0	63.0	63.0			27.0
Total Split (%)	18.2%	18.2%		57.3%	57.3%			57.3%	57.3%	57.3%			25%
Maximum Green (s)	14.0	14.0		58.0	58.0			58.0	58.0	58.0			24.0
Yellow Time (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0			2.0
All-Red Time (s)	3.0	3.0		2.0	2.0			2.0	2.0	2.0			1.0
Lost Time Adjust (s)		0.0			0.0				0.0	0.0			
Total Lost Time (s)		6.0			5.0				5.0	5.0			
Lead/Lag				Lead	Lead			Lead	Lead	Lead			Lag
Lead-Lag Optimize?				Yes	Yes			Yes	Yes	Yes			Yes
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0	2.0	2.0			2.0
Recall Mode	Max	Max		C-Max	C-Max			C-Max	C-Max	C-Max			None
Walk Time (s)													8.0
Flash Dont Walk (s)													16.0
Pedestrian Calls (#/hr)													65
Act Effct Green (s)		14.0			63.4				63.4	63.4			
Actuated g/C Ratio		0.13			0.58				0.58	0.58			
v/c Ratio		0.31			0.59				0.25	0.22			
Control Delay		23.5			5.2				19.0	13.1			
Queue Delay		0.0			0.0				0.0	0.0			
Total Delay		23.5			5.2				19.0	13.1			
LOS		C			A				B	B			
Approach Delay		23.5			5.2					13.7			
Approach LOS		C			A					B			
Queue Length 50th (ft)		19			50				17	78			
Queue Length 95th (ft)		62			63				46	108			
Internal Link Dist (ft)		410			273					725	1238		
Turn Bay Length (ft)									150				
Base Capacity (vph)		256			1829				185	1909			
Starvation Cap Reductn		0			5				0	0			
Spillback Cap Reductn		0			0				0	0			
Storage Cap Reductn		0			0				0	0			
Reduced v/c Ratio		0.31			0.59				0.25	0.22			

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 48 (44%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.59
Intersection Signal Delay: 8.5 Intersection LOS: A
Intersection Capacity Utilization 49.1% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Warren Street & Waverly Street & Copeland Street



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	59	71	0	742	427	0
Future Volume (Veh/h)	59	71	0	742	427	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.83	0.83	0.95	0.95	0.90	0.90
Hourly flow rate (vph)	71	86	0	781	474	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1255	474	474			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1255	474	474			
tC, single (s)	6.5	6.3	4.1			
tC, 2 stage (s)						
tF (s)	3.6	3.4	2.2			
p0 queue free %	62	85	100			
cM capacity (veh/h)	185	582	1099			

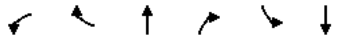
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	157	781	474
Volume Left	71	0	0
Volume Right	86	0	0
cSH	295	1700	1700
Volume to Capacity	0.53	0.46	0.28
Queue Length 95th (ft)	73	0	0
Control Delay (s)	30.2	0.0	0.0
Lane LOS	D		
Approach Delay (s)	30.2	0.0	0.0
Approach LOS	D		

Intersection Summary				
Average Delay		3.4		
Intersection Capacity Utilization		53.3%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	51	688	469	110
Future Volume (Veh/h)	0	0	51	688	469	110
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.25	0.25	0.96	0.96	0.94	0.94
Hourly flow rate (vph)	0	0	53	717	499	117
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1380	558	616			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1380	558	616			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	95			
cM capacity (veh/h)	150	530	974			

Direction, Lane #	NB 1	SB 1
Volume Total	770	616
Volume Left	53	0
Volume Right	0	117
cSH	974	1700
Volume to Capacity	0.05	0.36
Queue Length 95th (ft)	4	0
Control Delay (s)	1.4	0.0
Lane LOS	A	
Approach Delay (s)	1.4	0.0
Approach LOS		

Intersection Summary				
Average Delay	0.8			
Intersection Capacity Utilization	77.1%	ICU Level of Service	D	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	81	55	688	0	0	498
Future Volume (Veh/h)	81	55	688	0	0	498
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.96	0.96	0.96	0.96	0.94	0.94
Hourly flow rate (vph)	84	57	717	0	0	530
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1247	717			717	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1247	717			717	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	56	87			100	
cM capacity (veh/h)	189	433			893	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	141	717	530
Volume Left	84	0	0
Volume Right	57	0	0
cSH	245	1700	1700
Volume to Capacity	0.58	0.42	0.31
Queue Length 95th (ft)	82	0	0
Control Delay (s)	38.0	0.0	0.0
Lane LOS	E		
Approach Delay (s)	38.0	0.0	0.0
Approach LOS	E		

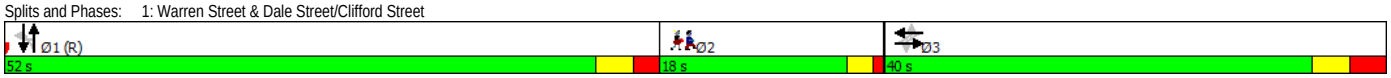
Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	50.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT	SBR	Ø2
Lane Configurations														
Traffic Volume (vph)	123	0	105	106	55	54	8	43	648	0	0	758	65	
Future Volume (vph)	123	0	105	106	55	54	8	43	648	0	0	758	65	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		0	0		0		150		0	0		115	
Storage Lanes	0		0	0		0		1		0	0		0	
Taper Length (ft)	25			25				100			25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	1.00	0.95	0.95	
Frt		0.938			0.966							0.988		
Flt Protected		0.974			0.976			0.950						
Satd. Flow (prot)	0	1678	0	0	1748	0	0	1705	3343	0	0	3435	0	
Flt Permitted		0.680			0.713			0.213						
Satd. Flow (perm)	0	1171	0	0	1277	0	0	382	3343	0	0	3435	0	
Right Turn on Red			Yes			Yes				Yes			Yes	
Satd. Flow (RTOR)		50			16							10		
Link Speed (mph)		30			30				30			30		
Link Distance (ft)		754			1244				349			353		
Travel Time (s)		17.1			28.3				7.9			8.0		
Peak Hour Factor	0.86	0.86	0.86	0.80	0.80	0.80	0.93	0.93	0.93	0.93	0.95	0.95	0.95	
Heavy Vehicles (%)	3%	0%	4%	2%	0%	6%	0%	7%	8%	0%	0%	4%	2%	
Adj. Flow (vph)	143	0	122	133	69	68	9	46	697	0	0	798	68	
Shared Lane Traffic (%)														
Lane Group Flow (vph)	0	265	0	0	270	0	0	55	697	0	0	866	0	
Turn Type	Perm	NA		Perm	NA		Perm	Perm	NA			NA		
Protected Phases		3			3				1			1		2
Permitted Phases	3			3			1	1						
Detector Phase	3	3		3	3		1	1	1			1		
Switch Phase														
Minimum Initial (s)	6.0	6.0		6.0	6.0		10.0	10.0	10.0			10.0		1.0
Minimum Split (s)	20.0	20.0		20.0	20.0		15.0	15.0	15.0			15.0		18.0
Total Split (s)	40.0	40.0		40.0	40.0		52.0	52.0	52.0			52.0		18.0
Total Split (%)	36.4%	36.4%		36.4%	36.4%		47.3%	47.3%	47.3%			47.3%		16%
Maximum Green (s)	34.0	34.0		34.0	34.0		47.0	47.0	47.0			47.0		15.0
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0			3.0		2.0
All-Red Time (s)	3.0	3.0		3.0	3.0		2.0	2.0	2.0			2.0		1.0
Lost Time Adjust (s)		0.0			0.0			0.0	0.0			0.0		
Total Lost Time (s)		6.0			6.0			5.0	5.0			5.0		
Lead/Lag							Lead	Lead	Lead			Lead		Lag
Lead-Lag Optimize?							Yes	Yes	Yes			Yes		Yes
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0			2.0		2.0
Recall Mode	Max	Max		Max	Max		C-Max	C-Max	C-Max			C-Max		None
Walk Time (s)	7.0	7.0		7.0	7.0									7.0
Flash Dont Walk (s)	7.0	7.0		7.0	7.0									8.0
Pedestrian Calls (#/hr)	0	0		0	0									96
Act Effct Green (s)		34.0			34.0			47.0	47.0			47.0		
Actuated g/C Ratio		0.31			0.31			0.43	0.43			0.43		
v/c Ratio		0.67			0.67			0.34	0.49			0.59		
Control Delay		36.2			40.4			28.5	24.2			7.9		
Queue Delay		0.0			0.0			0.0	0.0			0.0		
Total Delay		36.2			40.4			28.5	24.2			7.9		
LOS		D			D			C	C			A		
Approach Delay		36.2			40.4				24.6			7.9		
Approach LOS		D			D				C			A		
Queue Length 50th (ft)		133			156			25	183			51		
Queue Length 95th (ft)		214			214			64	237			64		
Internal Link Dist (ft)		674			1164				269			273		
Turn Bay Length (ft)								150						
Base Capacity (vph)		396			405			163	1428			1473		
Starvation Cap Reductn		0			0			0	0			0		
Spillback Cap Reductn		0			0			0	0			0		
Storage Cap Reductn		0			0			0	0			0		
Reduced v/c Ratio		0.67			0.67			0.34	0.49			0.59		

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 5 (5%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.67
Intersection Signal Delay: 21.2 Intersection LOS: C
Intersection Capacity Utilization 61.9% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 1: Warren Street & Dale Street/Clifford Street

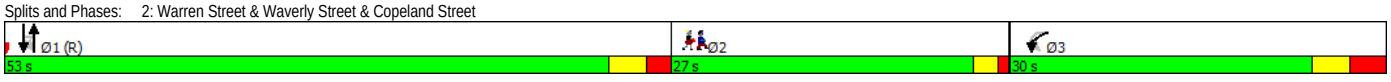


Lane Group	WBL2	WBL	WBR	NBT	NBR	NBR2	SBU	SBL	SBT	NWL	NWR	Ø2
Lane Configurations												
Traffic Volume (vph)	13	70	25	698	0	127	10	84	753	0	0	
Future Volume (vph)	13	70	25	698	0	127	10	84	753	0	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)		0	0		115			150		0	0	
Storage Lanes		1	0		0			1		0	0	
Taper Length (ft)		25						100		25		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	0.95	1.00	0.95	1.00	1.00	
Frt		0.969		0.977								
Flt Protected		0.963						0.950				
Satd. Flow (prot)	0	1708	0	3259	0	0	0	1698	3438	0	0	
Flt Permitted		0.963						0.229				
Satd. Flow (perm)	0	1708	0	3259	0	0	0	409	3438	0	0	
Right Turn on Red			Yes			Yes						
Satd. Flow (RTOR)		50		60								
Link Speed (mph)		30		30					30	30		
Link Distance (ft)		490		353					805	1318		
Travel Time (s)		11.1		8.0					18.3	30.0		
Peak Hour Factor	0.86	0.86	0.86	0.98	0.98	0.98	0.97	0.97	0.97	0.25	0.25	
Heavy Vehicles (%)	0%	3%	8%	9%	0%	4%	0%	7%	5%	0%	0%	
Adj. Flow (vph)	15	81	29	712	0	130	10	87	776	0	0	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	125	0	842	0	0	0	97	776	0	0	
Turn Type	Perm	Prot		NA			Perm	Perm	NA			
Protected Phases		3		1					1			2
Permitted Phases	3						1	1				
Detector Phase	3	3		1			1	1	1			
Switch Phase												
Minimum Initial (s)	6.0	6.0		10.0			10.0	10.0	10.0			1.0
Minimum Split (s)	12.0	12.0		15.0			15.0	15.0	15.0			27.0
Total Split (s)	30.0	30.0		53.0			53.0	53.0	53.0			27.0
Total Split (%)	27.3%	27.3%		48.2%			48.2%	48.2%	48.2%			25%
Maximum Green (s)	24.0	24.0		48.0			48.0	48.0	48.0			24.0
Yellow Time (s)	3.0	3.0		3.0			3.0	3.0	3.0			2.0
All-Red Time (s)	3.0	3.0		2.0			2.0	2.0	2.0			1.0
Lost Time Adjust (s)		0.0		0.0				0.0	0.0			
Total Lost Time (s)		6.0		5.0				5.0	5.0			
Lead/Lag				Lead			Lead	Lead	Lead			Lag
Lead-Lag Optimize?				Yes			Yes	Yes	Yes			Yes
Vehicle Extension (s)	2.0	2.0		2.0			2.0	2.0	2.0			2.0
Recall Mode	Max	Max		C-Max			C-Max	C-Max	C-Max			None
Walk Time (s)												8.0
Flash Dont Walk (s)												16.0
Pedestrian Calls (#/hr)												165
Act Effct Green (s)		24.0		48.0				48.0	48.0			
Actuated g/C Ratio		0.22		0.44				0.44	0.44			
v/c Ratio		0.30		0.58				0.54	0.52			
Control Delay		24.0		8.3				36.9	24.1			
Queue Delay		0.0		0.1				0.0	0.0			
Total Delay		24.0		8.4				36.9	24.1			
LOS		C		A				D	C			
Approach Delay		24.0		8.4					25.5			
Approach LOS		C		A					C			
Queue Length 50th (ft)		44		75				49	205			
Queue Length 95th (ft)		91		96				114	262			
Internal Link Dist (ft)		410		273					725	1238		
Turn Bay Length (ft)								150				
Base Capacity (vph)		411		1455				178	1500			
Starvation Cap Reductn		0		60				0	0			
Spillback Cap Reductn		0		0				0	0			
Storage Cap Reductn		0		0				0	0			
Reduced v/c Ratio		0.30		0.60				0.54	0.52			

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 5 (5%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.58
Intersection Signal Delay: 17.6 Intersection LOS: B
Intersection Capacity Utilization 51.1% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Warren Street & Waverly Street & Copeland Street



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	79	85	0	509	590	0
Future Volume (Veh/h)	79	85	0	509	590	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.88	0.88	0.93	0.93	0.87	0.87
Hourly flow rate (vph)	90	97	0	547	678	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1225	678	678			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1225	678	678			
tC, single (s)	6.4	6.4	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.4	2.2			
p0 queue free %	54	77	100			
cM capacity (veh/h)	196	430	923			

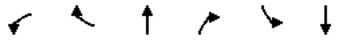
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	187	547	678
Volume Left	90	0	0
Volume Right	97	0	0
cSH	273	1700	1700
Volume to Capacity	0.69	0.32	0.40
Queue Length 95th (ft)	114	0	0
Control Delay (s)	42.7	0.0	0.0
Lane LOS	E		
Approach Delay (s)	42.7	0.0	0.0
Approach LOS	E		

Intersection Summary				
Average Delay		5.7		
Intersection Capacity Utilization		47.3%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	40	457	649	98
Future Volume (Veh/h)	0	0	40	457	649	98
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.25	0.25	0.99	0.99	0.93	0.93
Hourly flow rate (vph)	0	0	40	462	698	105
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1292	750	803			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1292	750	803			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	95			
cM capacity (veh/h)	173	414	808			

Direction, Lane #	NB 1	SB 1
Volume Total	502	803
Volume Left	40	0
Volume Right	0	105
cSH	808	1700
Volume to Capacity	0.05	0.47
Queue Length 95th (ft)	4	0
Control Delay (s)	1.4	0.0
Lane LOS	A	
Approach Delay (s)	1.4	0.0
Approach LOS		

Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	60.5%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	72	53	457	0	0	675
Future Volume (Veh/h)	72	53	457	0	0	675
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.89	0.89	0.99	0.99	0.93	0.93
Hourly flow rate (vph)	81	60	462	0	0	726
Pedestrians	3					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	0					
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1191	465			465	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1191	465			465	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	61	90			100	
cM capacity (veh/h)	208	600			1104	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	141	462	726
Volume Left	81	0	0
Volume Right	60	0	0
cSH	289	1700	1700
Volume to Capacity	0.49	0.27	0.43
Queue Length 95th (ft)	63	0	0
Control Delay (s)	28.8	0.0	0.0
Lane LOS	D		
Approach Delay (s)	28.8	0.0	0.0
Approach LOS	D		

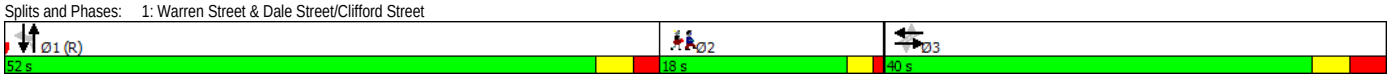
Intersection Summary			
Average Delay	3.1		
Intersection Capacity Utilization	49.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR	Ø2
Lane Configurations															
Traffic Volume (vph)	77	0	36	125	68	89	2	41	861	0	3	0	398	21	
Future Volume (vph)	77	0	36	125	68	89	2	41	861	0	3	0	398	21	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		0	0		0		150		0		0		115	
Storage Lanes	0		0	0		0		1		0		0		0	
Taper Length (ft)	25			25				100				25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	0.95	
Frt		0.957			0.957								0.993		
Flt Protected		0.967			0.978			0.950							
Satd. Flow (prot)	0	1665	0	0	1696	0	0	1767	3343	0	0	0	3347	0	
Flt Permitted		0.601			0.801			0.471					0.950		
Satd. Flow (perm)	0	1035	0	0	1389	0	0	876	3343	0	0	0	3180	0	
Right Turn on Red			Yes			Yes				Yes				Yes	
Satd. Flow (RTOR)		50			22								6		
Link Speed (mph)		30			30				30				30		
Link Distance (ft)		754			192				349				353		
Travel Time (s)		17.1			4.4				7.9				8.0		
Peak Hour Factor	0.80	0.80	0.80	0.93	0.93	0.93	0.91	0.91	0.91	0.91	0.98	0.98	0.98	0.98	
Heavy Vehicles (%)	4%	0%	9%	1%	9%	7%	50%	0%	8%	0%	0%	0%	7%	10%	
Adj. Flow (vph)	96	0	45	134	73	96	2	45	946	0	3	0	406	21	
Shared Lane Traffic (%)															
Lane Group Flow (vph)	0	141	0	0	303	0	0	47	946	0	0	0	430	0	
Turn Type	Perm	NA		Perm	NA		Perm	Perm	NA		Perm		NA		
Protected Phases		3			3				1				1		2
Permitted Phases	3			3			1	1			1				
Detector Phase	3	3		3	3		1	1	1		1		1		
Switch Phase															
Minimum Initial (s)	6.0	6.0		6.0	6.0		10.0	10.0	10.0		10.0		10.0		1.0
Minimum Split (s)	20.0	20.0		20.0	20.0		15.0	15.0	15.0		15.0		15.0		18.0
Total Split (s)	40.0	40.0		40.0	40.0		52.0	52.0	52.0		52.0		52.0		18.0
Total Split (%)	36.4%	36.4%		36.4%	36.4%		47.3%	47.3%	47.3%		47.3%		47.3%		16%
Maximum Green (s)	34.0	34.0		34.0	34.0		47.0	47.0	47.0		47.0		47.0		15.0
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0		3.0		2.0
All-Red Time (s)	3.0	3.0		3.0	3.0		2.0	2.0	2.0		2.0		2.0		1.0
Lost Time Adjust (s)		0.0			0.0			0.0	0.0				0.0		
Total Lost Time (s)		6.0			6.0			5.0	5.0				5.0		
Lead/Lag							Lead	Lead	Lead		Lead		Lead		Lag
Lead-Lag Optimize?							Yes	Yes	Yes		Yes		Yes		Yes
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0		2.0		2.0		2.0
Recall Mode	Max	Max		Max	Max		C-Max	C-Max	C-Max		C-Max		C-Max		None
Walk Time (s)	7.0	7.0		7.0	7.0										7.0
Flash Dont Walk (s)	7.0	7.0		7.0	7.0										8.0
Pedestrian Calls (#/hr)	0	0		0	0										40
Act Effct Green (s)		34.0			34.0			54.2	54.2				54.2		
Actuated g/C Ratio		0.31			0.31			0.49	0.49				0.49		
v/c Ratio		0.40			0.68			0.11	0.57				0.27		
Control Delay		22.9			39.8			19.2	23.1				8.5		
Queue Delay		0.0			0.0			0.0	0.0				0.0		
Total Delay		22.9			39.8			19.2	23.1				8.5		
LOS		C			D			B	C				A		
Approach Delay		22.9			39.8				22.9				8.5		
Approach LOS		C			D				C				A		
Queue Length 50th (ft)		49			174			20	275				33		
Queue Length 95th (ft)		89			276			45	347				46		
Internal Link Dist (ft)		674			112				269				273		
Turn Bay Length (ft)								150							
Base Capacity (vph)		354			444			431	1647				1570		
Starvation Cap Reductn		0			0			0	0				0		
Spillback Cap Reductn		0			0			0	0				0		
Storage Cap Reductn		0			0			0	0				0		
Reduced v/c Ratio		0.40			0.68			0.11	0.57				0.27		

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 51 (46%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.68
Intersection Signal Delay: 22.3 Intersection LOS: C
Intersection Capacity Utilization 61.5% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 1: Warren Street & Dale Street/Clifford Street



Lane Group	WBL2	WBL	WBR	NBU	NBT	NBR	NBR2	SBU	SBL	SBT	NWL	NWR	Ø2
Lane Configurations													
Traffic Volume (vph)	7	37	26	6	934	0	89	1	46	378	0	0	
Future Volume (vph)	7	37	26	6	934	0	89	1	46	378	0	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)		0	0	0		115			150		0	0	
Storage Lanes		1	0	0		0			1		0	0	
Taper Length (ft)		25		25					100		25		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	1.00	0.95	1.00	1.00	
Frt		0.949			0.987								
Flt Protected		0.970							0.950				
Satd. Flow (prot)	0	1672	0	0	3281	0	0	0	1574	3312	0	0	
Flt Permitted		0.970			0.953				0.189				
Satd. Flow (perm)	0	1672	0	0	3127	0	0	0	313	3312	0	0	
Right Turn on Red			Yes				Yes						
Satd. Flow (RTOR)		50			60								
Link Speed (mph)		30			30					30	30		
Link Distance (ft)		490			353					805	224		
Travel Time (s)		11.1			8.0					18.3	5.1		
Peak Hour Factor	0.88	0.88	0.88	0.94	0.94	0.94	0.94	0.92	0.92	0.92	0.25	0.25	
Heavy Vehicles (%)	0%	3%	8%	0%	9%	0%	5%	0%	15%	9%	0%	0%	
Adj. Flow (vph)	8	42	30	6	994	0	95	1	50	411	0	0	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	80	0	0	1095	0	0	0	51	411	0	0	
Turn Type	Perm	Prot		Perm	NA			Perm	Perm	NA			
Protected Phases		3			1					1			2
Permitted Phases	3			1				1	1				
Detector Phase	3	3		1	1			1	1	1			
Switch Phase													
Minimum Initial (s)	6.0	6.0		10.0	10.0			10.0	10.0	10.0			1.0
Minimum Split (s)	12.0	12.0		15.0	15.0			15.0	15.0	15.0			27.0
Total Split (s)	20.0	20.0		63.0	63.0			63.0	63.0	63.0			27.0
Total Split (%)	18.2%	18.2%		57.3%	57.3%			57.3%	57.3%	57.3%			25%
Maximum Green (s)	14.0	14.0		58.0	58.0			58.0	58.0	58.0			24.0
Yellow Time (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0			2.0
All-Red Time (s)	3.0	3.0		2.0	2.0			2.0	2.0	2.0			1.0
Lost Time Adjust (s)		0.0			0.0				0.0	0.0			
Total Lost Time (s)		6.0			5.0				5.0	5.0			
Lead/Lag				Lead	Lead			Lead	Lead	Lead			Lag
Lead-Lag Optimize?				Yes	Yes			Yes	Yes	Yes			Yes
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0	2.0	2.0			2.0
Recall Mode	Max	Max		C-Max	C-Max			C-Max	C-Max	C-Max			None
Walk Time (s)													8.0
Flash Dont Walk (s)													16.0
Pedestrian Calls (#/hr)													65
Act Effct Green (s)		14.0			63.4				63.4	63.4			
Actuated g/C Ratio		0.13			0.58				0.58	0.58			
v/c Ratio		0.31			0.60				0.28	0.22			
Control Delay		23.5			5.4				20.3	13.1			
Queue Delay		0.0			0.0				0.0	0.0			
Total Delay		23.5			5.4				20.3	13.1			
LOS		C			A				C	B			
Approach Delay		23.5			5.4					13.9			
Approach LOS		C			A					B			
Queue Length 50th (ft)		19			53				20	78			
Queue Length 95th (ft)		62			64				51	108			
Internal Link Dist (ft)		410			273					725	144		
Turn Bay Length (ft)									150				
Base Capacity (vph)		256			1827				180	1909			
Starvation Cap Reductn		0			5				0	0			
Spillback Cap Reductn		0			0				0	0			
Storage Cap Reductn		0			0				0	0			
Reduced v/c Ratio		0.31			0.60				0.28	0.22			

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 48 (44%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.60
Intersection Signal Delay: 8.7 Intersection LOS: A
Intersection Capacity Utilization 53.2% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Warren Street & Waverly Street & Copeland Street

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	60	71	0	742	427	0
Future Volume (Veh/h)	60	71	0	742	427	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.83	0.83	0.95	0.95	0.90	0.90
Hourly flow rate (vph)	72	86	0	781	474	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1255	474	474			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1255	474	474			
tC, single (s)	6.5	6.3	4.1			
tC, 2 stage (s)						
tF (s)	3.6	3.4	2.2			
p0 queue free %	61	85	100			
cM capacity (veh/h)	185	582	1099			

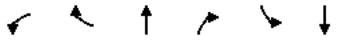
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	158	781	474
Volume Left	72	0	0
Volume Right	86	0	0
cSH	294	1700	1700
Volume to Capacity	0.54	0.46	0.28
Queue Length 95th (ft)	74	0	0
Control Delay (s)	30.6	0.0	0.0
Lane LOS	D		
Approach Delay (s)	30.6	0.0	0.0
Approach LOS	D		

Intersection Summary				
Average Delay		3.4		
Intersection Capacity Utilization		53.4%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	51	688	469	111
Future Volume (Veh/h)	0	0	51	688	469	111
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.25	0.25	0.96	0.96	0.94	0.94
Hourly flow rate (vph)	0	0	53	717	499	118
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1381	558	617			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1381	558	617			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	95			
cM capacity (veh/h)	150	529	973			

Direction, Lane #	NB 1	SB 1
Volume Total	770	617
Volume Left	53	0
Volume Right	0	118
cSH	973	1700
Volume to Capacity	0.05	0.36
Queue Length 95th (ft)	4	0
Control Delay (s)	1.4	0.0
Lane LOS	A	
Approach Delay (s)	1.4	0.0
Approach LOS		

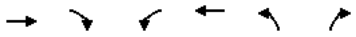
Intersection Summary				
Average Delay	0.8			
Intersection Capacity Utilization	77.1%	ICU Level of Service	D	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	82	55	688	0	0	498
Future Volume (Veh/h)	82	55	688	0	0	498
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.96	0.96	0.96	0.96	0.94	0.94
Hourly flow rate (vph)	85	57	717	0	0	530
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1247	717			717	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1247	717			717	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	55	87			100	
cM capacity (veh/h)	189	433			893	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	142	717	530
Volume Left	85	0	0
Volume Right	57	0	0
cSH	244	1700	1700
Volume to Capacity	0.58	0.42	0.31
Queue Length 95th (ft)	83	0	0
Control Delay (s)	38.4	0.0	0.0
Lane LOS	E		
Approach Delay (s)	38.4	0.0	0.0
Approach LOS	E		

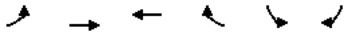
Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	50.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	132	11	0	0	0	1
Future Volume (Veh/h)	132	11	0	0	0	1
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	143	12	0	0	0	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	224					
pX, platoon unblocked						
vC, conflicting volume			155		149	149
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			155		149	149
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1425		843	898

Direction, Lane #	EB 1	NB 1
Volume Total	155	1
Volume Left	0	0
Volume Right	12	1
cSH	1700	898
Volume to Capacity	0.09	0.00
Queue Length 95th (ft)	0	0
Control Delay (s)	0.0	9.0
Lane LOS		A
Approach Delay (s)	0.0	9.0
Approach LOS		A

Intersection Summary				
Average Delay		0.1		
Intersection Capacity Utilization		17.6%	ICU Level of Service	A
Analysis Period (min)		15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	267	1	0	15
Future Volume (Veh/h)	0	0	267	1	0	15
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	290	1	0	16
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		192				
pX, platoon unblocked						
vC, conflicting volume	291				290	290
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	291				290	290
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	98
cM capacity (veh/h)	1271				700	749

Direction, Lane #	WB 1	SB 1
Volume Total	291	16
Volume Left	0	0
Volume Right	1	16
cSH	1700	749
Volume to Capacity	0.17	0.02
Queue Length 95th (ft)	0	2
Control Delay (s)	0.0	9.9
Lane LOS		A
Approach Delay (s)	0.0	9.9
Approach LOS		A

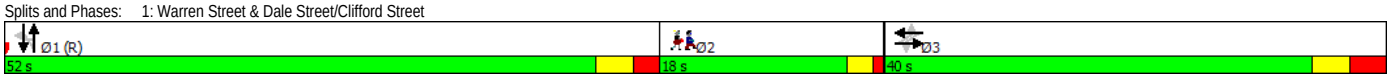
Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	24.1%	ICU Level of Service		A
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT	SBR	Ø2
Lane Configurations														
Traffic Volume (vph)	123	0	105	115	55	62	8	43	656	0	0	758	65	
Future Volume (vph)	123	0	105	115	55	62	8	43	656	0	0	758	65	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		0	0		0		150		0	0		115	
Storage Lanes	0		0	0		0		1		0	0		0	
Taper Length (ft)	25			25				100			25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	1.00	0.95	0.95	
Frt		0.938			0.964							0.988		
Flt Protected		0.974			0.976			0.950						
Satd. Flow (prot)	0	1678	0	0	1742	0	0	1705	3343	0	0	3435	0	
Flt Permitted		0.672			0.712			0.213						
Satd. Flow (perm)	0	1158	0	0	1271	0	0	382	3343	0	0	3435	0	
Right Turn on Red			Yes			Yes				Yes			Yes	
Satd. Flow (RTOR)		50			17							10		
Link Speed (mph)		30			30				30			30		
Link Distance (ft)		754			180				349			353		
Travel Time (s)		17.1			4.1				7.9			8.0		
Peak Hour Factor	0.86	0.86	0.86	0.80	0.80	0.80	0.93	0.93	0.93	0.93	0.95	0.95	0.95	
Heavy Vehicles (%)	3%	0%	4%	2%	0%	6%	0%	7%	8%	0%	0%	4%	2%	
Adj. Flow (vph)	143	0	122	144	69	78	9	46	705	0	0	798	68	
Shared Lane Traffic (%)														
Lane Group Flow (vph)	0	265	0	0	291	0	0	55	705	0	0	866	0	
Turn Type	Perm	NA		Perm	NA		Perm	Perm	NA			NA		
Protected Phases		3			3				1			1		2
Permitted Phases	3			3			1	1						
Detector Phase	3	3		3	3		1	1	1			1		
Switch Phase														
Minimum Initial (s)	6.0	6.0		6.0	6.0		10.0	10.0	10.0			10.0		1.0
Minimum Split (s)	20.0	20.0		20.0	20.0		15.0	15.0	15.0			15.0		18.0
Total Split (s)	40.0	40.0		40.0	40.0		52.0	52.0	52.0			52.0		18.0
Total Split (%)	36.4%	36.4%		36.4%	36.4%		47.3%	47.3%	47.3%			47.3%		16%
Maximum Green (s)	34.0	34.0		34.0	34.0		47.0	47.0	47.0			47.0		15.0
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0			3.0		2.0
All-Red Time (s)	3.0	3.0		3.0	3.0		2.0	2.0	2.0			2.0		1.0
Lost Time Adjust (s)		0.0			0.0			0.0	0.0			0.0		
Total Lost Time (s)		6.0			6.0			5.0	5.0			5.0		
Lead/Lag							Lead	Lead	Lead			Lead		Lag
Lead-Lag Optimize?							Yes	Yes	Yes			Yes		Yes
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0			2.0		2.0
Recall Mode	Max	Max		Max	Max		C-Max	C-Max	C-Max			C-Max		None
Walk Time (s)	7.0	7.0		7.0	7.0									7.0
Flash Dont Walk (s)	7.0	7.0		7.0	7.0									8.0
Pedestrian Calls (#/hr)	0	0		0	0									96
Act Effct Green (s)		34.0			34.0			47.0	47.0			47.0		
Actuated g/C Ratio		0.31			0.31			0.43	0.43			0.43		
v/c Ratio		0.68			0.72			0.34	0.49			0.59		
Control Delay		36.6			43.4			28.5	24.4			7.9		
Queue Delay		0.0			0.0			0.0	0.0			0.0		
Total Delay		36.6			43.4			28.5	24.4			7.9		
LOS		D			D			C	C			A		
Approach Delay		36.6			43.4				24.7			7.9		
Approach LOS		D			D				C			A		
Queue Length 50th (ft)		133			172			25	186			51		
Queue Length 95th (ft)		215			234			64	241			64		
Internal Link Dist (ft)		674			100				269			273		
Turn Bay Length (ft)								150						
Base Capacity (vph)		392			404			163	1428			1473		
Starvation Cap Reductn		0			0			0	0			0		
Spillback Cap Reductn		0			0			0	1			0		
Storage Cap Reductn		0			0			0	0			0		
Reduced v/c Ratio		0.68			0.72			0.34	0.49			0.59		

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 5 (5%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.72
Intersection Signal Delay: 21.9 Intersection LOS: C
Intersection Capacity Utilization 61.8% ICU Level of Service B
Analysis Period (min) 15

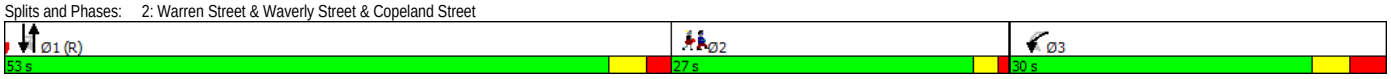
Splits and Phases: 1: Warren Street & Dale Street/Clifford Street



Lane Group	WBL2	WBL	WBR	NBT	NBR	NBR2	SBU	SBL	SBT	NWL	NWR	Ø2
Lane Configurations												
Traffic Volume (vph)	13	70	25	706	0	135	10	92	753	0	0	
Future Volume (vph)	13	70	25	706	0	135	10	92	753	0	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)		0	0		115			150		0	0	
Storage Lanes		1	0		0			1		0	0	
Taper Length (ft)		25						100		25		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	0.95	1.00	0.95	1.00	1.00	
Frt		0.969		0.976								
Flt Protected		0.963						0.950				
Satd. Flow (prot)	0	1708	0	3256	0	0	0	1697	3438	0	0	
Flt Permitted		0.963						0.222				
Satd. Flow (perm)	0	1708	0	3256	0	0	0	397	3438	0	0	
Right Turn on Red			Yes			Yes						
Satd. Flow (RTOR)		50		60								
Link Speed (mph)		30		30					30	30		
Link Distance (ft)		490		353					805	225		
Travel Time (s)		11.1		8.0					18.3	5.1		
Peak Hour Factor	0.86	0.86	0.86	0.98	0.98	0.98	0.97	0.97	0.97	0.25	0.25	
Heavy Vehicles (%)	0%	3%	8%	9%	0%	4%	0%	7%	5%	0%	0%	
Adj. Flow (vph)	15	81	29	720	0	138	10	95	776	0	0	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	125	0	858	0	0	0	105	776	0	0	
Turn Type	Perm	Prot		NA			Perm	Perm	NA			
Protected Phases		3		1					1			2
Permitted Phases	3						1	1				
Detector Phase	3	3		1			1	1	1			
Switch Phase												
Minimum Initial (s)	6.0	6.0		10.0			10.0	10.0	10.0			1.0
Minimum Split (s)	12.0	12.0		15.0			15.0	15.0	15.0			27.0
Total Split (s)	30.0	30.0		53.0			53.0	53.0	53.0			27.0
Total Split (%)	27.3%	27.3%		48.2%			48.2%	48.2%	48.2%			25%
Maximum Green (s)	24.0	24.0		48.0			48.0	48.0	48.0			24.0
Yellow Time (s)	3.0	3.0		3.0			3.0	3.0	3.0			2.0
All-Red Time (s)	3.0	3.0		2.0			2.0	2.0	2.0			1.0
Lost Time Adjust (s)		0.0		0.0				0.0	0.0			
Total Lost Time (s)		6.0		5.0				5.0	5.0			
Lead/Lag				Lead			Lead	Lead	Lead			Lag
Lead-Lag Optimize?				Yes			Yes	Yes	Yes			Yes
Vehicle Extension (s)	2.0	2.0		2.0			2.0	2.0	2.0			2.0
Recall Mode	Max	Max		C-Max			C-Max	C-Max	C-Max			None
Walk Time (s)												8.0
Flash Dont Walk (s)												16.0
Pedestrian Calls (#/hr)												165
Act Effct Green (s)		24.0		48.0				48.0	48.0			
Actuated g/C Ratio		0.22		0.44				0.44	0.44			
v/c Ratio		0.30		0.59				0.61	0.52			
Control Delay		24.0		8.5				41.6	24.1			
Queue Delay		0.0		0.1				0.0	0.0			
Total Delay		24.0		8.6				41.6	24.1			
LOS		C		A				D	C			
Approach Delay		24.0		8.6					26.2			
Approach LOS		C		A					C			
Queue Length 50th (ft)		44		79				56	205			
Queue Length 95th (ft)		91		100				#139	262			
Internal Link Dist (ft)		410		273					725	145		
Turn Bay Length (ft)								150				
Base Capacity (vph)		411		1454				173	1500			
Starvation Cap Reductn		0		51				0	0			
Spillback Cap Reductn		0		0				0	0			
Storage Cap Reductn		0		0				0	0			
Reduced v/c Ratio		0.30		0.61				0.61	0.52			

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 5 (5%), Referenced to phase 1:NBSB, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.61			
Intersection Signal Delay: 17.9		Intersection LOS: B	
Intersection Capacity Utilization 51.6%		ICU Level of Service A	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 2: Warren Street & Waverly Street & Copeland Street



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	80	85	0	509	590	0
Future Volume (Veh/h)	80	85	0	509	590	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.88	0.88	0.93	0.93	0.87	0.87
Hourly flow rate (vph)	91	97	0	547	678	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1225	678	678			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1225	678	678			
tC, single (s)	6.4	6.4	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.4	2.2			
p0 queue free %	53	77	100			
cM capacity (veh/h)	196	430	923			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	188	547	678
Volume Left	91	0	0
Volume Right	97	0	0
cSH	272	1700	1700
Volume to Capacity	0.69	0.32	0.40
Queue Length 95th (ft)	116	0	0
Control Delay (s)	43.2	0.0	0.0
Lane LOS	E		
Approach Delay (s)	43.2	0.0	0.0
Approach LOS	E		

Intersection Summary				
Average Delay		5.8		
Intersection Capacity Utilization		47.4%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	40	457	649	100
Future Volume (Veh/h)	0	0	40	457	649	100
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.25	0.25	0.99	0.99	0.93	0.93
Hourly flow rate (vph)	0	0	40	462	698	108
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1294	752	806			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1294	752	806			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	95			
cM capacity (veh/h)	172	413	806			

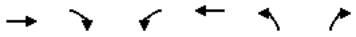
Direction, Lane #	NB 1	SB 1
Volume Total	502	806
Volume Left	40	0
Volume Right	0	108
cSH	806	1700
Volume to Capacity	0.05	0.47
Queue Length 95th (ft)	4	0
Control Delay (s)	1.4	0.0
Lane LOS	A	
Approach Delay (s)	1.4	0.0
Approach LOS		

Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	60.5%	ICU Level of Service	B	
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	74	53	457	0	0	675
Future Volume (Veh/h)	74	53	457	0	0	675
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.89	0.89	0.99	0.99	0.93	0.93
Hourly flow rate (vph)	83	60	462	0	0	726
Pedestrians	3					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	0					
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1191	465			465	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1191	465			465	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	60	90			100	
cM capacity (veh/h)	208	600			1104	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	143	462	726
Volume Left	83	0	0
Volume Right	60	0	0
cSH	287	1700	1700
Volume to Capacity	0.50	0.27	0.43
Queue Length 95th (ft)	65	0	0
Control Delay (s)	29.4	0.0	0.0
Lane LOS	D		
Approach Delay (s)	29.4	0.0	0.0
Approach LOS	D		

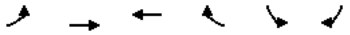
Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	49.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	225	16	0	0	0	1
Future Volume (Veh/h)	225	16	0	0	0	1
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	245	17	0	0	0	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	225					
pX, platoon unblocked						
vC, conflicting volume			262		254	254
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			262		254	254
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1302		735	785

Direction, Lane #	EB 1	NB 1
Volume Total	262	1
Volume Left	0	0
Volume Right	17	1
cSH	1700	785
Volume to Capacity	0.15	0.00
Queue Length 95th (ft)	0	0
Control Delay (s)	0.0	9.6
Lane LOS		A
Approach Delay (s)	0.0	9.6
Approach LOS		A

Intersection Summary				
Average Delay		0.0		
Intersection Capacity Utilization		22.8%	ICU Level of Service	A
Analysis Period (min)		15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	214	2	0	17
Future Volume (Veh/h)	0	0	214	2	0	17
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	233	2	0	18
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		180				
pX, platoon unblocked						
vC, conflicting volume	235				234	234
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	235				234	234
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	98
cM capacity (veh/h)	1332				754	805

Direction, Lane #	WB 1	SB 1
Volume Total	235	18
Volume Left	0	0
Volume Right	2	18
cSH	1700	805
Volume to Capacity	0.14	0.02
Queue Length 95th (ft)	0	2
Control Delay (s)	0.0	9.6
Lane LOS		A
Approach Delay (s)	0.0	9.6
Approach LOS		A

Intersection Summary				
Average Delay	0.7			
Intersection Capacity Utilization	21.4%	ICU Level of Service	A	
Analysis Period (min)	15			

TRIP GENERATION CALCULATIONS

2016054 - Michael Haynes Building

Trip Generation Assessment

HOWARD STEIN HUDSON
8-Jul-2016

XXX Means Columns U, X, and AA do not sum to Column R; hard code adjustements are needed
XX HARD CODED TO BALANCE (Manually change formatting)

Land Use	Size	Category	Directional Split	Average Trip Rate	Unadjusted Vehicle Trips	Assumed National Vehicle Occupancy Rate[1]	Unadjusted Person-Trips	Internal Capture Person-Trips[2]	Pass-By Person-Trips Share	Pass-By Person-Trips	Non-Primary Person-Trips	Primary Person-Trips	Transit Share[3]	Transit Person-Trips	Walk/Bike/ Other Share[3]	Walk/ Bike/ Other Trips	Auto Share[3]	Auto Person-Trips	Assumed Local Auto Occupancy Rate[4]	Total Adjusted Auto Trips
Daily Peak Hour																				
Apartment[5]	51	Total		6.650	340	1.13	**384**	0		0	0	**384**	17%	**66**	26%	**100**	57%	**218**	1.13	**192**
	units	In	50%	3.325	170	1.13	**192**		0%	0	0	**192**	17%	**33**	26%	**50**	57%	**109**	1.13	**96**
		Out	50%	3.325	170	1.13	**192**		0%	0	0	**192**	17%	**33**	26%	**50**	57%	**109**	1.13	**96**
Elderly Housing[6]	44	Total		3.440	152	1.13	**172**	0		0	0	**172**	17%	**30**	26%	**44**	57%	**98**	1.13	**86**
	units	In	50%	1.720	76	1.13	**86**		0%	0	0	**86**	17%	**15**	26%	**22**	57%	**49**	1.13	**43**
		Out	50%	1.720	76	1.13	**86**		0%	0	0	**86**	17%	**15**	26%	**22**	57%	**49**	1.13	**43**
Office Building[7]	9.684	Total		11.030	106	1.78	**188**	0		0	0	**188**	24%	**46**	17%	**32**	59%	**110**	1.78	**62**
	KSF	In	50%	5.515	53	1.78	**94**		0%	0	0	**94**	24%	**23**	17%	**16**	59%	**55**	1.78	**31**
		Out	50%	5.515	53	1.78	**94**		0%	0	0	**94**	24%	**23**	17%	**16**	59%	**55**	1.78	**31**
Shopping Center[8]	3.117	Total		42.700	134	1.78	**238**	0		0	0	**238**	12%	**28**	35%	**84**	53%	**126**	1.78	**70**
	KSF	In	50%	21.350	67	1.78	**119**		0%	0	0	**119**	12%	**14**	35%	**42**	53%	**63**	1.78	**35**
		Out	50%	21.350	67	1.78	**119**		0%	0	0	**119**	12%	**14**	35%	**42**	53%	**63**	1.78	**35**
Total		Total			**492**		**556**	**0**		**0**	0	**556**		**96**		**144**		**316**		**278**
		In			**246**		**278**	**0**		**0**	0	**278**		**48**		**72**		**158**		**139**
		Out			**246**		**278**	**0**		**0**	0	**278**		**48**		**72**		**158**		**139**
AM Peak Hour																				
Apartment[5]	51	Total		0.51	26	1.13	**30**	0		0	0	**30**		**8**		**8**		**14**	1.13	**13**
	units	In	20%	0.102	5	1.13	**6**		0%	0	0	**6**	19%	**1**	27%	**2**	54%	**3**	1.13	**3**
		Out	80%	0.408	21	1.13	**24**		0%	0	0	**24**	29%	**7**	27%	**6**	44%	**11**	1.13	**10**
Elderly Housing[6]	44	Total		0.20	9	1.13	**10**	0		0	0	**10**		**2**		**3**		**5**	1.13	**5**
	units	In	20%	0.040	2	1.13	**2**		0%	0	0	**2**	19%	**0**	27%	**1**	54%	**1**	1.13	**1**
		Out	80%	0.160	7	1.13	**8**		0%	0	0	**8**	29%	**2**	27%	**2**	44%	**4**	1.13	**4**
Office Building[7]	9.684	Total		1.56	15	1.78	**27**	0		0	0	**27**		**8**		**5**		**14**	1.78	**8**
	KSF	In	88%	1.373	13	1.78	**23**		0%	0	0	**23**	27%	**6**	18%	**4**	55%	**13**	1.78	**7**
		Out	12%	0.187	2	1.78	**4**		0%	0	0	**4**	40%	**2**	17%	**1**	43%	**1**	1.78	**1**
Shopping Center[8]	3.117	Total		0.96	3	1.78	**6**	0		0	0	**6**		**1**		**2**		**3**	1.78	**2**
	KSF	In	62%	0.595	2	1.78	**4**		0%	0	0	**4**	13%	**1**	36%	**1**	51%	**2**	1.78	**1**
		Out	38%	0.365	1	1.78	**2**		0%	0	0	**2**	21%	**0**	37%	**1**	42%	**1**	1.78	**1**
Total		Total			**35**		**40**	**0**		**0**	0	**40**		**10**		**11**		**19**		**18**
		In			**7**		**8**	**0**		**0**	0	**8**		**1**		**3**		**4**		**4**
		Out			**28**		**32**	**0**		**0**	0	**32**		**9**		**8**		**15**		**14**
PM Peak Hour																				
Apartment[5]	51	Total		0.62	32	1.13	**36**	0		0	0	**36**		**9**		**9**		**18**	1.13	**16**
	units	In	65%	0.403	21	1.13	**24**		0%	0	0	**24**	29%	**7**	27%	**6**	44%	**11**	1.13	**10**
		Out	35%	0.217	11	1.13	**12**		0%	0	0	**12**	19%	**2**	27%	**3**	54%	**7**	1.13	**6**
Elderly Housing[6]	44	Total		0.25	11	1.13	**13**	0		0	0	**13**		**3**		**3**		**7**	1.13	**7**
	units	In	65%	0.163	7	1.13	**8**		0%	0	0	**8**	29%	**2**	27%	**2**	44%	**4**	1.13	**4**
		Out	35%	0.088	4	1.13	**5**		0%	0	0	**5**	19%	**1**	27%	**1**	54%	**3**	1.13	**3**
Office Building[7]	9.684	Total		1.49	14	1.78	**25**	0		0	0	**25**		**8**		**5**		**12**	1.78	**7**
	KSF	In	17%	0.253	2	1.78	**4**		0%	0	0	**4**	40%	**2**	17%	**1**	43%	**1**	1.78	**1**
		Out	83%	1.237	12	1.78	**21**		0%	0	0	**21**	27%	**6**	18%	**4**	55%	**11**	1.78	**6**
Shopping Center[8]	3.117	Total		3.71	12	1.78	**22**	0		0	0	**22**		**3**		**8**		**11**	1.78	**6**
	KSF	In	48%	1.781	6	1.78	**11**		0%	0	0	**11**	21%	**2**	37%	**4**	42%	**5**	1.78	**3**
		Out	52%	1.929	6	1.78	**11**		0%	0	0	**11**	13%	**1**	36%	**4**	51%	**6**	1.78	**3**
Total		Total			**43**		**49**	**0**		**0**	0	**49**		**12**		**12**		**25**		**23**
		In			**28**		**32**	**0**		**0**	0	**32**		**9**		**8**		**15**		**14**
		Out			**15**		**17**	**0**		**0**	0	**17**		**3**		**4**		**10**		**9**

1. 2009 National vehicle occupancy rates - 1.13:home to work; 1.84: family/personal business; 1.78: shopping; 2.2 social/recreational
2. Based on ITE Trip Generation Handbook, 3rd Edition method
3. Mode shares based on peak-hour BTD Data for Area 15
4. Local vehicle occupancy rates based on 2009 National vehicle occupancy rates
5. ITE Trip Generation Manual, 9th Edition, LUC 220 (Apartment), average rate
6. ITE Trip Generation Manual, 9th Edition, LUC 252 (Senior Adult Housing - Attached), average rate
7. ITE Trip Generation Manual, 9th Edition, LUC 710 (General Office Building), average rate
8. ITE Trip Generation Manual, 9th Edition, LUC 820 (Shopping Center), average rate

APPENDIX E - CLIMATE CHANGE RESILIENCY AND ADAPTABILITY QUESTIONNAIRE

Climate Change Preparedness and Resiliency Checklist for New Construction

In November 2013, in conformance with the Mayor's 2011 Climate Action Leadership Committee's recommendations, the Boston Redevelopment Authority adopted policy for all development projects subject to Boston Zoning Article 80 Small and Large Project Review, including all Institutional Master Plan modifications and updates, are to complete the following checklist and provide any necessary responses regarding project resiliency, preparedness, and to mitigate any identified adverse impacts that might arise under future climate conditions.

For more information about the City of Boston's climate policies and practices, and the 2011 update of the climate action plan, *A Climate of Progress*, please see the City's climate action web pages at http://www.cityofboston.gov/climate

In advance we thank you for your time and assistance in advancing best practices in Boston.

Climate Change Analysis and Information Sources:

1. Northeast Climate Impacts Assessment (www.climatechoices.org/ne/)
2. USGCRP 2009 (http://www.globalchange.gov/publications/reports/scientific-assessments/us-impacts/)
3. Army Corps of Engineers guidance on sea level rise (http://planning.usace.army.mil/toolbox/library/ECs/EC11652212Nov2011.pdf)
4. Proceeding of the National Academy of Science, "Global sea level rise linked to global temperature", Vermeer and Rahmstorf, 2009 (http://www.pnas.org/content/early/2009/12/04/0907765106.full.pdf)
5. "Hotspot of accelerated sea-level rise on the Atlantic coast of North America", Asbury H. Sallenger Jr*, Kara S. Doran and Peter A. Howd, 2012 (http://www.bostonredevelopmentauthority.org/planning/Hotspot of Accelerated Sea-level Rise 2012.pdf)
6. "Building Resilience in Boston": Best Practices for Climate Change Adaptation and Resilience for Existing Buildings, Linnean Solutions, The Built Environment Coalition, The Resilient Design Institute, 2103 (http://www.greenribboncommission.org/downloads/Building_Resilience_in_Boston_SML.pdf)

Checklist

Please respond to all of the checklist questions to the fullest extent possible. For projects that respond "Yes" to any of the D.1 – Sea-Level Rise and Storms, Location Description and Classification questions, please respond to all of the remaining Section D questions.

Checklist responses are due at the time of initial project filing or Notice of Project Change and final filings just prior seeking Final BRA Approval. A PDF of your response to the Checklist should be submitted to the Boston Redevelopment Authority via your project manager.

Please Note: When initiating a new project, please visit the BRA web site for the most current Climate Change Preparedness & Resiliency Checklist.

A.1 - Project Information

	Michael Haynes Apartments
Project Address Primary:	280-290 Warren Avenue
Project Address Additional:	Roxbury, MA 02119
Project Contact (name / Title / Company / email / phone):	Mitch Fishman/mitchfischman@gmail.com/781-760-1726

A.2 - Team Description

Owner / Developer:	Cruz Development
Architect:	Micheal Washington
Engineer (building systems):	Zade
Sustainability / LEED:	Clearesult
Permitting:	Mitchell Fishman Consulting
Construction Management:	Cruz Construction
Climate Change Expert:	Clearesult

A.3 - Project Permitting and Phase

At what phase is the project – most recent completed submission at the time of this response?

PNF / Expanded PNF Submission √	Draft / Final Project Impact Report Submission	BRA Board Approved	Notice of Project Change
Planned Development Area	BRA Final Design Approved	Under Construction	Construction just completed:

A.4 - Building Classification and Description

List the principal Building Uses:	Residential
List the First Floor Uses:	Office and Residential

What is the principal Construction Type – select most appropriate type?

	Wood Frame	Masonry	Steel Frame	Concrete

Describe the building?

Site Area:	*34,963 SF*	Building Area:	*151,674 SF*
Building Height:	*59 Ft.*	Number of Stories:	*5 Flrs.*
First Floor Elevation (reference Boston City Base):	*78.7 Elev.*	Are there below grade spaces/levels, if yes how many:	*Yes 1*

A.5 - Green Building

Which LEED Rating System(s) and version has or will your project use (by area for multiple rating systems)?

Select by Primary Use:	New Construction	Core & Shell	Healthcare	Schools
	Retail	Homes Midrise √	Homes	Other
Select LEED Outcome:	Certified√	Silver	Gold	Platinum

Will the project be USGBC Registered and / or USGBC Certified?

Registered:	*YES*	Certified:	*YES*

A.6 - Building Energy

What are the base and peak operating energy loads for the building?

Electric:	*10 KW/APARTMENT (kW)*	Heating:	*10(MMBtu/hr) PER APARTMENT*
What is the planned building Energy Use Intensity:	*55 (kbut/SF or kWh/SF)*	Cooling:	*1.5(Tons/hr) PER APARTMENT*

What are the peak energy demands of your critical systems in the event of a service interruption?

Electric:	*SYSTEM IS DOWN (kW)*	SYSTEM IS DOWN Heating:	*(MMBtu/hr)*
		SYSTEM IS DOWN Cooling:	*(Tons/hr)*

What is nature and source of your back-up / emergency generators? NO GENERATOR

Electrical Generation:	*(kW)*		Fuel Source:	
System Type and Number of Units:	Combustion Engine	Gas Turbine	Combine Heat and Power	*(Units)*

B - Extreme Weather and Heat Events

Climate change will result in more extreme weather events including higher year round average temperatures, higher peak temperatures, and more periods of extended peak temperatures. The section explores how a project responds to higher temperatures and heat waves.

B.1 - Analysis

What is the full expected life of the project?

Select most appropriate:	10 Years	25 Years	50 Years	75 Years √

What is the full expected operational life of key building systems (e.g. heating, cooling, ventilation)?

Select most appropriate:	10 Years	25 Years √	50 Years	75 Years

What time span of future Climate Conditions was considered?

Select most appropriate:	10 Years	25 Years	50 Years	75 Years √

Analysis Conditions - What range of temperatures will be used for project planning – Low/High?

7/ 93 Deg.

What Extreme Heat Event characteristics will be used for project planning – Peak High, Duration, and Frequency?

95Deg.	10 Days	1 Events / yr.

What Drought characteristics will be used for project planning – Duration and Frequency?

60 Days	1 Events / yr.

What Extreme Rain Event characteristics will be used for project planning – Seasonal Rain Fall, Peak Rain Fall, and Frequency of Events per year?

45 Inches / yr.	2 Inches	.5 Events / yr.

What Extreme Wind Storm Event characteristics will be used for project planning – Peak Wind Speed, Duration of Storm Event, and Frequency of Events per year?

120 Peak Wind	3 Hours	.3 Events / yr.

B.2 - Mitigation Strategies

What will be the overall energy performance, based on use, of the project and how will performance be determined?

Building energy use below code:	20 %
How is performance determined:	ASHRAE MODELING

What specific measures will the project employ to reduce building energy consumption?

Select all appropriate:	High performance building envelop	High performance lighting & controls-√	Building day lighting	EnergyStar equip. / appliances-√
	High performance HVAC equipment-√	Energy recovery ventilation	No active cooling	No active heating
Describe any added measures:				

What are the insulation (R) values for building envelop elements?

Roof:	R = 25	Walls / Curtain Wall Assembly:	R = 20+3.5
Foundation:	R = N/A	Basement / Slab:	R =10
Windows:	/ U =.32	Doors:	/ U =.45

What specific measures will the project employ to reduce building energy demands on the utilities and infrastructure?

	On-site clean energy / CHP system(s)	Building-wide power dimming	Thermal energy storage systems	Ground source heat pump
	On-site Solar PV	On-site Solar Thermal	Wind power	None√
Describe any added measures:				

Will the project employ Distributed Energy / Smart Grid Infrastructure and /or Systems?

Select all appropriate:	Connected to local distributed electrical √	Building will be Smart Grid read	Connected to distributed steam, hot, chilled water	Distributed thermal energy ready

Will the building remain operable without utility power for an extended period?

	NO	If yes, for how long:	*Days*
If Yes, is building "Islandable?			
If Yes, describe strategies:			

Describe any non-mechanical strategies that will support building functionality and use during an extended interruption(s) of utility services and infrastructure:

Select all appropriate:	Solar oriented – longer south walls	Prevailing winds oriented	External shading devices	Tuned glazing,
	Building cool zones	Operable windows	Natural ventilation	Building shading
	Potable water for drinking / food preparation	Potable water for sinks / sanitary systems	Waste water storage capacity	High Performance Building Envelop
Describe any added measures:				

What measures will the project employ to reduce urban heat-island effect?

Select all appropriate:	High reflective paving materials	Shade trees & shrubs	**High reflective roof materials √**	Vegetated roofs
Describe other strategies:				

What measures will the project employ to accommodate rain events and more rain fall?

Select all appropriate:	On-site retention systems & ponds	**Infiltration galleries & areas √**	vegetated water capture systems	Vegetated roofs
Describe other strategies:	Phase 2 infiltration design			

What measures will the project employ to accommodate extreme storm events and high winds?

Select all appropriate:	Hardened building structure & elements	**Buried utilities & hardened infrastructure √**	Hazard removal & protective landscapes	Soft & permeable surfaces (water infiltration)
Describe other strategies:				

C - Sea-Level Rise and Storms

Rising Sea-Levels and more frequent Extreme Storms increase the probability of coastal and river flooding and enlarging the extent of the 100 Year Flood Plain. This section explores if a project is or might be subject to Sea-Level Rise and Storm impacts.

C.1 - Location Description and Classification:

Do you believe the building to susceptible to flooding now or during the full expected life of the building?

No

Describe site conditions? **Aging Building Stock,**

Site Elevation – Low/High Points:	*Boston City Base Elev.(Ft.)* ***74.4/87.4***
Building Proximity to Water:	***1.5 Miles***

Is the site or building located in any of the following?

Coastal Zone:	*No*	Velocity Zone:	*No*
Flood Zone:	*No*	Area Prone to Flooding:	*No*

Will the 2013 Preliminary FEMA Flood Insurance Rate Maps or future floodplain delineation updates due to Climate Change result in a change of the classification of the site or building location?

2013 FEMA Prelim. FIRMs:	*No*	Future floodplain delineation updates:	*No*

What is the project or building proximity to nearest Coastal, Velocity or Flood Zone or Area Prone to Flooding?

3,170 Ft.

If you answered YES to any of the above Location Description and Classification questions, please complete the following questions. Otherwise you have completed the questionnaire; thank you!

C - Sea-Level Rise and Storms

This section explores how a project responds to Sea-Level Rise and / or increase in storm frequency or severity.

C.2 - Analysis

How were impacts from higher sea levels and more frequent and extreme storm events analyzed:

Sea Level Rise:	*Ft.*	Frequency of storms:	*per year*

C.3 - Building Flood Proofing

Describe any strategies to limit storm and flood damage and to maintain functionality during an extended periods of disruption.

What will be the Building Flood Proof Elevation and First Floor Elevation:

Flood Proof Elevation:	*Boston City Base Elev.(Ft.)*	First Floor Elevation:	*Boston City Base Elev. (Ft.)*

Will the project employ temporary measures to prevent building flooding (e.g. barricades, flood gates):

	Yes / No	If Yes, to what elevation	*Boston City Base Elev. (Ft.)*
If Yes, describe:			

What measures will be taken to ensure the integrity of critical building systems during a flood or severe storm event:

Systems located above 1st Floor.	Water tight utility conduits	Waste water back flow prevention	Storm water back flow prevention

Were the differing effects of fresh water and salt water flooding considered:

Yes / No

Will the project site / building(s) be accessible during periods of inundation or limited access to transportation:

Yes / No	If yes, to what height above 100 Year Floodplain:	*Boston City Base Elev. (Ft.)*

Will the project employ hard and / or soft landscape elements as velocity barriers to reduce wind or wave impacts?

Yes / No

If Yes, describe:

Will the building remain occupiable without utility power during an extended period of inundation:

Yes / No	If Yes, for how long:	*days*

Describe any additional strategies to addressing sea level rise and or sever storm impacts:

C.4 - Building Resilience and Adaptability

Describe any strategies that would support rapid recovery after a weather event and accommodate future building changes that respond to climate change:

Will the building be able to withstand severe storm impacts and endure temporary inundation?

Select appropriate:	*Yes / No*	Hardened / Resilient Ground Floor Construction	Temporary shutters and or barricades	Resilient site design, materials and construction

Can the site and building be reasonably modified to increase Building Flood Proof Elevation?

Select appropriate:	*Yes / No*	Surrounding site elevation can be raised	Building ground floor can be raised	Construction been engineered
Describe additional strategies:				

Has the building been planned and designed to accommodate future resiliency enhancements?

Select appropriate:	*Yes / No*	Solar PV	Solar Thermal	Clean Energy / CHP System(s)
		Potable water storage	Wastewater storage	Back up energy systems & fuel
Describe any specific or additional strategies:				

Thank you for completing the Boston Climate Change Resilience and Preparedness Checklist!

For questions or comments about this checklist or Climate Change Resiliency and Preparedness best practices, please contact: John.Dalzell.BRA@cityofboston.gov

APPENDIX F - RESPONSE TO ACCESSIBILITY GUIDELINES

Accessibility Checklist

(to be added to the BRA Development Review Guidelines)

In 2009, a nine-member Advisory Board was appointed to the Commission for Persons with Disabilities in an effort to reduce architectural, procedural, attitudinal, and communication barriers affecting persons with disabilities in the City of Boston. These efforts were instituted to work toward creating universal access in the built environment.

In line with these priorities, the Accessibility Checklist aims to support the inclusion of people with disabilities. In order to complete the Checklist, you must provide specific detail, including descriptions, diagrams and data, of the universal access elements that will ensure all individuals have an equal experience that includes full participation in the built environment throughout the proposed buildings and open space.

In conformance with this directive, all development projects subject to Boston Zoning Article 80 Small and Large Project Review, including all Institutional Master Plan modifications and updates, are to complete the following checklist and provide any necessary responses regarding the following:

- improvements for pedestrian and vehicular circulation and access;
- encourage new buildings and public spaces to be designed to enhance and preserve Boston's system of parks, squares, walkways, and active shopping streets;
- ensure that persons with disabilities have full access to buildings open to the public;
- afford such persons the educational, employment, and recreational opportunities available to all citizens; and
- preserve and increase the supply of living space accessible to persons with disabilities.

We would like to thank you in advance for your time and effort in advancing best practices and progressive approaches to expand accessibility throughout Boston's built environment.

Accessibility Analysis Information Sources:

1. Americans with Disabilities Act – 2010 ADA Standards for Accessible Design
    a. http://www.ada.gov/2010ADAstandards_index.htm
2. Massachusetts Architectural Access Board 521 CMR
    a. http://www.mass.gov/eopss/consumer-prot-and-bus-lic/license-type/aab/aab-rules-and-regulations-pdf.html
3. Boston Complete Street Guidelines
    a. http://bostoncompletestreets.org/
4. City of Boston Mayors Commission for Persons with Disabilities Advisory Board
    a. http://www.cityofboston.gov/Disability
5. City of Boston – Public Works Sidewalk Reconstruction Policy
    a. http://www.cityofboston.gov/images_documents/sidewalk%20policy%200114_tcm3-41668.pdf
6. Massachusetts Office On Disability Accessible Parking Requirements
    a. www.mass.gov/anf/docs/mod/hp-parking-regulations-mod.doc
7. MBTA Fixed Route Accessible Transit Stations
    a. http://www.mbta.com/about_the_mbta/accessibility/

Project Information

Project Name:	280-290 Warren Street (Including Phase I- Michael E. Haynes Arms Residences)
Project Address Primary:	280-290 Warren Street, Roxbury, MA
Project Address Additional:	270-272, 274 Warren Street, 10-12 Clifford Street
Project Contact (name / Title / Company / email / phone):	Edgar J. Carrere, Sr. Project Manager, Cruz Development Corporation: ecarrere@cruzcompanies.com 617 828 4812

Team Description

Owner / Developer:	Cruz Development Corporation
Architect:	Micheal Washington Architects Inc.
Engineer (building systems):	Zade Associates LLC
Sustainability / LEED:	Clearesult
Permitting:	MLF Consulting LLC
Construction Management:	n/a
Transportation/Infrastructure	Howard Stein Hudson
Air Quality and Noise	Tech Environmental, Inc.
Project Attorney	Tourse and Associates P.C . / McKenzie & Associates, P.C.

Project Permitting and Phase

At what phase is the project – at time of this questionnaire?

☑ PNF / Expanded PNF Submitted	Draft	BRA Board Approved
BRA Design Approved	n/a	Construction just completed:

Building Classification and Description

What are the principal Building Uses - select all appropriate uses?

Residential – One to Three Unit	☑ Residential - Multi-unit, Four +	Institutional	Education
Commercial	☑Office	☑Retail	Assembly
Laboratory / Medical	Manufacturing / Industrial	Mercantile	Storage, Utility and Other
First Floor Uses (List)	*Amenity Space, Accessory Retail Space*		

What is the Construction Type – select most appropriate type?

☑ Wood Frame	Masonry	Steel Frame	Concrete

Describe the building?

Site Area:	54,670 sf	Building Area:	Approx. 166,274 GSF
Building Height:	48'-0"/ 58'-0"	Number of Stories:	4 / 5 /
First Floor Elevation:	At exist grade + 1/2" across the site. *Final Elevation to be determined during Construction Drawing phase*	Are there below grade spaces:	☑*Yes / No*

Assessment of Existing Infrastructure for Accessibility:

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

Provide a description of the development neighborhood and identifying characteristics.	280-290 Warren Street is located in the Roxbury section of Greater Boston, a culturally and socio-economically diverse neighborhood. 280-290 Warren Street is bounded on one side by Warren Street (which runs almost due North) and Waverly Street (running appx East and West) along the Northern edge of the property and by the intersection of Clifford Street and Warren street on Southern and Eastern edge of the property. The site is shaped like a triangle with a rectangle attached with the apex of the triangle formed by the intersection of Waverly and Warren street at the Northern End of the property. The property runs for 292'-8" feet on Warren street, 142'-8" feet on Clifford Street and 344'-6" feet on Waverly Street. The 220"-0" remaining edge of property does not run along a street but runs appx North West and perpendicular to and connects both Clifford and Waverly street and forms the long side of the rectangle. The urban context is comprised of wood frame two story multifamily structures directly opposite the site along Warren street. Opposite the site along Waverly Street the urban fabric is again multifamily structures but of three to four story brick buildings.
List the surrounding ADA compliant MBTA transit lines and the proximity to the development site: Commuter rail, subway, bus, etc.	• **Dudley Station**, a ground-level bus station located in Dudley Square, Roxbury. It is a transfer point between 17 Massachusetts Bay Transportation Authority bus routes, including two Silver Line bus rapid transit lines and 15 local MBTA Bus routes. Dudley is fully handicapped accessible. Dudley Station is Appx .6 mi from the project site. • Bus lines 10, 14, 19, 23, and 28 operate on Warren Street. A Bus stop is located at the corner of Waverly and Warren Street at the project site.

List the surrounding institutions: hospitals, public housing and elderly and disabled housing developments, educational facilities, etc.	**Affordable/Public Housing:** Madison Park **Community Center:** Roxbury YMCA is within 5 min walking distance along Warren street. **School:** Several elementary schools; Roxbury Community College and Northeastern University are just a short bus ride away. **Public Library:** Boston Public Library (Dudley Branch) **Police:** Boston Police, Dudley Sq.
Is the proposed development on a priority accessible route to a key public use facility? List the surrounding: government buildings, libraries, community centers and recreational facilities and other related facilities.	**Recreation:** Franklin Park is less than 3 miles away down Warren street and can be reached by bus. Malcom X park is within walking distance **Community Center:** Roxbury YMCA is within 5 min walking distance along Warren street. **Transit:** Site is located (0.6 miles) to Dudley station connecting the site to major Boston public facilities.

Surrounding Site Conditions – Existing:

This section identifies the current condition of the sidewalks and pedestrian ramps around the development site.

Are there sidewalks and pedestrian ramps existing at the development site?	Yes
If yes above, list the existing sidewalk and pedestrian ramp materials and physical condition at the development site.	The existing sidewalk material is concrete with granite curbing. The physical condition of the existing concrete sidewalk and pedestrian ramps is good.
Are the sidewalks and pedestrian ramps existing-to-remain? If yes, have the sidewalks and pedestrian ramps been verified as compliant? If yes, please provide surveyors report.	Yes, sidewalks and pedestrian ramps to remain. No, the existing sidewalks and pedestrian ramps have not been verified as being in compliance at this time but will be verified during the project design.
Is the development site within a historic district? If yes, please identify.	A portion of the project site at 270 - 272 Warren Street is located within the Mooreland Street National Register Historic District.

Surrounding Site Conditions – Proposed

This section identifies the proposed condition of the walkways and pedestrian ramps in and around the development site. The width of the sidewalk contributes to the degree of comfort and enjoyment of walking along a street. Narrow sidewalks do not support lively pedestrian activity, and may create dangerous conditions that force people to walk in the street. Typically, a five foot wide Pedestrian Zone supports two people walking side by side or two wheelchairs passing each other. An eight foot wide Pedestrian Zone allows two pairs of people to comfortable pass each other, and a ten foot or wider Pedestrian Zone can support high volumes of pedestrians.

Are the proposed sidewalks consistent with the Boston Complete Street Guidelines? See: www.bostoncompletestreets.org	Yes (pending confirmation of existing cross slopes and clearances).
If yes above, choose which Street Type was applied: Downtown Commercial, Downtown Mixed-use, Neighborhood Main, Connector, Residential, Industrial, Shared Street, Parkway, Boulevard.	Neighborhood Connector on Warren Street and Clifford Street. Waverly Street is typically more a Neighborhood Residential Street.
What is the total width of the proposed sidewalk? List the widths of the proposed zones: Frontage, Pedestrian and Furnishing Zone.	Warren Street: Frontage Zone - 4'-0"; Pedestrian Zone – 6'-6"; for a total with of approximately 10'-0". Waverly Street: 8'-2". Clifford Street: 7'-8 1/2".
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?	All Zones - poured in place scored concrete pavement alternating with trees planted in landscaped beds. All are within the right of way.
If the pedestrian right-of-way is on private property, will the proponent seek a pedestrian easement with the City of Boston Public Improvement Commission?	*N/A*
Will sidewalk cafes or other furnishings be programmed for the pedestrian right-of-way?	There are locations for potential outdoor seating but they are not within the pedestrian right-of-way. Other furnishings such as light poles and bicycle racks will not be pedestrian right of way.

If yes above, what are the proposed dimensions of the sidewalk café or furnishings and what will the right-of-way clearance be?	The seating and furnishing area will be completely on private property. A min 5'-6" unobstructed pedestrian zone will be maintained.

Proposed Accessible Parking:

See Massachusetts Architectural Access Board Rules and Regulations 521 CMR Section 23.00 regarding accessible parking requirement counts and the Massachusetts Office of Disability Handicap Parking Regulations.

What is the total number of parking spaces provided at the development site parking lot or garage?	102 garage spaces
What is the total number of accessible spaces provided at the development site?	5 spaces including one van accessible space
Will any on street accessible parking spaces be required? **If yes,** has the proponent contacted the Commission for Persons with Disabilities and City of Boston Transportation Department regarding this need?	A visitor accessible space may be accommodated in the parking garage
Where is accessible visitor parking located?	1 on street accessible space can be accommodated pending coordination with City departments. This will also function as the accessible visitor parking
Has a drop-off area been identified? **If yes,** will it be accessible?	No drop-off area.
Include a diagram of the accessible routes to and from the accessible parking lot/garage and drop-off areas to the development entry locations. Please include route distances.	See attached drawings A1 - A7

Circulation and Accessible Routes:

The primary objective in designing smooth and continuous paths of travel is to accommodate persons of all abilities that allow for universal access to entryways, common spaces and the visit-ability* of neighbors.

**Visit-ability – Neighbors ability to access and visit with neighbors without architectural barrier limitations*

Provide a diagram of the accessible route connections through the site.	See drawings A1 - A7
Describe accessibility at each entryway: Flush Condition, Stairs, Ramp Elevator.	Main entry from Warren Street will be a Flush Condition.
Are the accessible entrance and the standard entrance integrated?	Yes
If no above, what is the reason?	
Will there be a roof deck or outdoor courtyard space? If yes, include diagram of the accessible route.	No
Has an accessible routes way-finding and signage package been developed? If yes, please describe.	Not as yet but all future way finding signage will be developed to meet Building Code and Accessibility Board Requirements

Accessible Units: (If applicable)

In order to facilitate access to housing opportunities this section addresses the number of accessible units that are proposed for the development site that remove barriers to housing choice.

What is the total number of proposed units for the development?	95 units
How many units are for sale; how many are for rent? What is the market value vs. affordable breakdown?	95 rental apartment units

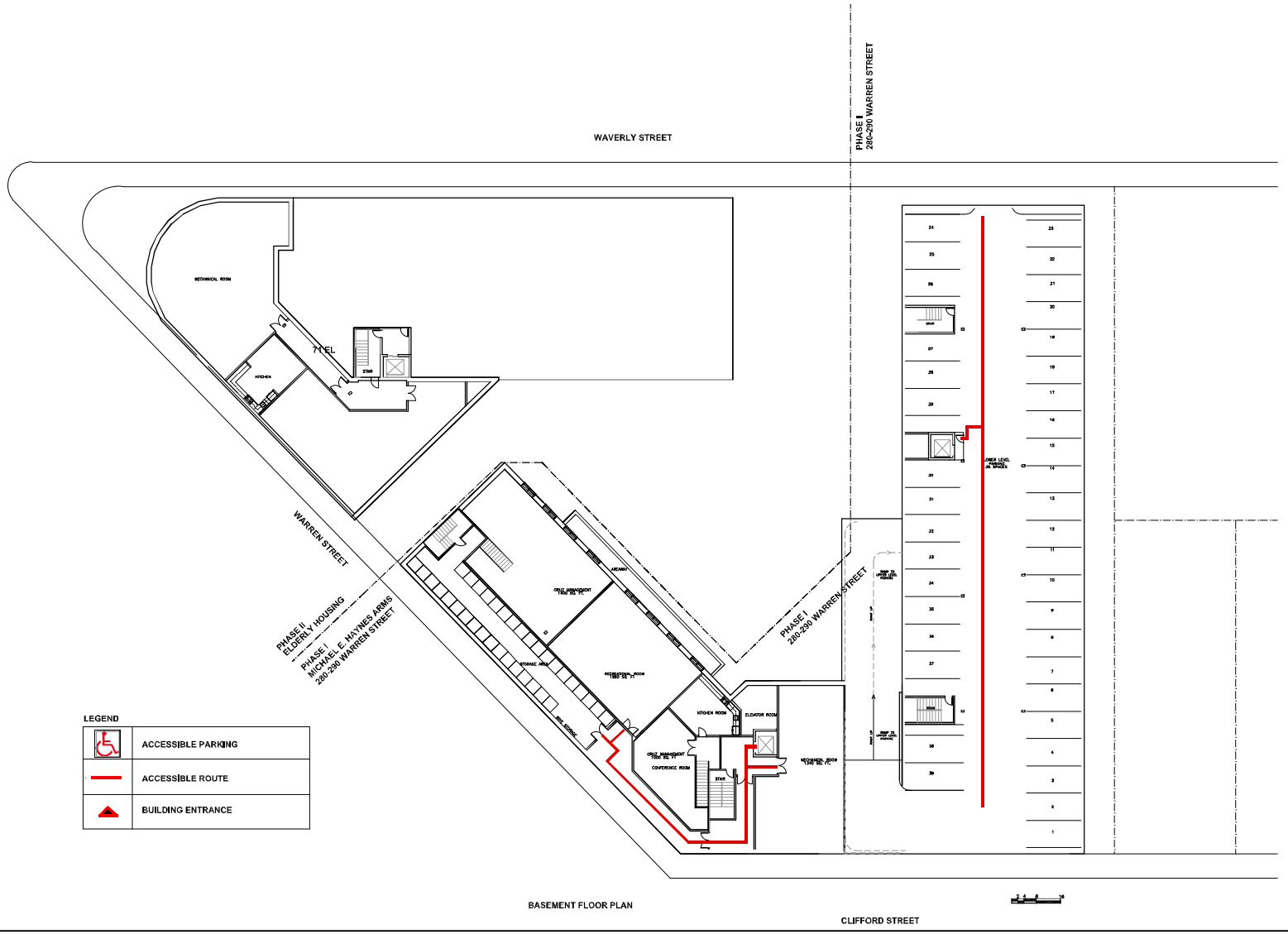
APPENDIX F - ACCESS RESPONSE

How many accessible units are being proposed?	4 Accessible units are currently being planned, but a final number will be determined during the CD Plan stage
Please provide plan and diagram of the accessible units.	See attached drawing, A1 –A7 for accessible access locations to units on a floor by floor basis; actual units will be determined at CD Plan stage.
How many accessible units will also be affordable? If none, please describe reason.	It will be a mix of affordable and market rate units. Final combination to be determined.
Do standard units have architectural barriers that would prevent entry or use of common space for persons with mobility impairments? Example: stairs at entry or step to balcony. **If yes,** please provide reason.	No
Has the proponent reviewed or presented the proposed plan to the City of Boston Mayor's Commission for Persons with Disabilities Advisory Board?	No
Did the Advisory Board vote to support this project? **If no,** what recommendations did the Advisory Board give to make this project more accessible?	Decision Pending

Thank you for completing the Accessibility Checklist!

For questions or comments about this checklist or accessibility practices, please contact:

kathryn.quigley@boston.gov | Mayors Commission for Persons with Disabilities



BASEMENT FLOOR PLAN

MIcheal WashIngton ArchItects Inc.

891 Centre Street
Jamaica Plain, MA 02130

Phone: 617-390-5515
E-MAIL: MWAINC1@HOTMAIL.COM

PROJECT

MICHAEL E. HAYNES BUILDING

280-290 WARREN STREET
ROXBURY, MASSACHUSETTS

DEVELOPER:

CRUZ DEVELOPMENT CORPORATION

ONE JOHN ELIOT SQUARE
ROXBURY, MASSACHUSETTS

SHEET TITLE

2 LEVEL PARKING OPTION BASEMENT PLAN

MICHEAL WASHINGTON ARCHITECTS INC.

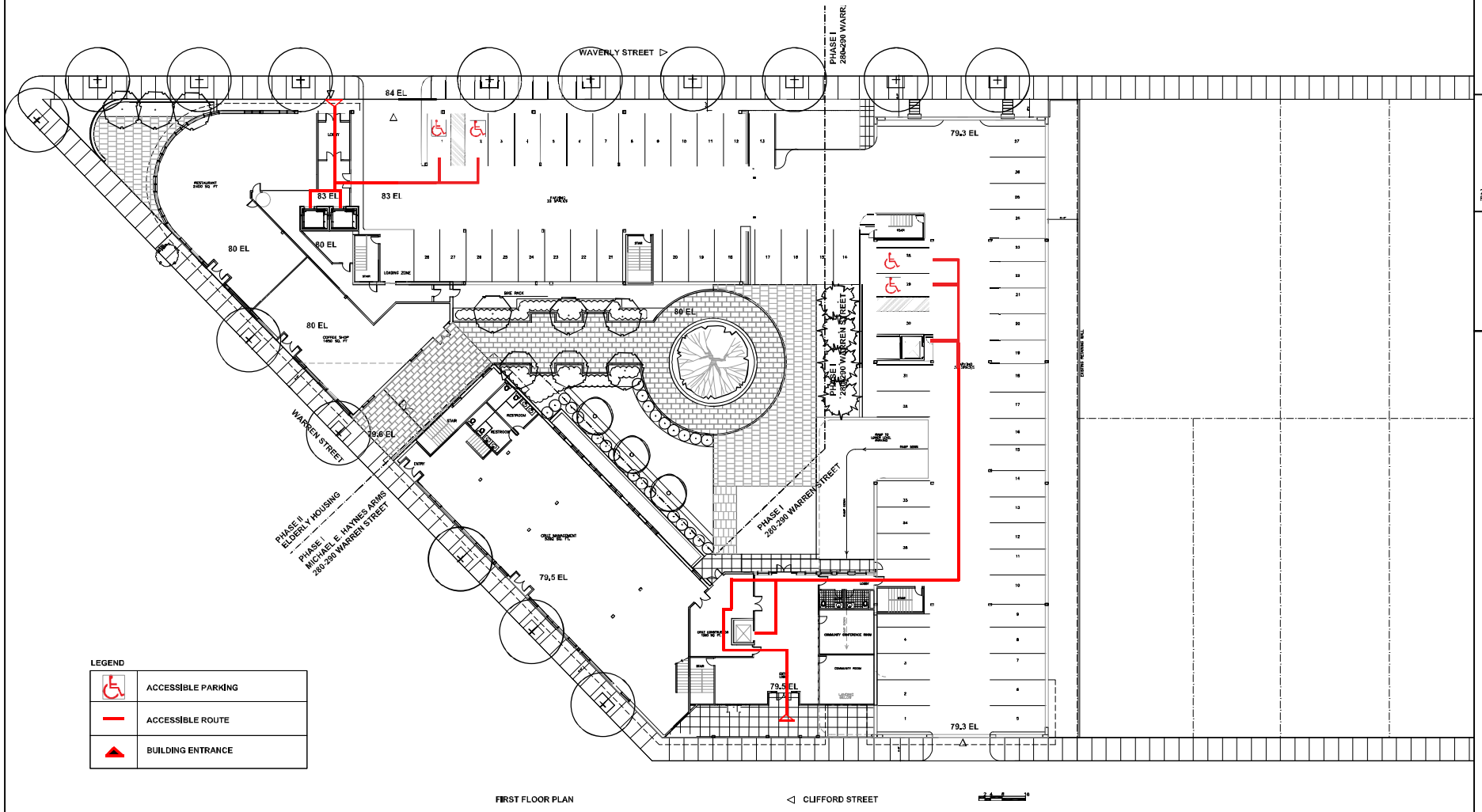
BASEMENT FLOOR
CLIFFORD STREET

NORTH

SCALE:	1/16"=1'-0"
DATE:	9/21/2016
DRAWN BY:	JRB
CHECKED BY:	MW
FILE:	MEH dwg

DRAWING NO.

A-1



FIRST FLOOR PLAN

MIcheal WashIngton ArchItects Inc.

891 Centre Street
Jamaica Plain, MA 02130

Phone: 617-390-5515
E-MAIL: MWAINC1@HOTMAIL.COM

PROJECT

MICHAEL E. HAYNES BUILDING

280-290 WARREN STREET
ROXBURY, MASSACHUSETTS

DEVELOPER:

CRUZ DEVELOPMENT CORPORATION

ONE JOHN ELIOT SQUARE
ROXBURY, MASSACHUSETTS

SHEET TITLE

2 LEVEL PARKING OPTION FIRST FLOOR PLAN

MICHEAL WASHINGTON ARCHITECTS INC.

FIRST FLOOR PARKING
CLIFFORD STREET

NORTH

SCALE:	1/16"=1'-0"
DATE:	9/21/2016
DRAWN BY:	JRB
CHECKED BY:	MW
FILE:	MEH dwg

DRAWING NO.

A-2

SECOND, THIRD AND FOURTH FLOOR PLANS

MIcheal WashIngton ArchItects Inc.

891 Centre Street
Jamaica Plain, MA 02130

Phone: 617-390-5515
E-MAIL: MIWAINC1@HOTMAIL.COM

PROJECT

MICHAEL E. HAYNES BUILDING

280-290 WARREN STREET
ROXBURY, MASSACHUSETTS

DEVELOPER:

CRUZ DEVELOPMENT CORPORATION

ONE JOHN ELIOT SQUARE
ROXBURY, MASSACHUSETTS

SHEET TITLE

SECOND FLOOR PLAN

MICHEAL WASHINGTON ARCHITECTS INC.

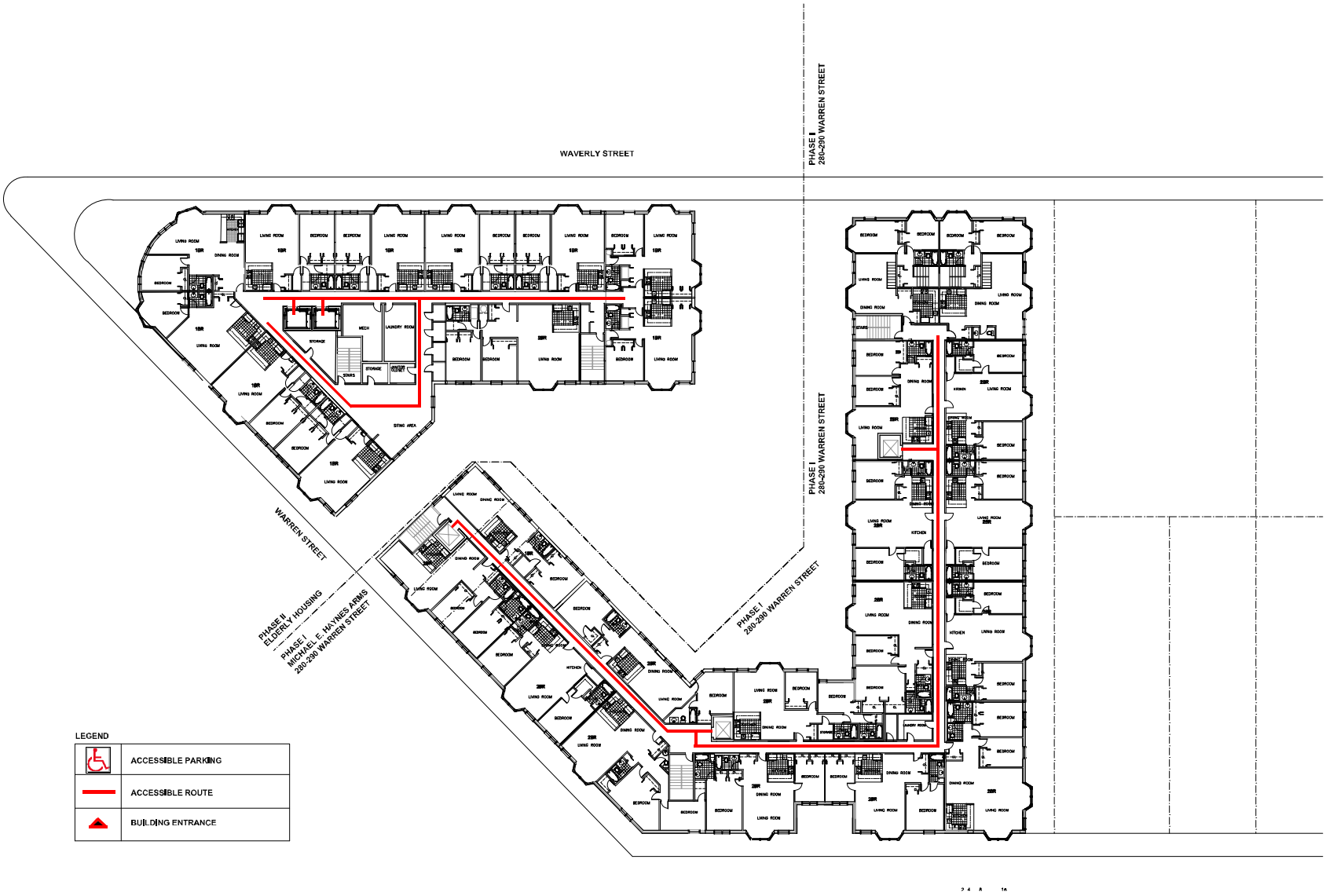
SECOND FLOOR
CLIFFORD STREET

NORTH

SCALE:	1/16"=1'-0"
DATE:	9/21/2016
DRAWN BY:	JRB
CHECKED BY:	MW
FILE:	MEH.dwg

DRAWING NO.

A-3



MIcheal WashIngton ArchItects Inc.

891 Centre Street
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Phone: 617-390-5515
E-MAIL: MWAINC1@HOTMAIL.COM

PROJECT

MICHAEL E. HAYNES BUILDING

280-290 WARREN STREET
ROXBURY, MASSACHUSETTS

DEVELOPER:

CRUZ DEVELOPMENT CORPORATION

ONE JOHN ELIOT SQUARE
ROXBURY, MASSACHUSETTS

SHEET TITLE

THIRD FLOOR PLAN

MICHEAL WASHINGTON ARCHITECTS INC.

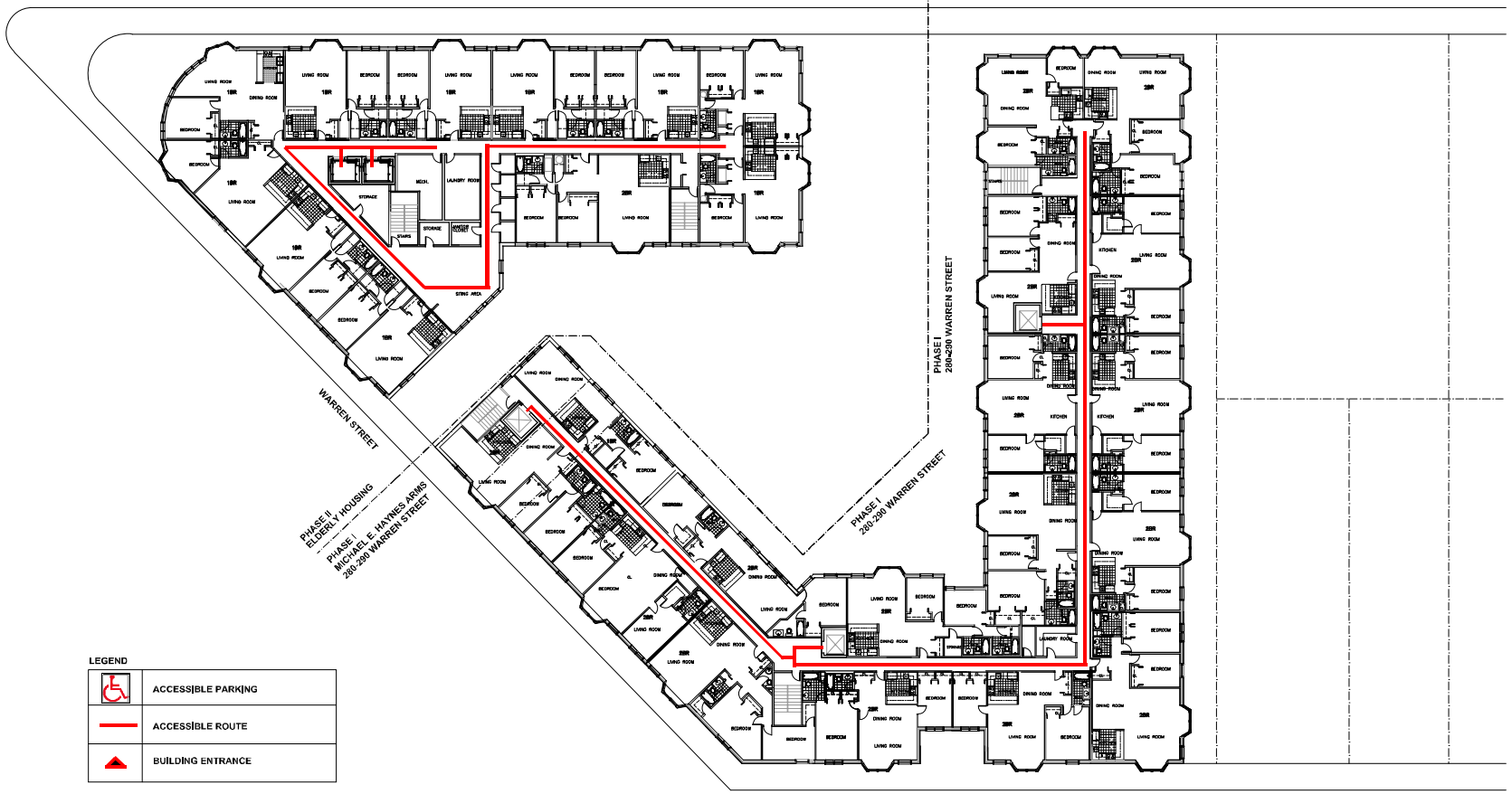
THIRD FLOOR
CLIFFORD STREET

NORTH

SCALE:	1/16"=1'-0"
DATE:	9/21/2016
DRAWN BY:	JRB
CHECKED BY:	MW
FILE:	MEH dwg

DRAWING NO.

A-4



FOURTH FLOOR PLAN

MIcheal WashIngton ArchItects Inc.

891 Centre Street
Jamaica Plain, MA 02130

Phone: 617-390-5515
E-MAIL: MWAINC1@HOTMAIL.COM

PROJECT

MICHAEL E. HAYNES BUILDING

280-290 WARREN STREET
ROXBURY, MASSACHUSETTS

DEVELOPER:

CRUZ DEVELOPMENT CORPORATION

ONE JOHN ELIOT SQUARE
ROXBURY, MASSACHUSETTS

SHEET TITLE

FOURTH FLOOR PLAN

MICHEAL WASHINGTON ARCHITECTS INC.

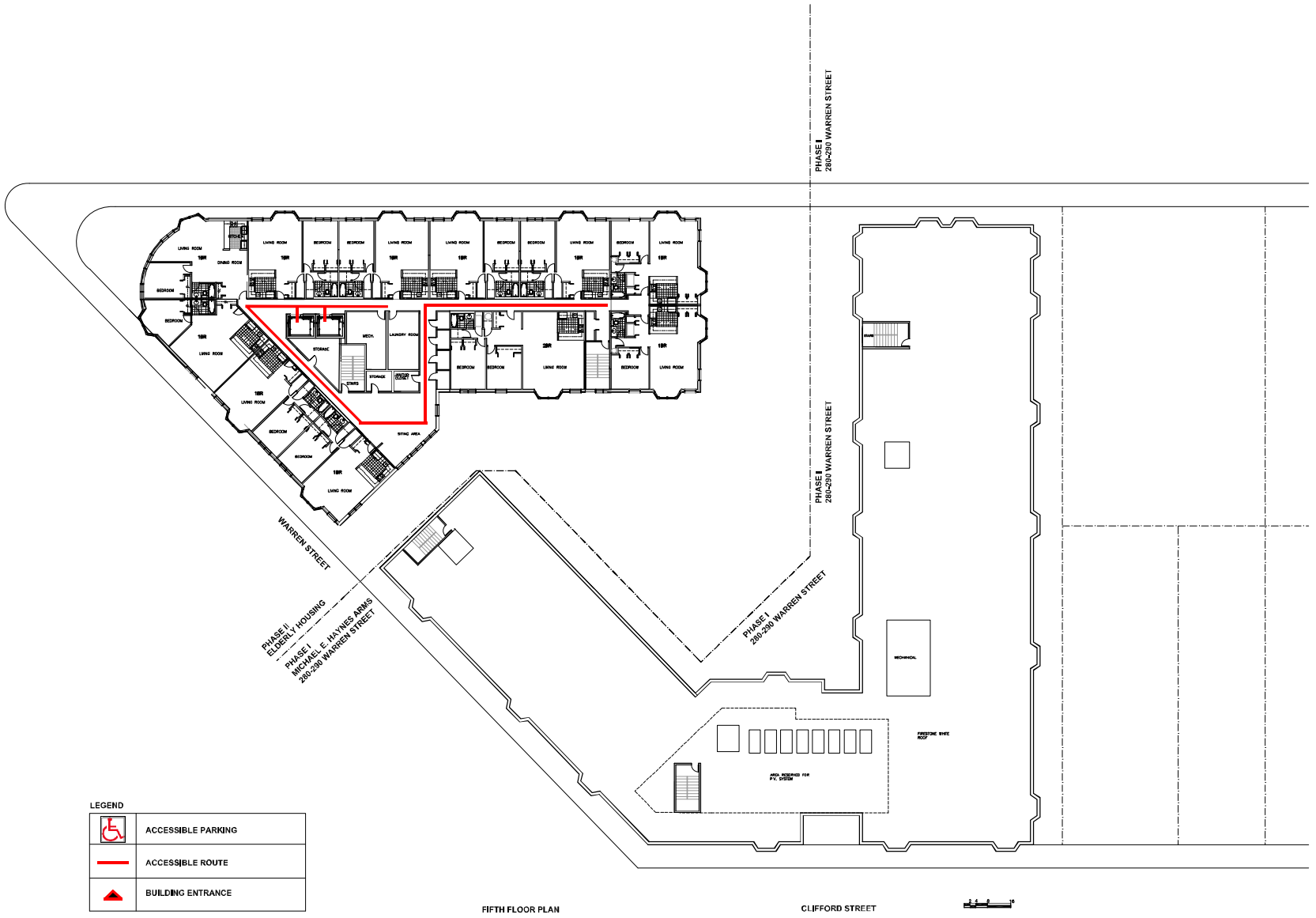
FOURTH FLOOR
CLIFFORD STREET

NORTH

SCALE:	1/16"=1'-0"
DATE:	9/21/2016
DRAWN BY:	JRB
CHECKED BY:	MW
FILE:	MEH dwg

DRAWING NO.

A-5



FIFTH FLOOR PLAN

MIcheal WashIngton ArchItects Inc.

891 Centre Street
Jamaica Plain, MA 02130

Phone: 617-390-5515
E-MAIL: MWAINC1@HOTMAIL.COM

PROJECT

MICHAEL E. HAYNES BUILDING

280-290 WARREN STREET
ROXBURY, MASSACHUSETTS

DEVELOPER:

CRUZ DEVELOPMENT CORPORATION

ONE JOHN ELIOT SQUARE
ROXBURY, MASSACHUSETTS

SHEET TITLE

FIFTH FLOOR PLAN

MICHEAL WASHINGTON ARCHITECTS INC.

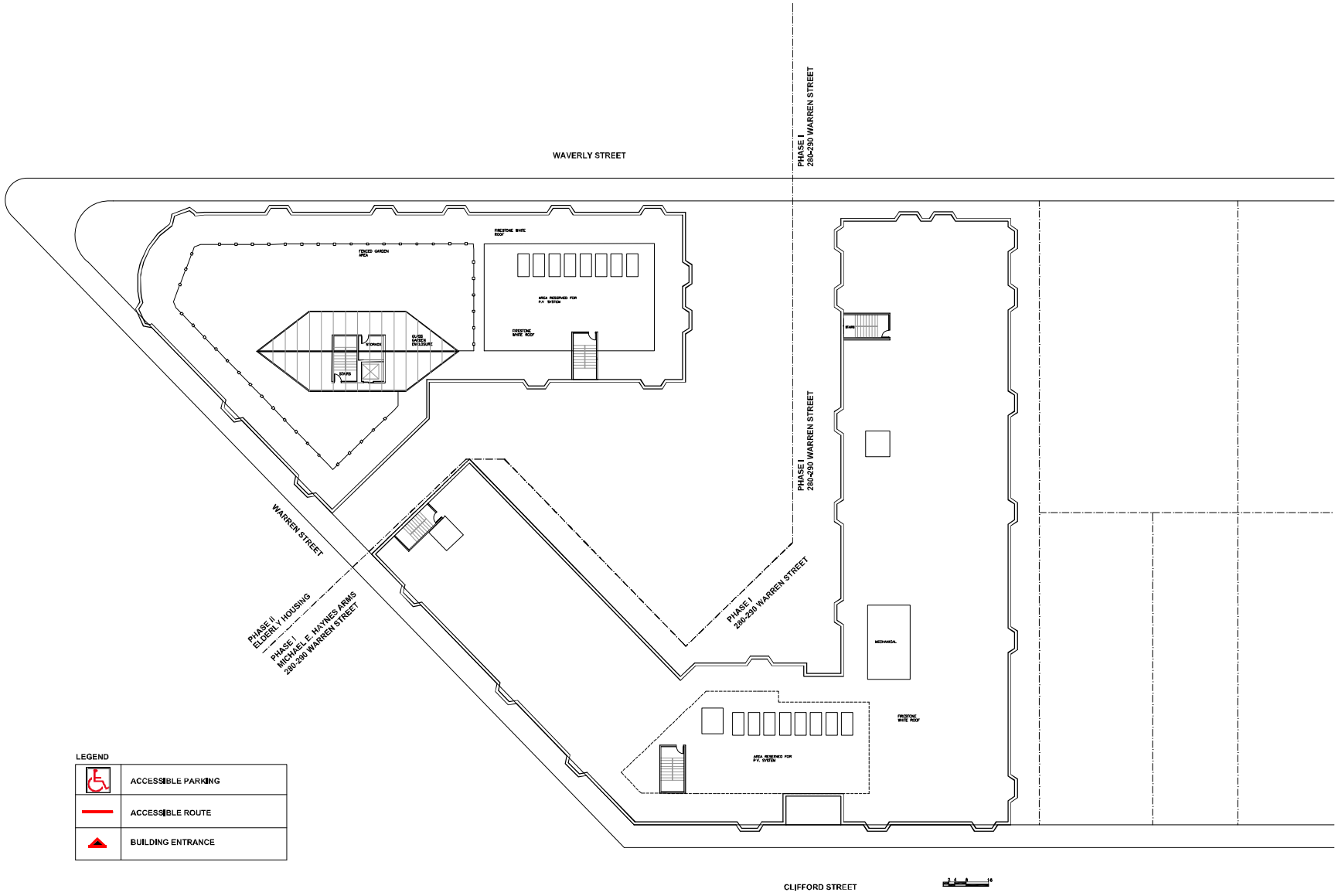
FIFTH FLOOR
CLIFFORD STREET

NORTH

SCALE:	1/16"=1'-0"
DATE:	9/21/2016
DRAWN BY:	JRB
CHECKED BY:	MW
FILE:	MEH dwg

DRAWING NO.

A-6



ROOF PLAN

MIcheal WashIngton ArchItects Inc.

891 Centre Street
Jamaica Plain, MA 02130

Phone: 617-390-5515
E-MAIL: MWAINC1@HOTMAIL.COM

PROJECT

MICHAEL E. HAYNES BUILDING

280-290 WARREN STREET
ROXBURY, MASSACHUSETTS

DEVELOPER:

CRUZ DEVELOPMENT CORPORATION

ONE JOHN ELIOT SQUARE
ROXBURY, MASSACHUSETTS

SHEET TITLE

ROOF PLAN

MICHEAL WASHINGTON ARCHITECTS INC.

ROOF PLAN
CLIFFORD STREET

NORTH

SCALE:	1/16"=1'-0"
DATE:	9/21/2016
DRAWN BY:	JRB
CHECKED BY:	MW
FILE:	MEH dwg

DRAWING NO.

A-7

MLF
CONSULTING LLC