EXPANDED PROJECT NOTIFICATION FORM

288 Harrison Residences

Submitted to:
Boston Planning and Development Agency
One City Hall Square
Boston, MA 02201

Submitted by:
Chinese Consolidated Benevolent Association of New England, Inc.
90 Tyler Street
Boston, MA 02111

AND

Beacon Communities, LLC
2 Center Plaza, Suite 700
Boston, MA 02114

Prepared by:
Epsilon Associates, Inc.
3 Mill & Main Place, Suite 250
Maynard, MA 01754

In Association with:
Bruner/Cott Associates
Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C.
Howard Stein Hudson
Nitsch Engineering
McPhail Associates, LLC

August 26, 2019

Epsilon
ASSOCIATES INC.

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Chapter 1.0

Introduction/Project Description

1.0 INTRODUCTION/ PROJECT DESCRIPTION

1.1 Introduction

This Project Notification Form (PNF) is being submitted to the Boston Redevelopment Authority, doing business as the Boston Planning & Development Agency (the "BPDA"), to initiate review of the Project (as described in Section 1.3.3) under Article 80B, Large Project Review, of the Boston Zoning Code, as amended (the "Code")[1]. The applicants are CCBA Tai Tung Management, Inc. ("CCBA Tai Tung"), an affiliate of the Chinese Consolidated Benevolent Association of New England, Inc. ("CCBA"), and Beacon Communities LLC, ("Beacon," and together with CCBA Tai Tung, the "Proponent"). The Project includes the construction of a six story building with approximately 86,100 square feet of Gross Floor Area (GFA) to comprise approximately 85 affordable rental apartments, and approximately 1,400 square feet of ground floor non-residential space, and approximately 40 covered and surface parking spaces.

CCBA is a non-profit organization established in 1923 to serve and unite the Chinese community, promote and preserve Chinese culture and traditions, assist in the provision of low income and other housing to the Chinese community, and serve as a coordinating body for Chinese community charitable and educational activities in Greater Boston. CCBA is an umbrella organization representing over 30 family associations and other Chinatown-based civic organizations. It sponsors an array of social and civic events, including the annual Lunar New Year and August Moon celebrations in Chinatown. CCBA is headquartered at the original Josiah Quincy School, which is located at 90 Tyler Street in Chinatown, was built in 1847, and is on the National Register of Historic Places. CCBA's headquarters at 90 Tyler Street also serves as a community center in Chinatown, offering space for many other community non-profits and cultural and educational programming geared towards all ages, but especially youth and seniors.

Through separate affiliates, CCBA owns and operates two major affordable housing developments in Chinatown and the South End, containing a total of 254 apartments: Tai Tung Village and Waterford Place. CCBA also owns the property known as 50 Herald Street in the South End neighborhood and received BPDA approval in 2018 for the development there of an approximately 313 unit mixed-income development with ground floor commercial, cultural and/or non-profit space and underground parking.

Beacon Communities is a Boston-based owner, developer, and manager of multifamily housing, and has been developing market-rate and affordable housing in New England, Pennsylvania, and the eastern seaboard for over twenty years. Since 1999, Beacon has completed over $1.7 billion of development and financial restructuring activities involving a myriad of state and federal financing as well as private debt. Beacon manages over 2,000 units of multifamily housing in the City of Boston, including Chinatown's Quincy Tower, which is located a few blocks away from Tai Tung Village.

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[1] Capitalized terms used but not defined in this PNF are as defined in the Code.

1.2 Project Identification

Address/Location:	288 Harrison Avenue
Proponent:	Chinese Consolidated Benevolent Association of New England, Inc. 90 Tyler Street Boston, MA 02111 (617) 542-2574 Paul Chan, President Susan Chu, Executive Director Peter Munkenbeck, Development Consultant Beacon Communities LLC 2 Center Plaza, Suite 700 Boston, MA 02118 (617) 574-1138 Joshua Cohen, President, Development Emily Bouton, Senior Development Associate
Architect:	Bruner/Cott Associates 225 Friend Street, Suite 701 Boston, MA 02114 (617) 492-8400 Lawrence Cheng Karno Widjaja
Legal Counsel:	Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C. One Financial Center Boston, MA 02111 (617) 348-3009 Rebecca A. Lee, Esq.
Permitting Consultants:	Epsilon Associates, Inc. 3 Mill & Main Place, Suite 250 Maynard, MA 01754 (978) 897-7100 Cindy Schlessinger Talya Moked

Transportation Consultant: Howard Stein-Hudson
11 Beacon Street, Suite 1010
Boston, MA 02108
(617) 482-7080
Elizabeth Peart
Melissa Restrepo

Civil Engineer: Nitsch Engineering
2 Center Plaza, Suite 430
Boston, MA 02108
(617) 338-0063
John Schmid
Jonathan Hedlund

Geotechnical Consultant: McPhail Associates, LLC
2269 Massachusetts Avenue
Cambridge, MA 02140
(617) 868-1420
Peter DeChaves

1.3 Project Description

1.3.1 Project Site

The project site ("Site") is the south parking lot at the Tai Tung Village development located at 210-262 Harrison Avenue in the Chinatown neighborhood of Boston (see Figure 1-1) and is approximately 0.54 acres. The Tai Tung Village property ("TTV Property") is bounded by Hudson Street to the south and east, Tai Tung Street and Oak Street to the north, and Harrison Avenue to the west. Tai Tung Village contains 214 dwelling units in four buildings ranging from three to 15 stories in size. The Site is bounded by the Tai Tung Village development to the north, by Hudson Street to the east and south, and by Harrison Avenue to the west. The eastbound ramp to the Boston Extension of the Massachusetts Turnpike is located across Hudson Street from the Site.

A plan of the TTV Property, including existing conditions at the Site, is included as Figure 1-2. An aerial view of existing conditions is included as Figure 1-3.

Tai Tung Village is owned by CCBA Tai Tung, a non-profit organization whose sole member is CCBA; thus, CCBA is the indirect owner of the TTV Property, including the Site.

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Data Source: Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, Information Technology Division

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Figure 1-1

Aerial Locus Map

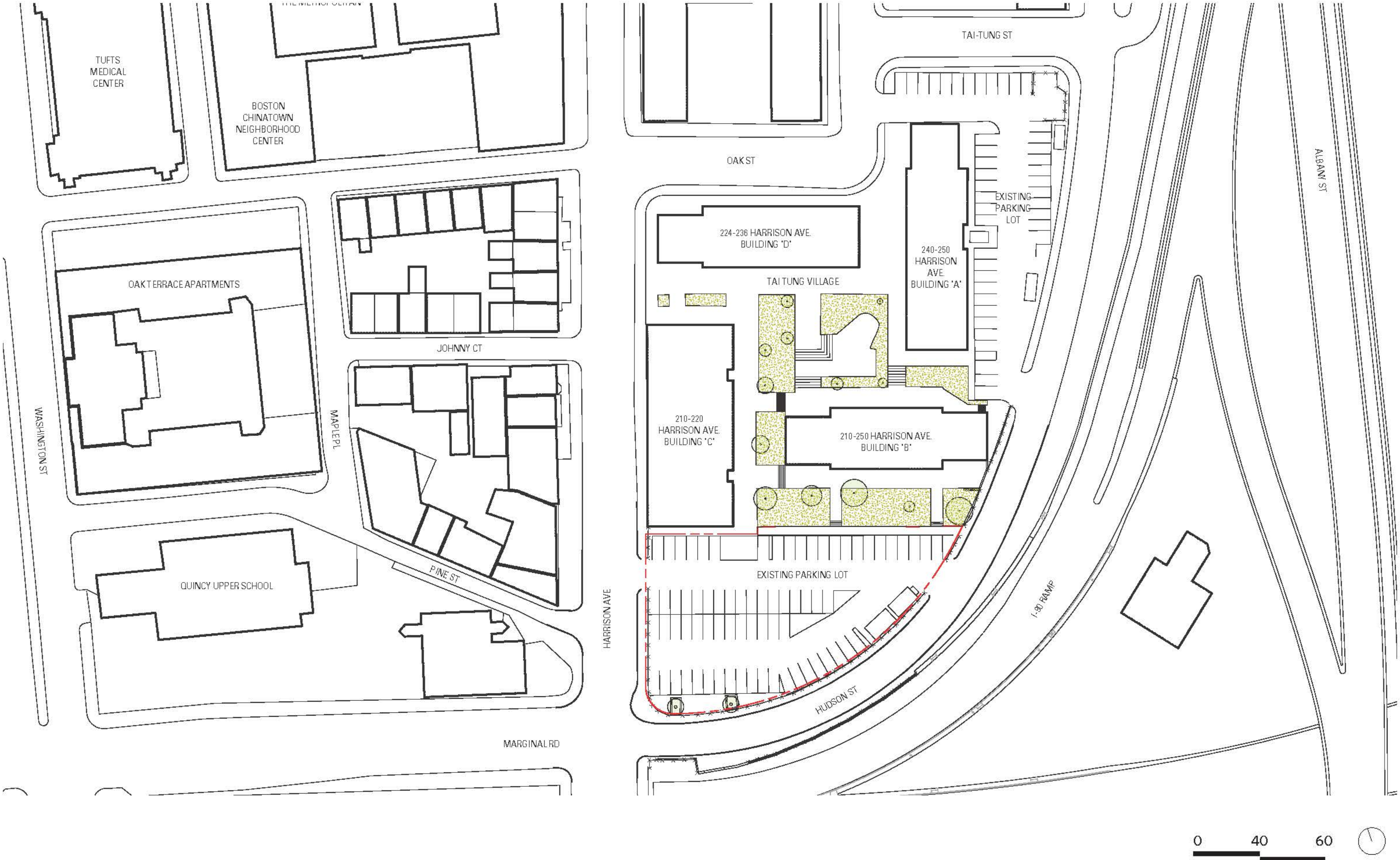

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Figure 1-2
TTV Property Plan

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Figure 1-3
Existing Conditions

1.3.2 Area Context

The Site is located in the heart of the densely developed residential section of Chinatown, and fronts on Harrison Avenue, which is a major commercial thoroughfare in the Chinatown neighborhood. Harrison Avenue is lined by commercial uses between Oak Street and Hudson/Marginal Streets near the Site and by institutional uses further north towards Kneeland Street. The commercial uses proximate to the Site include ground floor commercial uses that are part of the Tai Tung Village development on both Harrison Avenue and Oak Street. Aside from the existing 214 units at Tai Tung Village, nearby major residential developments include The Metropolitan, a 253 unit mixed income apartment/condominium building; Waterford Place, a 40 unit mixed-income apartment building where approximately 65% of the units are affordable rental units; Oak Terrace, an 88 unit mixed-income apartment building; and Quincy Tower, a 162 unit rental building where all of the units are affordable housing units.

The City of Boston has recently acquired property owned by the Boston Chinese Evangelical Church located at 249 Harrison Avenue, directly across from the Site, and to construct on that property and on the adjacent publicly-owned land, a new Josiah Quincy Upper School that would span the length of Marginal Road between Harrison Avenue and Washington Street.

The Site is located close to nearby commercial, cultural and service uses, including day care centers, the Pao Arts Center, the interim Chinatown branch of the Boston Public Library, and local markets, other merchants and service shops. The Site is also conveniently located close to MBTA Silver Line service and Orange Line service at the Tufts Medical Center and Chinatown stops, and to MBTA Green Line service at the Boylston Street stop. The Site is also served by multiple routes of major bus lines, including: 11 City Point – Downtown Boston, 15 Kane Square – Ruggles, SL4 Dudley – South Station, and SL5 Dudley – Downtown Crossing.

1.3.3 Proposed Project

The Proponent proposes to construct a six story (approximately 71 foot high) building with approximately 86,100 square feet of Gross Floor Area (GFA) to comprise approximately 85 affordable rental apartments, approximately 1,400 square feet of ground floor non-residential space, and approximately 40 covered and surface parking spaces, covered bicycle storage at a ratio of one bicycle storage space/dwelling unit, and related site and streetscape improvements on Hudson Street and Harrison Avenue (all of the foregoing, the "Project"). A site plan is included as Figure 1-4, and a typical floor plan and elevations are provided in Appendix A.

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Figure 1-4

Site Plan

The financing for the Project has not yet been procured, but pending the availability of adequate public and private resources, all of the dwelling units are intended to be affordable to households earning 60% or less of the Area Median Income ("AMI") as established by the U.S. Department of Housing and Urban Development. Some of the dwelling units will be made available to households earning 30% or less of the AMI. The unit mix and associated income limits for the units at the Project will be established in coordination with the BPDA and the City's Department of Neighborhood Development, if applicable, as subsidy sources are identified/procured.

1.4 Public Benefits

The Project will provide numerous public benefits, including during the construction period, as follows:

- The Project will result in the creation of approximately 85 much-needed affordable rental units. Affordable housing is desperately needed in Boston and in Chinatown in particular, which has a particularly high concentration of low-income households. Waiting lists at nearby affordable communities, including Tai Tung Village, are very long.
- The Project will create new housing at a location that is transit-rich, close to employment opportunities, and near a plethora of neighborhood resources and amenities.
- The Project will replace a surface parking lot with a handsome, contextual building that is appropriate to the current uses and scale of the nearby neighborhood.
- The Project will divert vehicular exit and entry traffic from the heavily-traversed Harrison Avenue to Hudson Street, a lesser-used street behind the building, eliminating a key conflict point between pedestrians and vehicles on Harrison Avenue.
- The Project will include streetscape improvements on both Harrison Avenue and Hudson Street to enhance the pedestrian experience in the area.
- The Project will generate increased property tax revenues to the City of Boston.
- Construction of the Project will create approximately 350 construction jobs and approximately six permanent jobs.

1.5 City of Boston Zoning

Zoning

The TTV Property (and thus the Site) is located within the Residential Chinatown Subdistrict as shown on Map 1C/1G/1N of the Boston Zoning Maps. At this location, the maximum Floor Area Ratio ("FAR") is 6.0 and the maximum Building Height is 100 feet for Proposed Projects undergoing Article 80B Large Project review. The Site is also located within the Groundwater Conservation Overlay District (GCOD) established by Article 32 of the Code, and the Restricted Parking Overlay District established by Article 3-1A.C of the Code.

As presently constituted, the existing Tai Tung Village residential development is a legally non-conforming structure, as it was constructed c. 1972, before the adoption of Article 43 of the Zoning Code, the Chinatown Neighborhood District zoning. The Proponent is proposing that the TTV Property, including the Site, be rezoned by action of the BPDA and the Boston Zoning Commission as an urban renewal overlay district (U*) pursuant to Section 3-1A.b of the Code. This will enable the existing structures at the Tai Tung Village property to become legally conforming under the Code, and set separate use, FAR, Building Height and other land use restrictions on the Project and the Site. No changes to the uses or any physical changes to the buildings at Tai Tung Village are proposed by the Proponent.

South Cove Urban Renewal Plan

The TTV Property comprises Parcel R-2A of the South Cove Urban Renewal Area and was originally assembled and subsequently conveyed by the Boston Redevelopment Authority ("BRA") pursuant to the South Cove Urban Renewal Plan for the development of the Tai Tung Village development. The use of the TTV Property is subject to a Land Disposition Agreement between CCBA Tai Tung, as the owner of the TTV Property, and the BRA (now the BPDA). Concurrently with the Article 80B Large Project Review process, the BPDA will make such modifications to the South Cove Urban Renewal Plan and related legal documentation as may be necessary to facilitate the development, financing and operation of the Project separate and apart from the Tai Tung Village development. There will be no change in the use or operation of Tai Tung Village (or its physical configuration) other than the proposed redevelopment of the South Parking Lot as discussed in this PNF. As part of this process, the Site will be subdivided from the remainder of the TTV Property.

1.6 Legal Information

1.6.1 Legal Judgments or Actions Pending Concerning the Proposed Project

There are no legal judgments or actions pending with respect to the Project or the Site.

1.6.2 History of Tax Arrears on Property

The Proponent has no history of tax arrears at the Site.

1.6.3 Site Control/ Public Easements

The Site is owned by CCBA Tai Tung Management, Inc., whose sole member is CCBA. There are no public easements burdening the Site. A Site survey is provided in Appendix B.

1.7 Anticipated Permits

Table 1-1 is a preliminary list of permits and approvals from governmental agencies that are expected to be required for the Project, based on currently available information. It is possible that only some of these permits or approvals will be required, and/or that additional permits or actions will be required.

Table 1-1 Anticipated Permits and Approvals

Agency	***Permit / Approval***
Local	
Boston Planning & Development Agency	Article 80B Large Project Review Article 80B Development and Affordable Housing Agreements Minor modifications to the South Cove Urban Renewal Plan and related documentation changes
Boston Civic Design Commission	Design Review
Boston Zoning Commission	U* District Designation
Boston Public Improvement Commission	Streetscape Improvements
Boston Transportation Department	Transportation Access Plan Agreement Construction Management Agreement
Boston Water and Sewer Commission	Site Plan Approval Temporary Construction Dewatering Permit Cross Connection/Backflow Prevention Approval Storm Drainage Approval
Interagency Green Building Committee	Article 37 Compliance
Boston Air Pollution Control Commission	Downtown Parking Freeze Approval
Boston Public Safety Commission, Committee on Licenses	Parking Garage Permit License for Storage of Inflammables
Inspectional Services Department	Building permit
State	
Massachusetts Historical Commission	State Register Review
Federal	
U.S. Environmental Protection Agency	Notice of Intent for EPA Construction Activities – Construction General Permit

1.8 Public Participation

As part of its planning efforts, prior to the filing of this PNF, the Proponent has discussed the Project as proposed with elected officials, neighborhood stakeholders, public agencies, and representatives of Chinatown-based organizations, including the Chinatown Neighborhood Council, the Chinatown Residents Association, The Chinatown Coalition, and the Chinese Progressive Association. And as previously noted, CCBA is itself an umbrella organization whose membership is comprised of over 30 family associations and other civic organizations.

The Proponent looks forward to working with the BPDA, city agencies, elected officials, neighbors, and others as the design and review processes move forward.

1.9 Schedule

Depending on funding cycles and availability, construction of the Project is anticipated to commence in the fourth quarter of 2020 and will last approximately 18-20 months.

Chapter 2.0

Transportation

2.0 TRANSPORTATION

2.1 Overview

The Proponent engaged Howard Stein Hudson (HSH) to conduct an evaluation of the transportation impacts of the Project. This transportation study adheres to the Boston Transportation Department (BTD) Transportation Access Plan Guidelines and BPDA Article 80 Large Project Review process. This study includes an evaluation of the existing conditions, future conditions with and outside of the Project, projected parking demand, loading/delivery plan, transit services, pedestrian and bicycle activity, and transportation demand management (TDM) strategies for the Project and construction-period impacts. The transportation study indicates that the Project will not adversely affect traffic operations in the area.

2.1.1 Project Description

The Site is located on the southern edge of the existing Tai Tung Village development at the corner of Harrison Avenue and Hudson Street. Currently, the Site consists of an active parking lot with approximately 69 parking spaces. The proposed Project will replace the existing surface parking lot with a building containing approximately 85 affordable residential units, and approximately 1,400 square feet of ground floor non-residential space, as well as approximately 40 covered and surface parking spaces that will replace some of the existing parking on the Site. The parking will primarily serve tenants of the Tai Tung Village development.

Table 2-1 presents a summary of the development program.

Table 2-1 Project Development Program

Land Use	Proposed Project
Residential	85 units
Non-residential	1,400 sf
Parking	40 spaces

2.1.2 Methodology

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

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

- The future transportation conditions analyses evaluate potential transportation impacts associated with the Project. The long-term transportation impacts are evaluated for the year 2026, based on a seven-year horizon from the year of the filing of this traffic study.
    - The No-Build (2026) Condition analysis includes general background traffic growth, traffic growth associated with specific developments (not including this Project), and transportation improvements that are planned near the Site.
    - The Build (2026) Condition analysis includes the No-Build condition plus the net change in traffic volume due to the Project. Expected roadway, parking, transit, pedestrian, and bicycle accommodations, as well as loading facilities associated with the Project, are identified.
- The final sections of the transportation study identify the transportation demand management measures to minimize automobile usage and Project-related impacts and outline the requirements of the Transportation Access Plan Agreement (TAPA) and Construction Management Plan (CMP).

2.1.3 Study Area

The study area, shown in Figure 2-1, consists of the following five intersections in the vicinity of the Site:

- Harrison Avenue/Hudson Street/Marginal Road/ (signalized);
- Kneeland Street/Hudson Street (unsignalized);
- Hudson Street/Tai Tung Street (unsignalized);
- Hudson Street/South Parking Lot Driveway (unsignalized); and
- Harrison Avenue/South Parking Lot Driveway (unsignalized).

2.2 Existing Condition

This section includes a description of existing study area roadway geometries, intersection geometries and traffic controls, curb usage (parking), public transportation services, and peak-hour traffic volumes for vehicles, bicycles, and pedestrians.

2.2.1 Existing Roadway Conditions

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

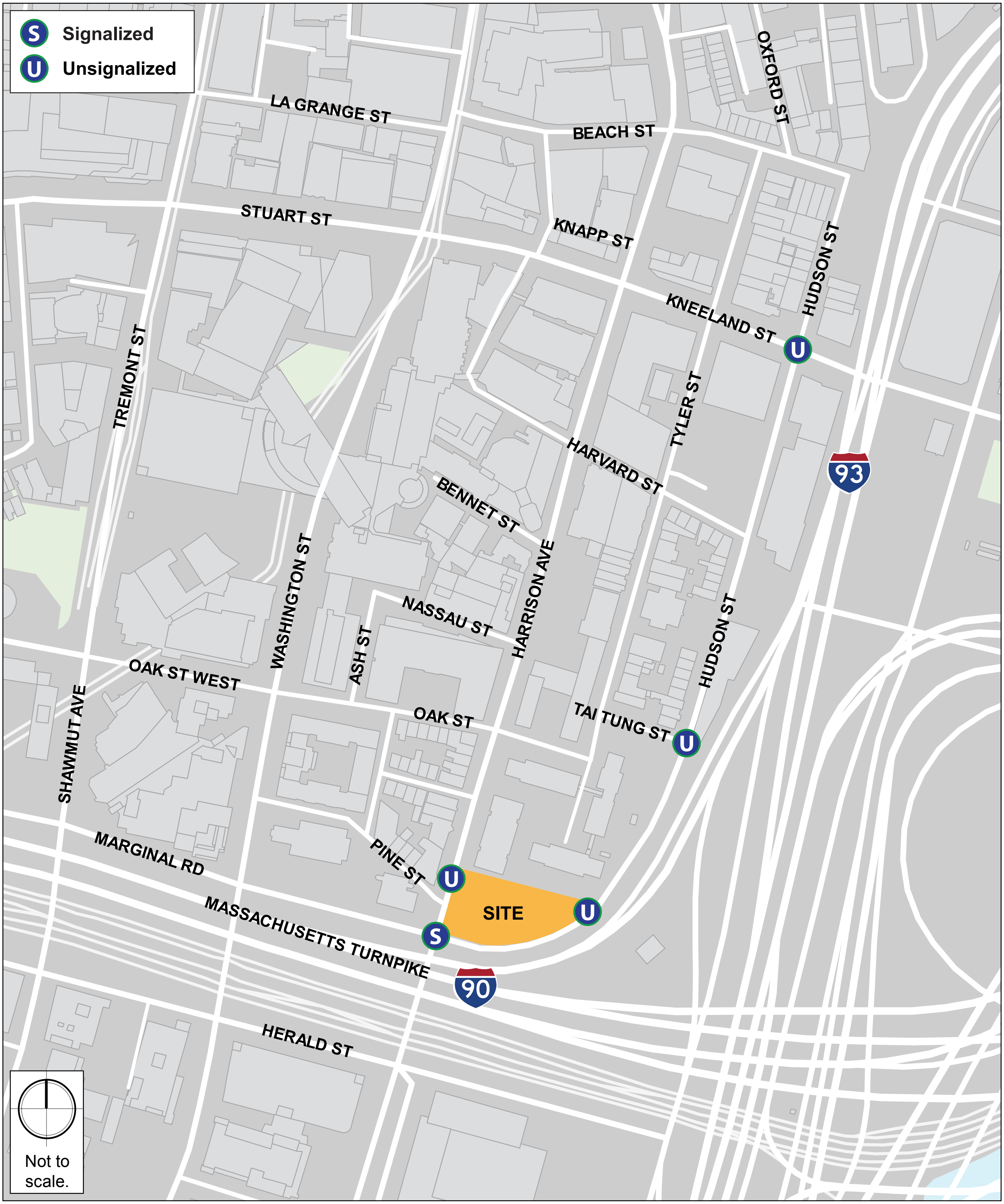

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Figure 2-1
Study Area

Harrison Avenue is located to the west of the Site and runs in a north-south direction from Avenue de Lafayette to Dudley Street. In the vicinity of the Site, Harrison Avenue is a two-lane roadway and is one-way southbound. On the south side of Interstate-90, Harrison Avenue becomes a two-way predominately two-lane roadway. Harrison Avenue is classified as an urban minor arterial roadway under BTD jurisdiction. On-street parking and sidewalks are provided on both sides of the roadway. See Section 3.3.3 for discussion of BTD's proposed future bicycle lanes along Harrison Avenue and associated changes to roadway geometry.

Hudson Street is a one-way, one lane roadway located to the east of the Site. Hudson Street runs in a predominantly north-south direction between Beach Street to the north and Marginal Road to the south. Hudson Street is one-way southbound to the south of Kneeland Street and one-way northbound to the north of Kneeland Street. Hudson Street is classified as an urban minor arterial roadway under BTD jurisdiction. On-street parking is only permitted on the west side of the roadway. Sidewalks are provided along both sides of the roadway north of Tai Tung Street and along the west side of the roadway south of Tai Tung Street. See Section 2.3.3 for a discussion of BTD's proposed future traffic calming measures along Hudson Street, between Kneeland Street and Harrison Avenue.

Kneeland Street is a two-way, four-lane roadway that runs in a predominantly east-west direction between Washington Street and Atlantic Avenue. Kneeland Street is located north of the Site and is classified as an urban principal arterial roadway under BTD jurisdiction. An approximately five-foot bike lane exists in both directions on Kneeland Street. Sidewalks are provided on both sides of the roadway as is intermittent on-street parking.

Tai Tung Street is a one-way, westbound, one-lane public roadway under BTD jurisdiction located to the north of the Site. Tai Tung Street runs in an east-west direction from Hudson Street to Tyler Street. Tai Tung Street is classified as a local roadway and travel along the roadway is restricted between 12:00 a.m. and 6:00 a.m. to local residents only. On-street parking and sidewalks are provided along both sides of the roadway.

Marginal Road is a two lane, one-way westbound roadway southwest of the Site and serves as the extension of Hudson Street. Marginal Road runs in an east-west direction between Harrison Avenue to the east and Arlington Street to the west. Marginal Road is classified as an urban minor arterial roadway under BTD jurisdiction. In the vicinity of the Site, sidewalks are provided and on-street parking is permitted along both sides of the roadway.

2.2.2 Existing Intersection Conditions

Existing conditions at the study area intersections are described below.

Harrison Avenue/Hudson Street/Marginal Road is a four-leg, signalized intersection with two approaches. The Hudson Street westbound approach consists of a shared left-turn/through lane. The Harrison Avenue southbound approach consists of a shared through/right-turn lane. Crosswalks with curb-ramps, and pedestrian equipment are provided across the Hudson Street westbound, Marginal Road eastbound, and Harrison Avenue southbound legs of the intersection. On-street parking is provided along the north side of Hudson Street and both sides of both Marginal Road and Harrison Avenue. See Section 2.3.3 for discussion of BTD's proposed future bicycle lanes along Harrison Avenue and associated changes to roadway geometry.

Kneeland Street/Hudson Street is a four-leg, unsignalized intersection with two approaches. The Kneeland Street eastbound and westbound approaches both consist of a shared left-turn/through lane and a shared through/right-turn lane. Crosswalk and curb-ramps are provided across the Hudson Street legs of the intersection. On-street parking is provided along the south side of Kneeland Street, the west side of Hudson Street south of Kneeland Street and both sides of Hudson Street north of Kneeland Street.

Hudson Street/Tai Tung Street is a three-leg, unsignalized intersection with one approach. The Hudson Street southbound approach consists of a shared through/right-turn lane. A crosswalk with curb ramps is provided across Hudson Street, south of Tai Tung Street. Curb-ramps are provided across Tai Tung Street. On-street parking is provided on the west side of Hudson Street and along both sides of Tai Tung Street.

Hudson Street/Existing Parking Lot East Driveway is a three-leg, unsignalized intersection with two approaches. The Hudson Street southbound approach consists of a shared through/right-turn lane. The existing parking lot driveway eastbound approach consists an exclusive right-turn lane. A sidewalk is provided along the west side of Hudson Street. On-street parking is provided along the west side of Hudson Street.

Harrison Avenue/Existing Parking Lot West Driveway is a three-leg, unsignalized intersection with two approaches. The Harrison Avenue southbound approach consists of a shared left-turn/through lane. The existing parking lot driveway westbound approach consists of an exclusive left-turn lane. Sidewalks are provided along both sides of Harrison Avenue. Crosswalks, curb-ramps, and pedestrian equipment are not provided across any leg of the intersection. On-street parking is provided on both sides of the Harrison Avenue southbound approach.

2.2.3 Parking

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

2.2.3.1 On-Street Parking and Curb Usage

On-street parking surrounding the Site consists of a variety of different parking regulations including, one- and two-hour metered parking, residential permit parking, 15-minute pick-up/drop-off areas, and several others. The on-street parking regulations within the study area are shown in Figure 2-2.

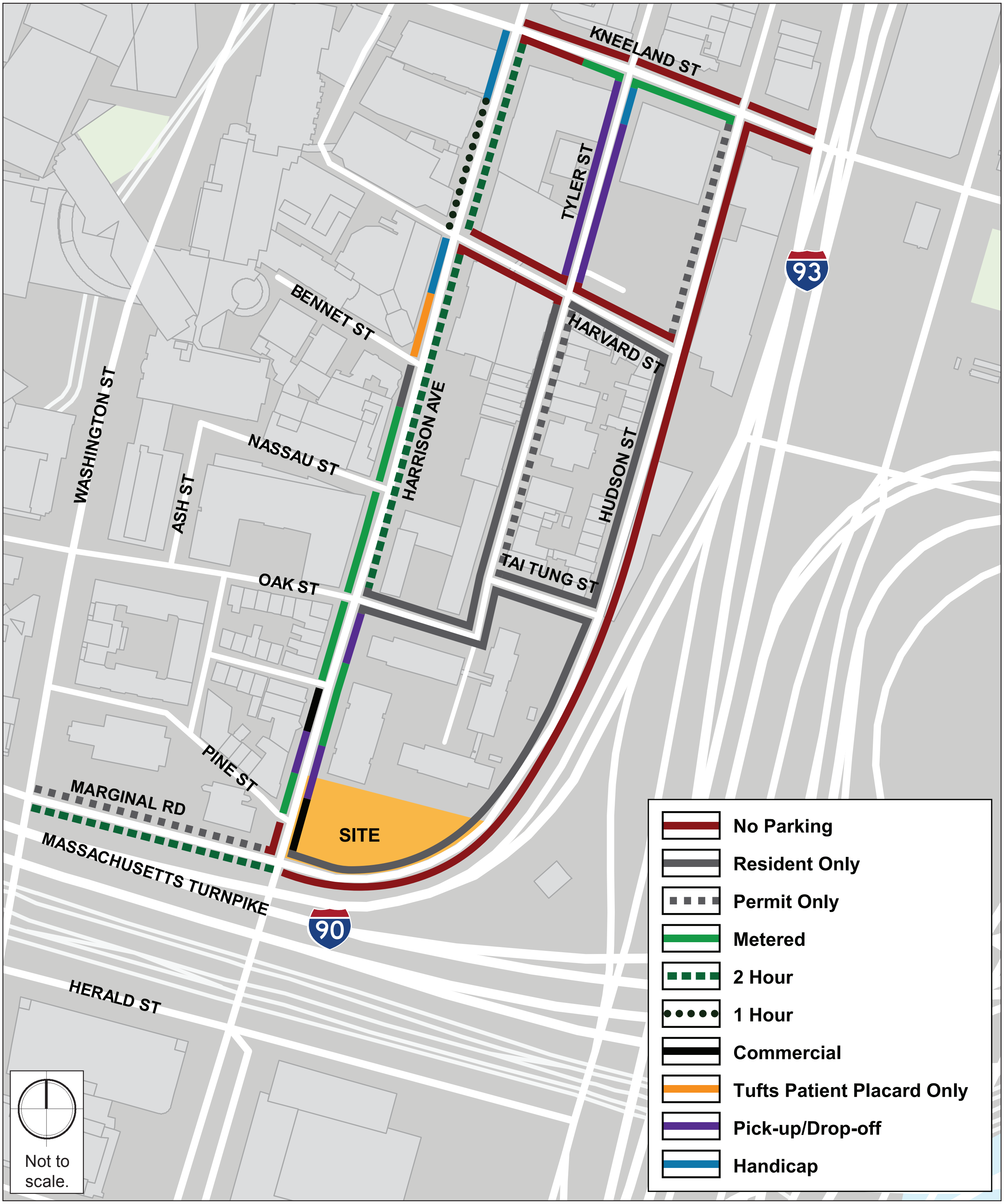

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Figure 2-2
On-street Parking

2.2.3.3 Car Sharing Services

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

Zipcar is the primary car share company in the Boston car sharing market, however other companies such as Turo and Getaround also operate within the city. There are currently two Zipcar locations, one Turo location, and one Getaround location within a five-minute walk (one-quarter mile) of the Site. Additionally, eleven Zipcar locations, one Turo location, and one Getaround location exist within a ten-minute walk (one-half mile) from the Site. The nearby car sharing locations are shown in Figure 2-3.

2.2.4 Existing Public Transportation Services

The Site is in the Chinatown neighborhood of Boston with many public transportation options. The MBTA subway stations within a ten-minute walk (less than one-half mile) of the Site include Tufts Medical Center Station and Chinatown Station on the Orange Line and Boylston Street Station on the Green Line. The Silver Line routes SL4 and SL5 operate between Dudley Station – South Station and Dudley Station – Downtown Crossing, respectively. Each Silver Line route stops at Tufts Medical Center on Washington Street in the inbound and outbound directions. The Site is located within an approximately 15-minute walk (less than one mile) from South Station, which provides connections to Logan Airport via the Silver Line, access to the Red Line, Silver Line, and Commuter Rail, as well as regional bus service connections.

Additionally, the MBTA operates three bus routes in close proximity to the Site. Nearby public transportation services are mapped in Figure 2-4 and listed in Table 2-2 below.

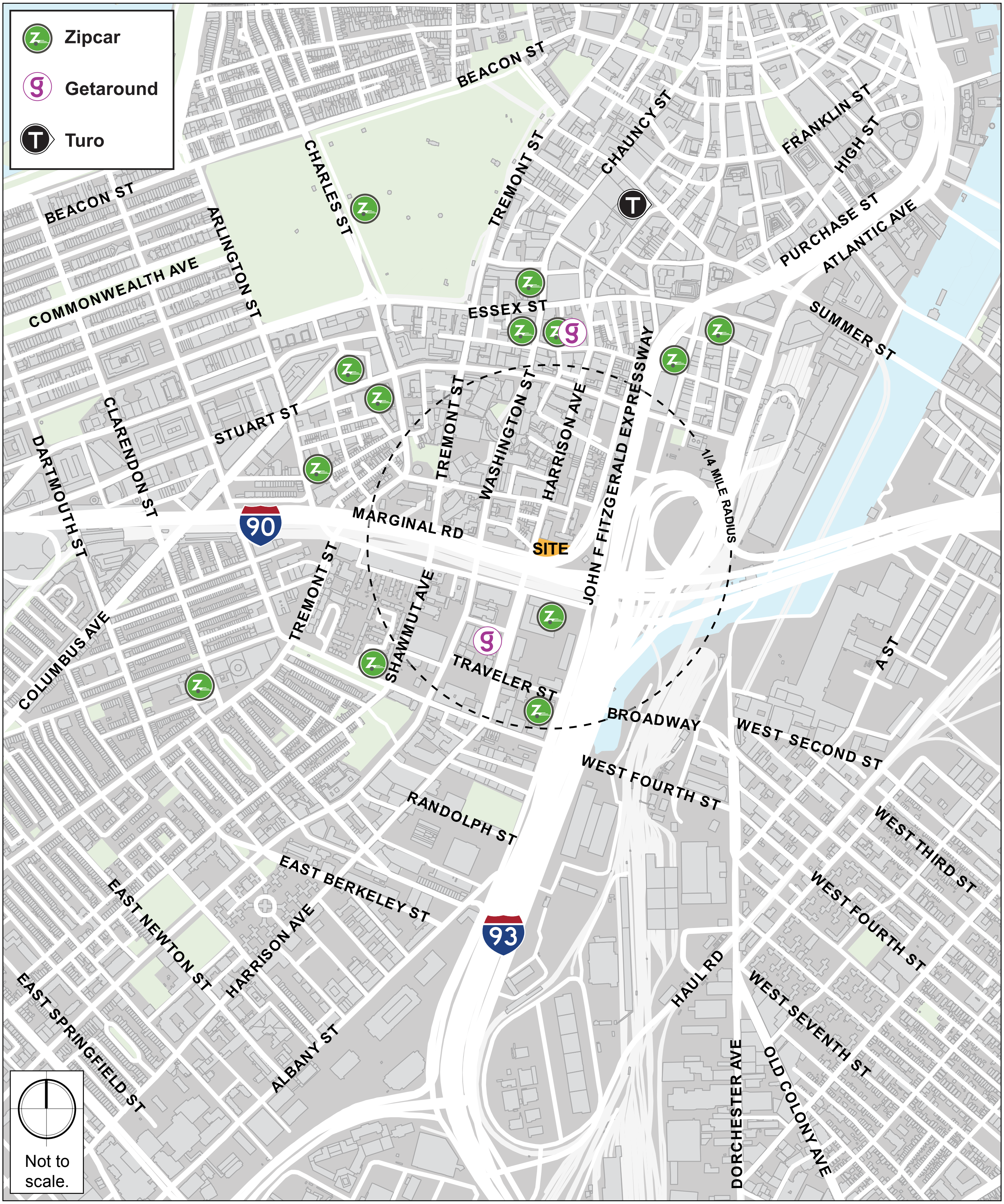

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Figure 2-3
Car Sharing Locations

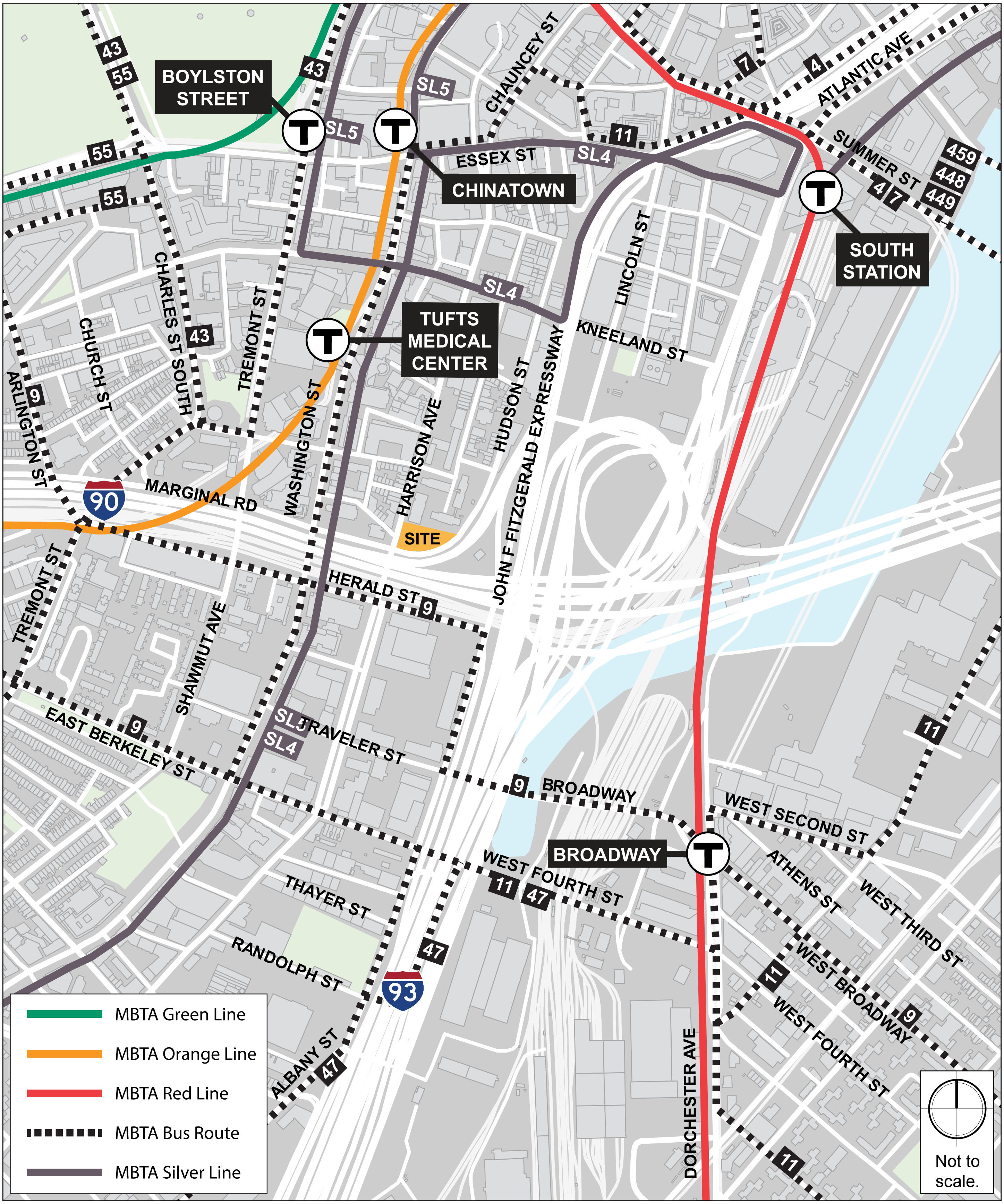

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Figure 2-4
Public Transportation

Table 2-2 Existing Public Transportation Service Summary

Transit Service	Description	Peak-Hour Headway (minutes)[1]
Rapid Transit Routes		
Orange Line	Forest Hills – Oak Grove	6
Silver Line SL4	Dudley Station – South Station	12
Silver Line SL5	Dudley Station – Downtown Crossing (Temple Place)	8
Green Line	Lechmere – Boston College, Cleveland Circle, Riverside, or Heath Street	6
Bus Routes		
Route 9	City Point – Copley Square	5-15
Route 11	City Point – Downtown BayView Route	10-12
Route 43	Ruggles Station – Park & Tremont Streets via Tremont Street	20-30

1 Headway is the scheduled time between trains or buses. Headways are approximate.
Source: www.mbta.com, May 2019.

2.2.5 Existing Traffic Data

Turning Movement Counts (TMCs) and vehicle classification counts were conducted during the weekday a.m. and weekday p.m. peak periods (7:00 – 9:00 a.m. and 4:00 – 6:00 p.m., respectively) on Tuesday, June 25, 2019. The traffic classification counts included car, heavy vehicle, pedestrian, and bicycle movements. The detailed traffic counts for the study area intersections are provided in Appendix C.

To account for seasonal variation in traffic volumes throughout the year, data provided by MassDOT was reviewed. The most recent (2017) MassDOT Weekday Seasonal Factors were used to determine the need for seasonal adjustments to the June 2019 TMCs. The seasonal adjustment factor for roadways similar to the study area (Group 6) in the month of June is 0.89. This indicates that average month traffic volumes are approximately 11 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 2017 Weekday Seasonal Factors table is provided in Appendix C.

2.2.6 Existing Vehicular Traffic Volumes

The existing traffic volumes that were collected in June 2019 were used to develop the Existing Condition traffic volumes. The volumes were balanced where necessary across the roadway network within the study area.

The resulting Existing weekday a.m. peak hour and weekday p.m. peak hour traffic volumes are shown in Figure 2-5 and Figure 2-6, respectively.

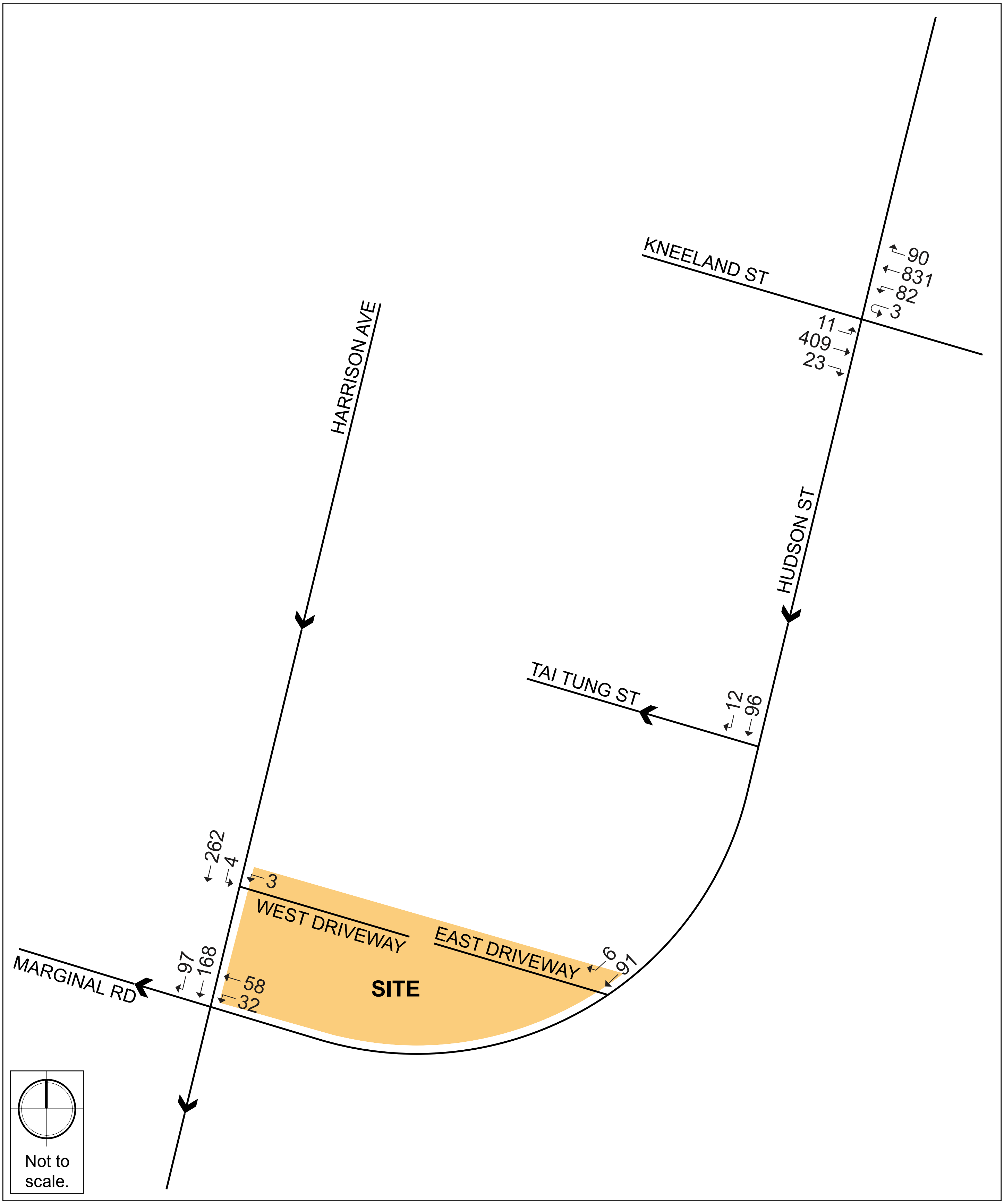

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Figure 2-5

Existing Condition Traffic Volumes, Weekday a.m. Peak Hour

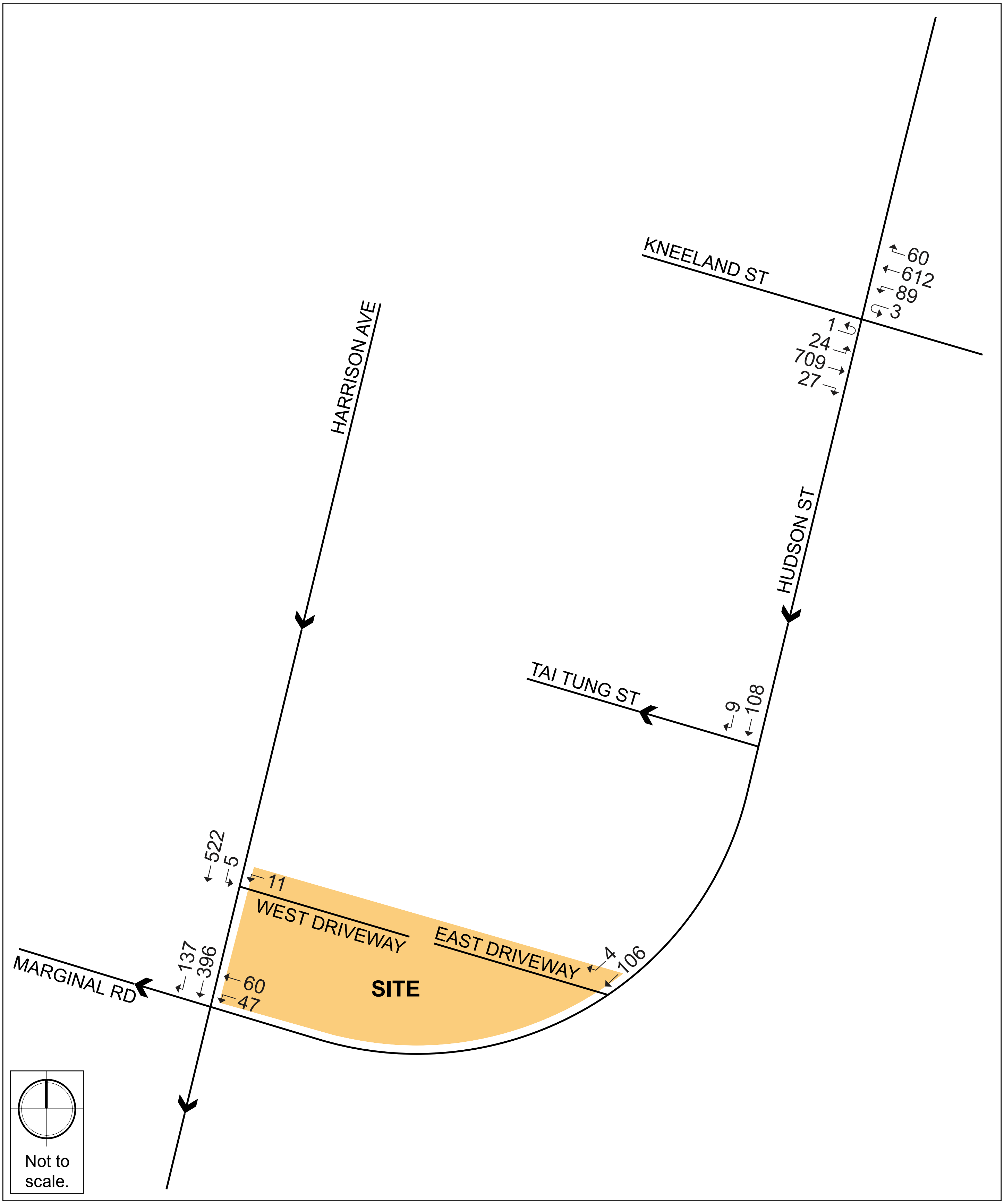

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Figure 2-6

Existing Condition Traffic Volumes, Weekday p.m. Peak Hour

2.2.7 Existing Bicycle Volumes and Accommodations

In recent years, bicycle use has increased dramatically throughout the City of Boston. The City's "Bike Routes of Boston" map assigns a level of difficulty to many Boston streets. Study area streets and their associated level are presented below:

- Kneeland Street and Hudson Street are designated as advanced routes which are suitable for experienced and traffic-confident cyclists. Traffic volumes and/or speeds can be high.
- Tremont Street, Washington Street and Harrison Avenue north of Oak Street are designated as intermediate routes which are suitable for riders with some on-road experience. Traffic volumes and speeds tend to be moderate.

Bicycle counts, presented in Figure 2-7, were conducted concurrently with the vehicular TMCs, and bicycle activity in the area was generally high along Hudson Street.

The Site is also located in proximity to numerous bicycle sharing stations provided by BLUEbikes (formerly Hubway). BLUEbikes is the Boston area's largest bicycle sharing service, which was launched in 2011 and currently consists of more than 3,400 shared bicycles at more than 190 stations throughout Boston, Brookline, Cambridge, Somerville, and Everett. As shown in Figure 2-8, there are five BLUEbike stations located within a quarter mile of the Site and an additional six are located within a half-mile of the Site.

2.2.8 Existing Pedestrian Volumes and Accommodations

In general, sidewalks are provided along all roadways and are in good condition. Crosswalks and curb ramps are provided across Hudson Street at the Kneeland Street/Hudson Street intersection. Crosswalks, curb ramps, and pedestrian signals are provided across Hudson Street, Marginal Road, and the Harrison Avenue southbound approach at the intersection of Harrison Avenue/Hudson Street/Marginal Road.

To determine the amount of pedestrian activity within the study area, pedestrian counts were conducted concurrently with the TMCs at the study area intersections and are presented in Figure 2-9.

2.3 No-Build Condition

The No-Build (2026) Condition reflects a future scenario that incorporates anticipated traffic volume changes associated with background traffic growth independent of any specific project, traffic associated with 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 facility, and bicycle facility improvements.

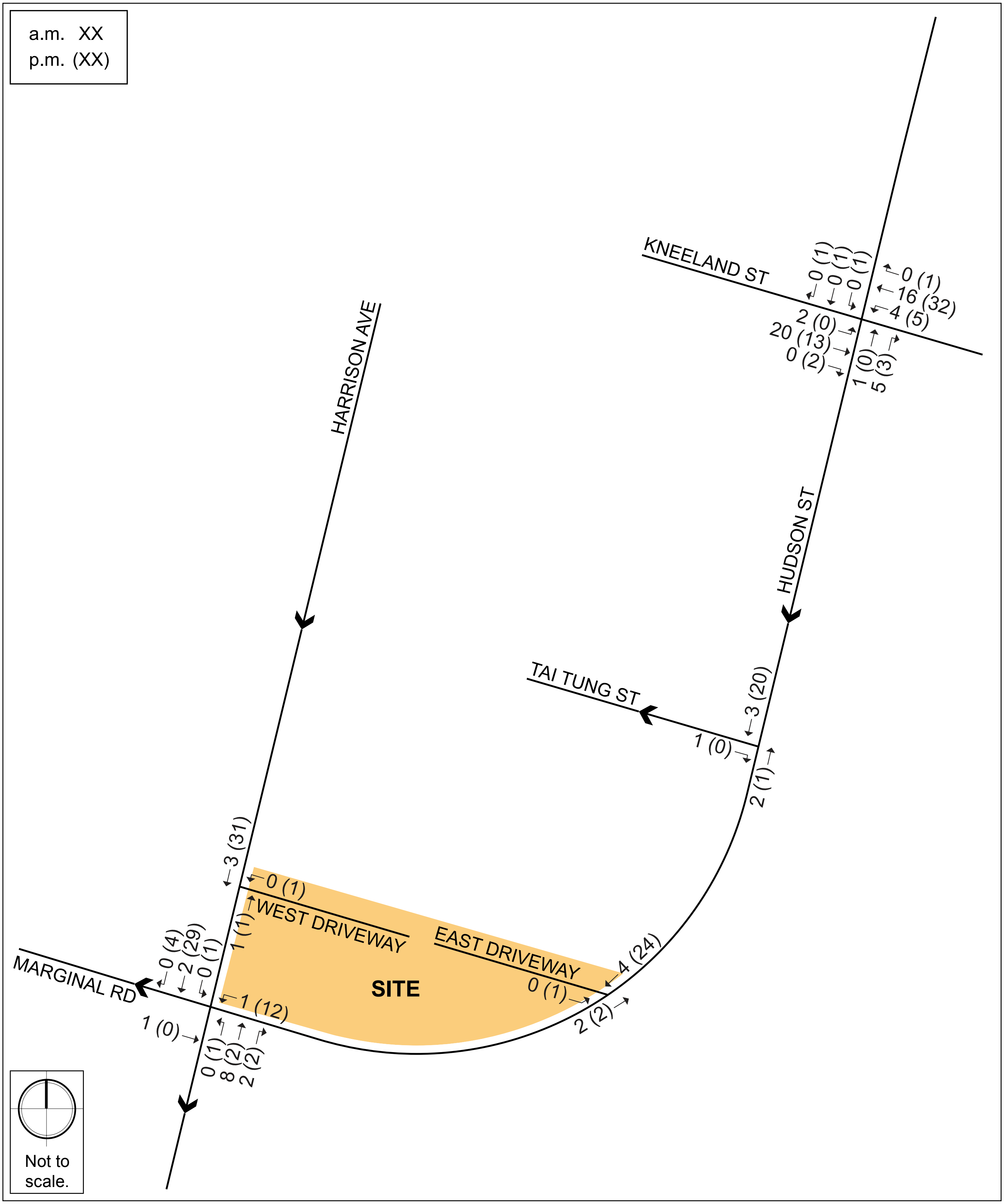

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Figure 2-7

Existing Condition Bicycle Volumes, Weekday a.m. and p.m. Peak Hours

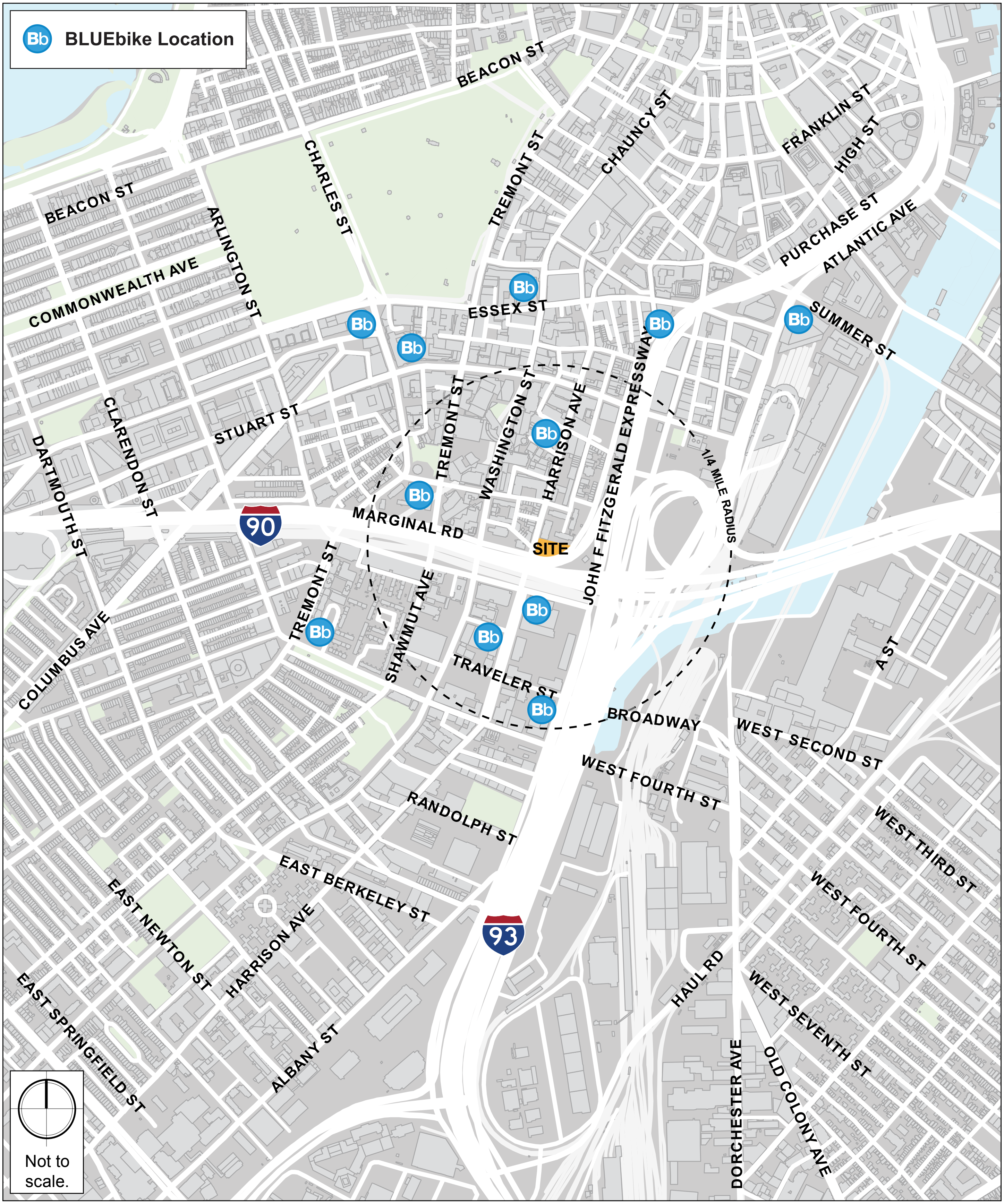

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Figure 2-8
Bicycle Sharing Locations

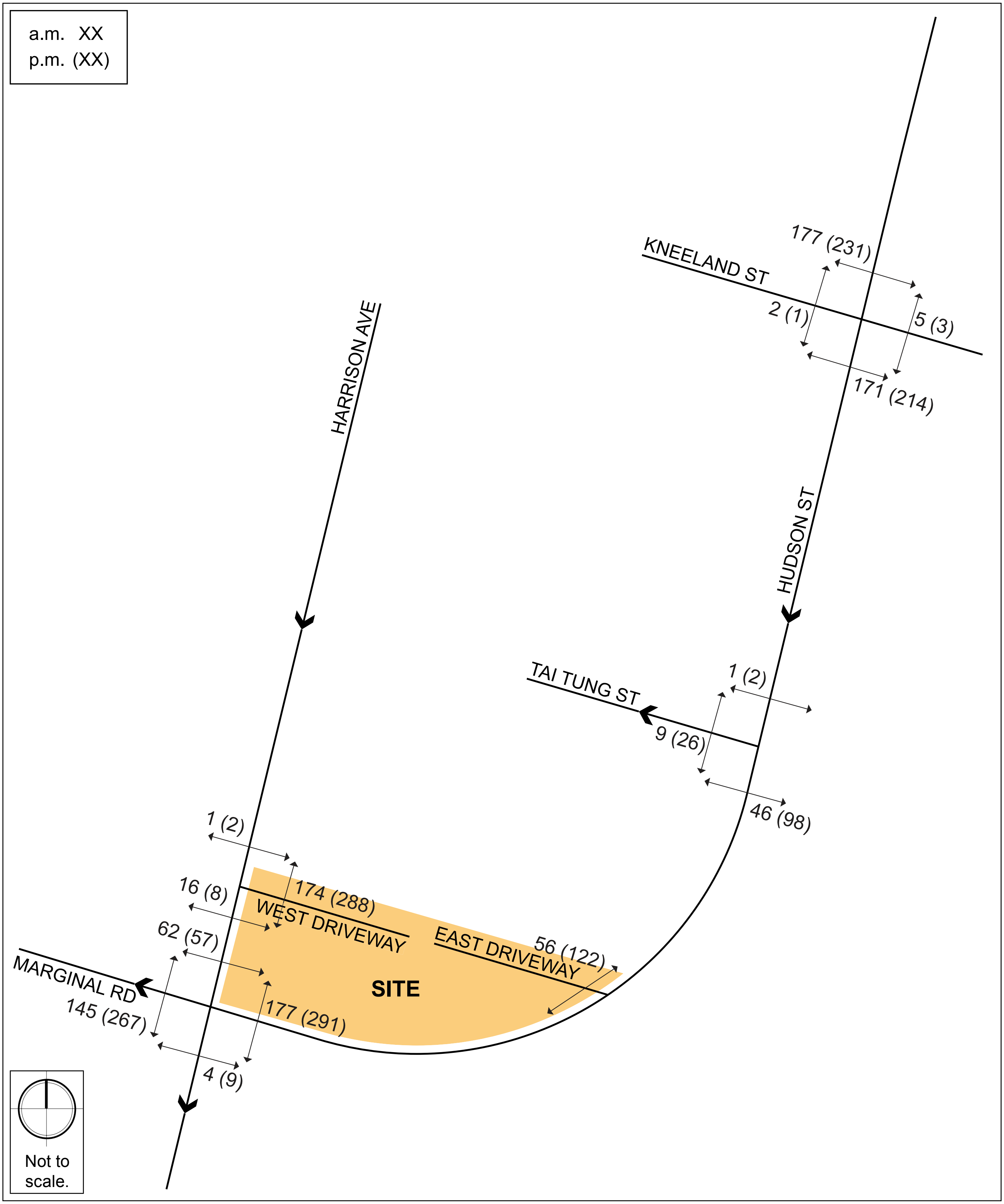

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Figure 2-9

Existing Condition Pedestrian Volumes, Weekday a.m. and p.m. Peak Hours

2.3.1 Background Growth Traffic

The methodology to account for general future background traffic growth is to evaluate how traffic volumes 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 and to account for any additional unforeseen traffic growth, a traffic growth rate of one-half percent per year, compounded annually through the horizon year seven years in the future, was used.

2.3.2 Specific Development Traffic Growth

Traffic volumes associated with known, larger, or adjacent development projects can affect traffic patterns throughout the study area within the future analysis time horizon. Key background development projects were identified in the vicinity of the Site and are shown in Figure 2-10. Traffic volumes associated with the following projects were directly incorporated into the future conditions traffic volumes:

- **Motor Mart Garage (201 Stuart Street)** – This proposed project consists of the redevelopment of the existing eight-story Motor Mart Garage with a 20-story tower above the existing Garage with approximately 306 residential units, retention of 46,000 sf of retail and restaurant space, and retention of 672 parking spaces. This project is currently under review by the BPDA.
- **212 Stuart Street** – This project consists of an approximately 146,000 sf 19-story building with 126 residential units and 3,000 sf of first floor retail/restaurant space. Parking would be provided at the adjacent garage located at 200 Stuart Street. This project has been approved by the BPDA Board.
- **41 LaGrange Street** – This project consists of a new 19-story residential tower with approximately 126 residential units. There will be no on-site parking. This project has been approved by the BPDA Board.
- **47 LaGrange Street** – The project consists of an approximately 157,000 **sf** 21-story building with up to 176 residential units. This project has been approved by the BPDA Board.
- **150 Kneeland Street** – This project consists of a 21-story hotel with approximately 230 rooms and a 3,000-sf lounge. This project has been approved by the BPDA Board.
- **Parcel P-7A** – The project consists of the construction of a 125,000 sf, 23-story micro hotel with approximately 346 rooms and the installation of a three-story digital/fixed advertising signage. This project is currently under construction.
- **217 Albany Street** – The project consists of the construction of a 14-story, multi-family residential building with approximately 180 residential units. The project has been approved by the BPDA Board.

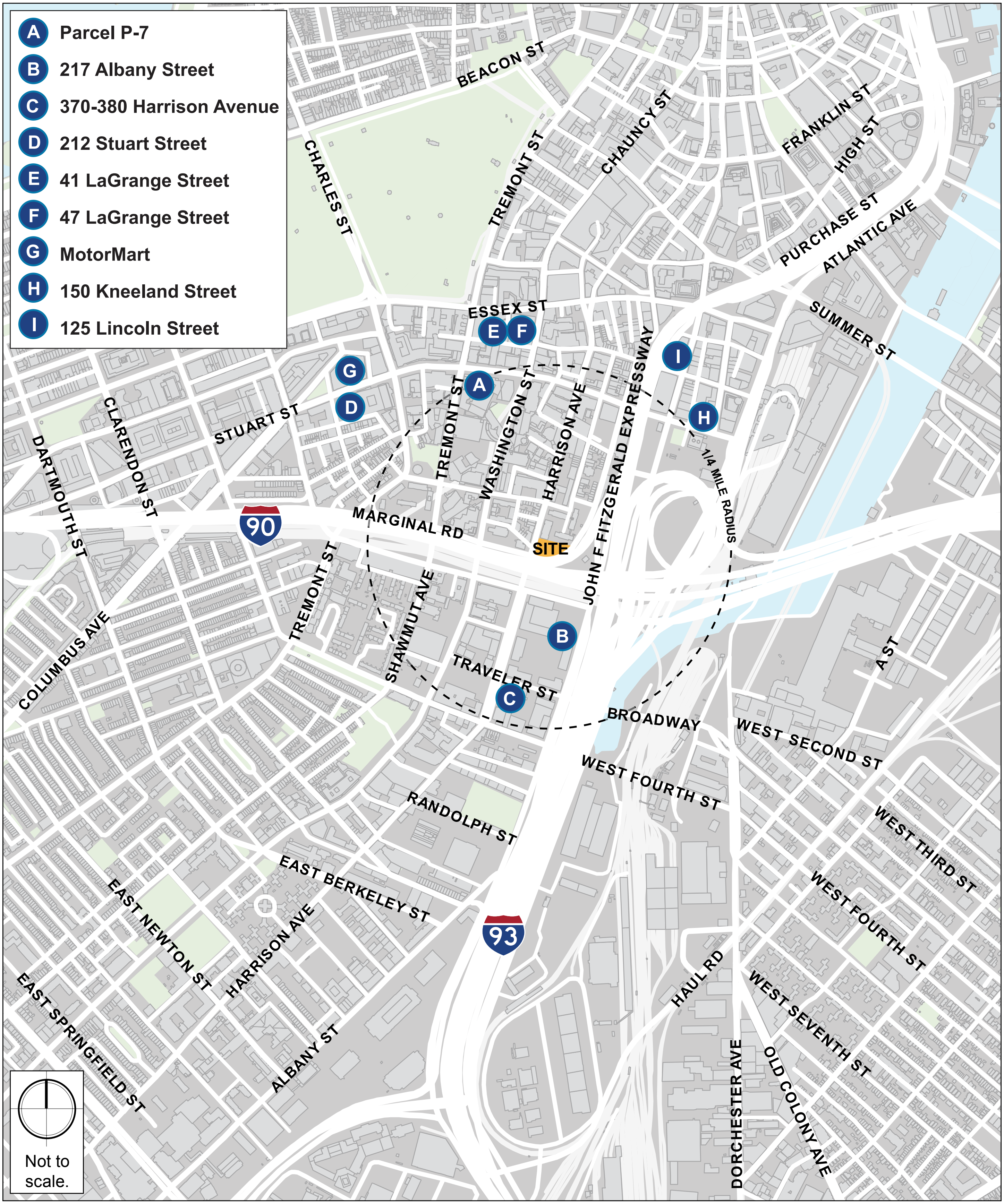

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Figure 2-10
Background Projects

- **370-380 Harrison Avenue** – The project consists of the construction of a mixed-use building with approximately 273 residential units, 180 off-street parking spaces and approximately 8,500 square feet of commercial space. This project is currently under construction.
- **125 Lincoln Street** – The proposed project consists of the demolition of the existing parking garage and commercial space and the construction of a 625,000 square foot office building with retail and other publicly accessible ground floor space. The project will also provide approximately 275 parking spaces in up to five below grade parking levels. This project is currently under review by the BPDA.

2.3.3 Proposed Infrastructure and Transit 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 study area. These improvements have been incorporated into the future analysis, as appropriate.

- The BTD has created the Neighborhood Slow Streets program to allow organized neighborhood groups to apply for traffic calming opportunities with the goal of reducing vehicle speeds and personal injuries or property damage caused by vehicular crashes as well as to improve pedestrians' perception of safety and quality of life in the surrounding area. Chinatown has been selected as a priority neighborhood and BTD has identified several areas in proximity to the Site that would benefit from the following traffic calming techniques:
    - Reducing the 25-mph city wide speed limit to a zone-wide speed limit of 20 mph. The change in speed limit will be reinforced through the implementation of speed limit signs as well as pavement markings. In Chinatown, the targeted zone is the area bounded by Kneeland Street to the north, Hudson Street to the east, Marginal Road to the south, and Washington Street to the west.
    - Intersection "daylighting" or restricting parking within 20 feet of an intersection by means of gore-striping and flex posts.
    - Constructing raised crosswalks at three intersections: two across Harrison Avenue, north of Harvard Street and north of Bennet Street, and one across Oak Street, approximately halfway between Ash Street and Maple Street.
    - Implementing three speed humps on Hudson Street spaced approximately 150-feet to 250-feet apart to the north of Tai Tung Street as well as the introduction of a chicane, a partial parking lane shift, along the curve to the south of Tai Tung Street.

- As part of the City's Vision Zero effort, which will provide safer pedestrian crossings and better bicycle connections throughout all neighborhoods, the BTD is planning to install bicycle lanes along Harrison Avenue in Chinatown and over the I-90 bridge into the South End. While curbside parking lanes along both sides of Harrison Avenue will be maintained with generally the same governing regulations, the plan will re-purpose the roadway between Oak Street and Marginal Road to accommodate:
    - one southbound travel lane (instead of the current two);
    - one southbound bicycle lane outboard of the western curb parking lane; and
    - one northbound (contraflow) bicycle lane inboard of the eastern curb parking lane.

2.3.4 No-Build Traffic Volumes

The one-half percent per year annual growth rate, compounded annually, was applied to the Existing Condition traffic volumes, then the traffic volumes associated with the background development projects listed above were added to develop the No-Build (2026) Condition traffic volumes. The No-Build (2026) weekday a.m. and p.m. peak hour traffic volumes are shown on Figure 2-11 and Figure 2-12, respectively.

2.4 Build Condition

The Project includes the construction of approximately 86,100 of gross floor area with all 85 rental units being affordable, as well as approximately 1,400 square feet of ground floor non-residential space facing Harrison Avenue. Approximately 40 parking spaces will be provided that will replace some of the existing parking on the Site, and will primarily serve tenants of the Tai Tung Village development.

2.4.1 Site Access and Vehicle Circulation

The site plan is shown in Figure 2-13. Vehicular access to the Site will be provided on Hudson Street at approximately the same location as the existing curb cut. Because Hudson Street is one-way southbound, the Site driveway will operate with only right-in and right-out maneuvers. The primary pedestrian entrance to the building's residential lobby will be located on Harrison Avenue. The non-residential space(s) will also have entrances on Harrison Avenue. Residents who park in the parking garage or in the surface parking area will be able to enter the building lobby from the parking garage. The Proponent will construct new sidewalks adjacent to the Site in accordance with Boston Complete Streets guidelines and requirements of the Americans with Disabilities Act and Massachusetts Architectural Access Board (ADA/AAB), to the extent feasible.

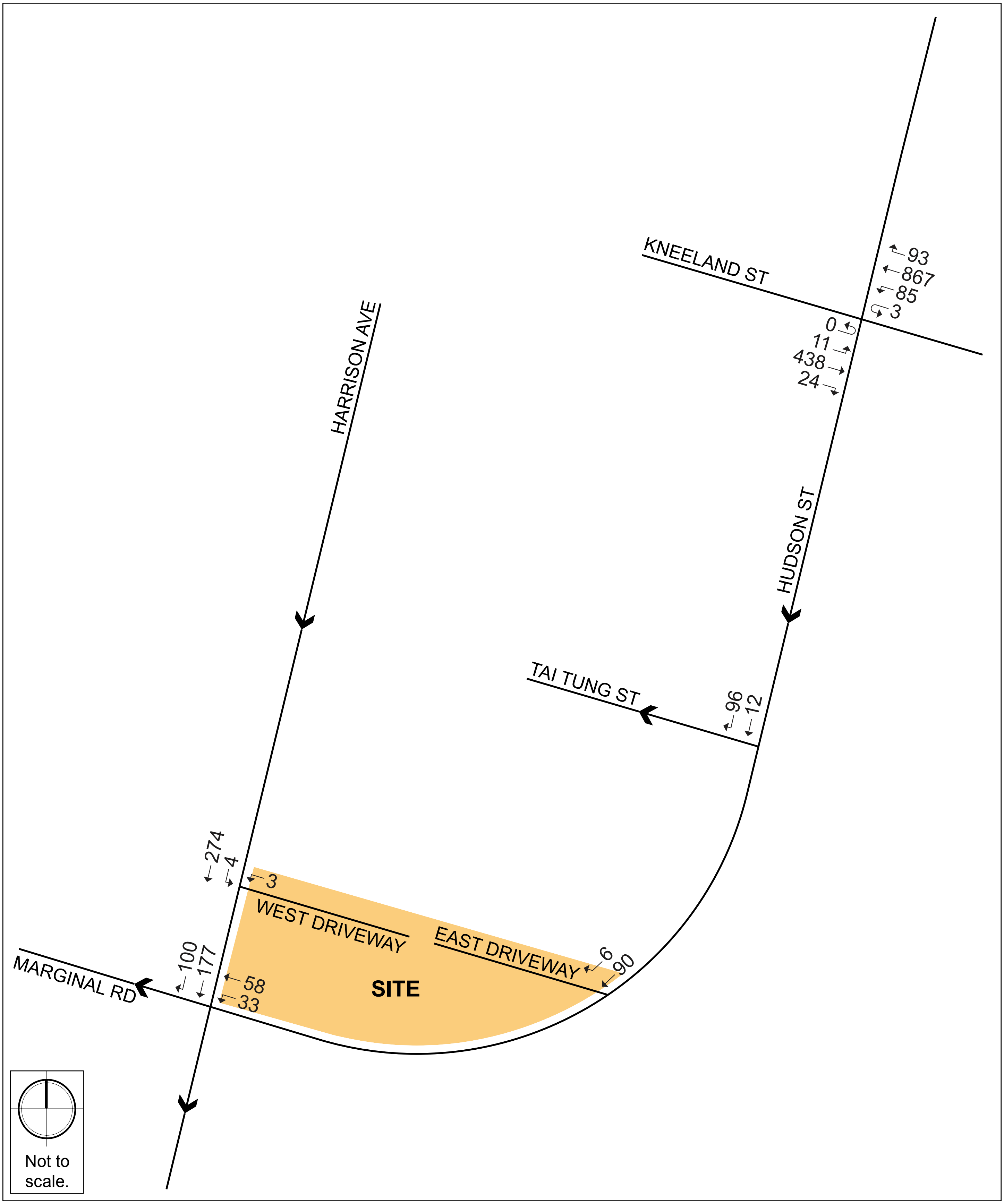

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Figure 2-11
No-Build Condition Traffic Volumes, Weekday a.m. Peak Hour

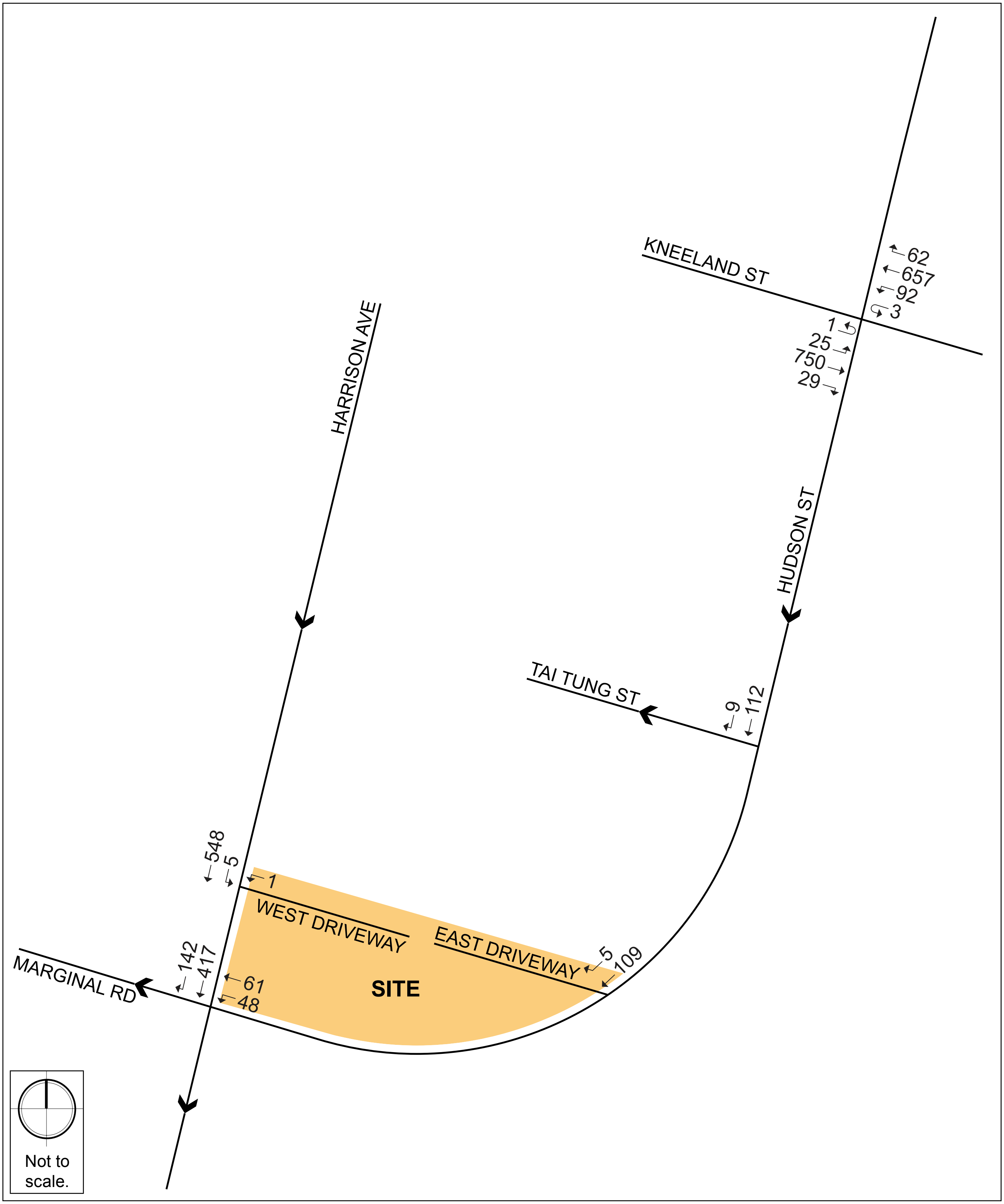

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Figure 2-12

No-Build Condition Traffic Volumes, Weekday p.m. Peak Hour

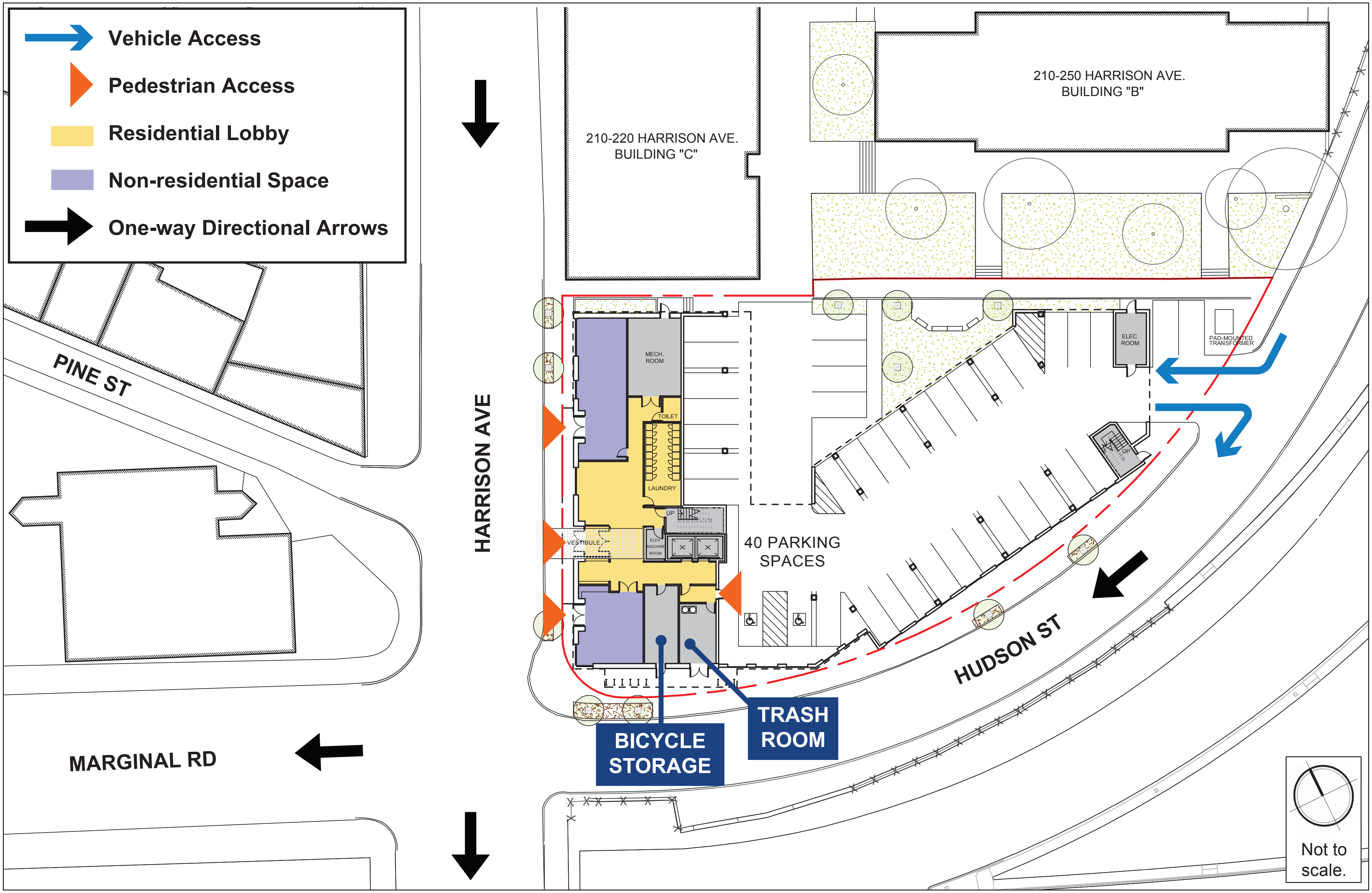

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Figure 2-13
Site Plan

2.4.2 Project Parking

The Site currently contains a 69-space parking lot for some existing residents of the Tai Tung Village and some commercial tenants of Tai Tung Village. Users must have a permit to use the lot. When completed, the Project will include approximately 40 surface level parking spaces, which will serve the same type of users. No parking will be provided for the residents of the Project (except as needed by disabled persons). The parking area will exist beneath an elevated portion of the structure and also include a surface element. Access to the parking area will be provided on Hudson Street and is shown in Figure 2-13.

Residents of Chinatown have a lower percentage of auto ownership than some other neighborhoods of the City and complete many trips by walking or transit. BTD has set parking space goals and guidelines throughout the City to establish the amount of parking supply to be provided with new developments. BTD's maximum parking ratio guidelines for residential uses in this neighborhood is 1.0 space per residential unit. Because no parking spaces will be provided for the new residential units, the Project adheres to these guidelines.

2.4.3 Loading and Service Accommodations

It is typical for a residential building in downtown Boston to provide an off-street loading area for move-in/move-out activity. However, affordable housing units, which will comprise all of the residential units at the Project, have a lower annual tenant turnover. Because the number of turnovers will be relatively low, the Proponent intends to manage move-in/move-out activity through temporary curbside permits available from the Boston Transportation Department.

Trash will be accommodated in an on-site trash room with access onto Hudson Street. For trash pick-up, the dumpster will be rolled into a designated area adjacent to the building for pick-up.

2.4.4 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, and walk/bicycle trips associated with a proposed development and a specific land use program. A project's location and proximity to different travel modes determines how people will travel to and from a site.

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

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

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

Land Use Code 220 – Multifamily Housing Low-Rise. The Multifamily Housing Low-Rise LUC includes apartments, townhouse, and condominiums located within the same building with at least three other dwelling units and that have one or two floors. Calculations of the number of trips uses ITE's average rate per dwelling units. ITE also provides data for mid-rise residential buildings with 3-10 floors. While the Project will include residential units that are considered mid-rise in height, the study team adopted trip rates associated with the Low-Rise Residential LUC, which are higher, resulting in a more conservative analysis (higher impact).

Land Use Code 820 – Retail/Shopping Center. Although the type of use for non-residential space within the Project has not yet been designated, it is expected to be leased to neighborhood retail businesses. Of the ITE categories, this LUC was adopted as most appropriate for the potential uses. A retail shopping center is an integrated group of commercial establishments that is planned, developed, owned, and managed as a unit. A shopping center's composition is related to its market area in terms of size, location, and type of store. Calculations of the number of trips use ITE's average rate per 1,000 square feet.

2.4.5 Travel Mode Share

The American Census Survey (ACS) provides travel mode share rates for residents traveling from home to work and back via walking/biking, transit, and vehicles by census tract. The Site is located in Census Tract 702. An average of the travel mode shares from the census tracts were adopted for the Project's residential land use.

Additionally, BTD provides vehicle, transit, and walking mode share rates for different areas of Boston. The Project is located in the eastern portion of designated Area 3 – Park Plaza. The BTD travel mode shares were adopted for the Project's non-residential space.

The unadjusted vehicular trips were converted to person-trips by using vehicle occupancy rates published by the Federal Highway Administration (FHWA)[2]. The person-trips were then distributed to different modes according to the mode shares shown in Table 2-3.

[2] Summary of Travel Trends: 2017 National Household Travel Survey; FHWA; Washington, D.C.; July 2018.

Table 2-3 Travel Mode Shares

Land Use		Walk/Bicycle Share	Transit Share	Vehicle Share	Vehicle Occupancy Rate
Daily					
Residential LUC 220 – 85 Units	In	67%	12%	21%	1.18
	Out	67%	12%	21%	1.18
Non-Residential LUC 820 – 1,400 SF	In	43%	17%	40%	1.82
	Out	43%	17%	40%	1.82
a.m. Peak Hour					
Residential LUC 220 – 85 Units	In	67%	12%	21%	1.18
	Out	67%	12%	21%	1.18
Non-Residential LUC 820 – 1,400 SF	In	33%	16%	51%	1.82
	Out	79%	8%	13%	1.82
p.m. Peak Hour					
Residential LUC 220 – 85 Units	In	67%	12%	21%	1.18
	Out	67%	12%	21%	1.18
Non-Residential LUC 820 – 1,400 SF	In	79%	8%	13%	1.82
	Out	33%	16%	51%	1.82

2.4.6 Existing Trip Generation

When assessing a site with existing, active land uses, it is standard practice to estimate existing trips and subtract those trips from the projected new future trips. The result of this process yields "net new" trips that become the basis for traffic analysis.

The existing site generates trips associated with the 69-space surface parking lot. The existing site trips were collected concurrently with the TMCs completed in June 2019. For the Build (2026) Condition, because the Project will provide approximately 40 spaces primarily to current residential and commercial tenants of the Tai Tung Village, the trips associated with the existing land uses have been preserved in the study area roadway network and re-routed to the new Project driveway on Hudson Street. Retaining these trips results in a conservative (higher impact) evaluation of traffic operations.

2.4.7 Project Trip Generation

The travel mode share percentages shown in Table 2-3 were applied to the number of person trips to develop walk/bicycle, transit, and vehicle trip generation estimates for the Project. Vehicle trips include automobiles, taxicabs, and transportation network company (TNC) services, such as Uber and Lyft. The trip generation for the Project by travel mode is shown in Table 2-4. The detailed trip generation information is provided in Appendix C.

Table 2-4 Project Trip Generation

Land Use		Walk/Bicycle Trips	Transit Trips	Vehicle Trips: Private	Vehicle Trips: Taxicab/ TNC	Total Vehicle Trips
Daily						
Residential LUC 220 – 85 Units	In	246	44	62	3	65
	Out	246	44	62	3	65
	Total	**492**	**88**	**124**	**6**	**130**
Non-Residential[1] LUC 820 – 1,400 SF	In	60	24	29	2	31
	Out	60	24	29	2	31
	Total	**120**	**48**	**58**	**4**	**62**
Total	In	306	68	91	5	96
	Out	306	68	91	5	96
	Total	**612**	**136**	**182**	**10**	**192**
a.m. Peak Hour						
Residential LUC 220 – 85 Units	In	8	1	2	0	2
	Out	24	4	6	0	6
	Total	**32**	**5**	**8**	**0**	**8**
Non-Residential[1] LUC 820 – 1,400 SF	In	1	1	1	0	1
	Out	2	0	0	0	0
	Total	**3**	**1**	**1**	**0**	**1**
Total	In	9	2	3	0	3
	Out	26	4	6	0	6
	Total	**35**	**6**	**9**	**0**	**9**
p.m. Peak Hour						
Residential LUC 220 – 85 Units	In	24	4	6	0	6
	Out	14	3	3	0	3
	Total	**38**	**7**	**9**	**0**	**9**
Non-Residential[1] LUC 820 – 1,400 SF	In	10	1	1	0	1
	Out	5	2	4	0	4
	Total	**15**	**3**	**5**	**0**	**5**
Total	In	34	5	7	0	7
	Out	19	5	7	0	7
	Total	**53**	**10**	**14**	**0**	**14**

[1] - The Project trip generation was conducted for a program that included 85 residential units and approximately 4,100 sf of non-residential space. Subsequent to completion of the Project trip generation and Project traffic analysis, the Project design evolved, resulting in a reduction of non-residential space to approximately 1,400 sf. Because the completed analysis incorporated a higher forecast of travel activity, the trip generation and traffic analysis (see Table 2-6 and Table 2-7) were not revised as the results are considered conservative (i.e. higher impact).

The Project is expected to generate approximately 192 new daily vehicle trips with 9 new vehicle trips (3 entering and 6 exiting) during the weekday a.m. peak hour and 14 new vehicle trips (7 entering and 7 exiting) during the weekday p.m. peak hour. Note that while taxicab/TNC trips are expected to drop-off/pick-up passengers along Harrison Avenue, the expected number of these trips during the peak hours is expected to be low. Therefore, all peak hour vehicle trips have been assigned to the Project driveway on Hudson Street.

The Project is also expected to generate 612 new daily pedestrian/bicycle trips, of which 35 occur during the morning peak hour and 53 occur during the evening peak hour.

Additionally, the Project is expected to generate 136 new daily transit trips, of which only 6 would occur during the morning peak hour and 10 would occur during the evening peak hour.

2.4.8 Trip Distribution

The trip distribution identifies the various travel paths for vehicles associated with the Project. Trip distribution patterns for the Project were based on BTD's origin-destination data for Area 3 and trip distribution patterns presented in traffic studies for nearby projects. The trip distribution patterns for the Project are illustrated in Figure 2-14.

2.4.9 Build (2026) Traffic Volumes

The Project-generated vehicle trips were distributed throughout the study area according to the trip distribution patterns. The Project-generated trips at the study area intersections are shown for the weekday a.m. peak hour and the weekday p.m. peak hour in Figure 2-15 and Figure 2-16, respectively.

The trip assignments were added to the No-Build (2026) Condition vehicular traffic volumes to produce the Build (2026) Condition vehicular traffic volumes. The Build (2026) Condition a.m. and p.m. peak hour traffic volumes are shown in Figure 2-17 and Figure 2-18, respectively.

2.4.10 Bicycle Accommodations

Secure bicycle parking will be provided for residents. Based on BTD guidelines for bicycle accommodations, the Project will provide one secure/covered bicycle parking space per residential unit, for an approximate total of 85 secure/covered spaces. A bicycle room, as shown in Figure 2-13, will be located on-site with direct access onto Hudson Street. Additionally, five BLUEbike stations are located within a five-minute walk of the Site, as shown in Figure 2-8, with many more in the wider area.

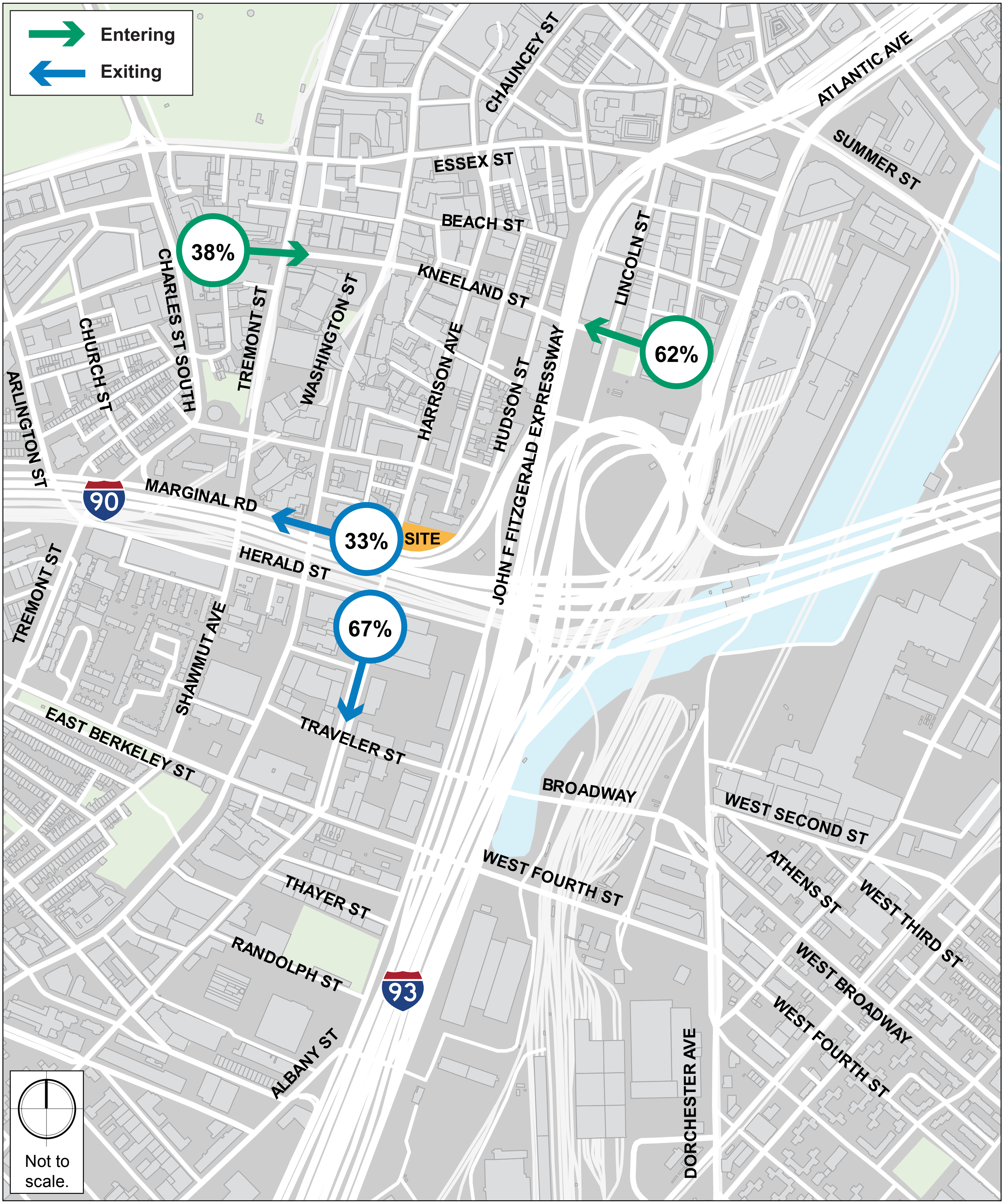

Figure 2-14
Trip Distribution

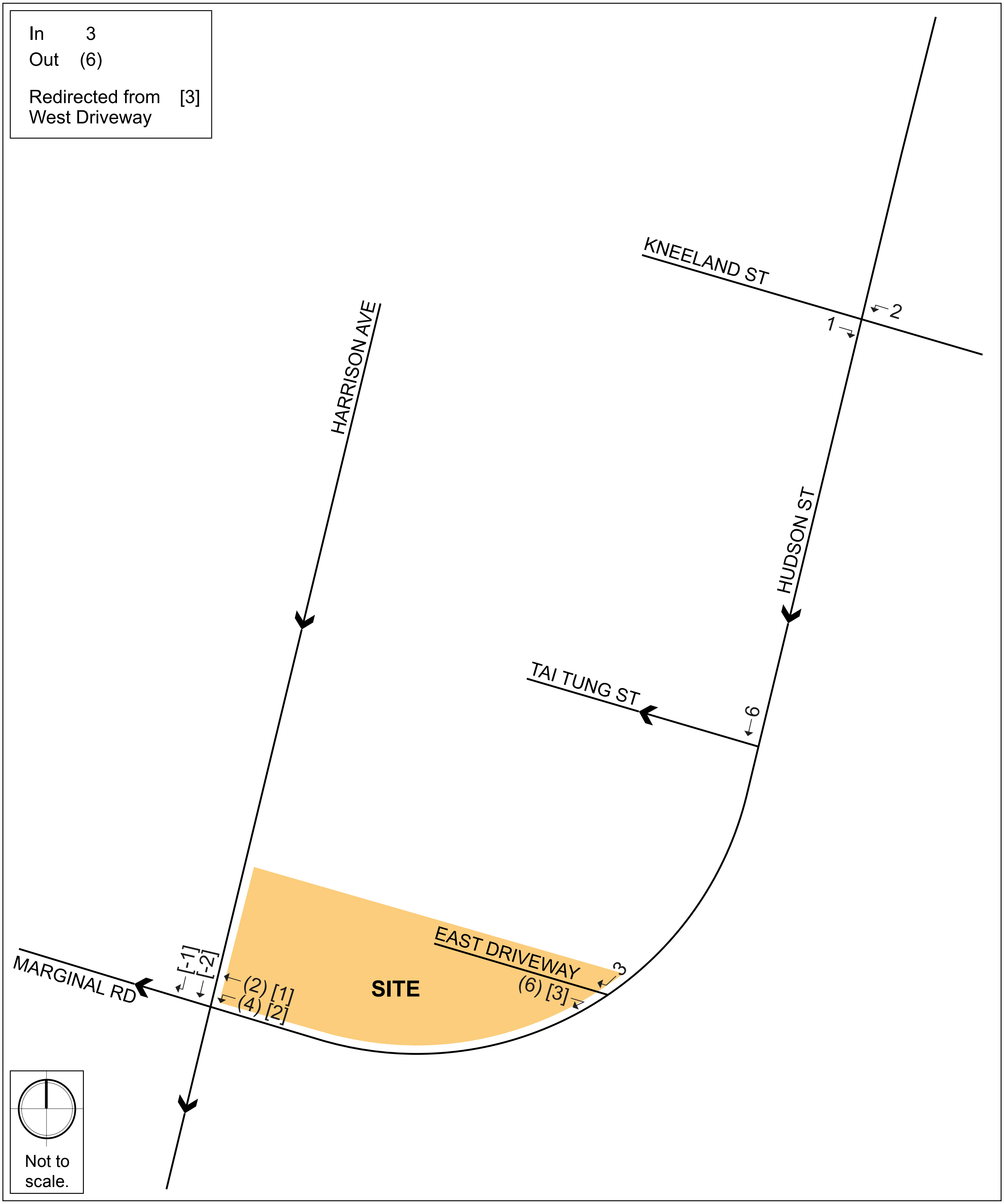

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Figure 2-15
Project Generated Condition Traffic Volumes, Weekday a.m. Peak Hour

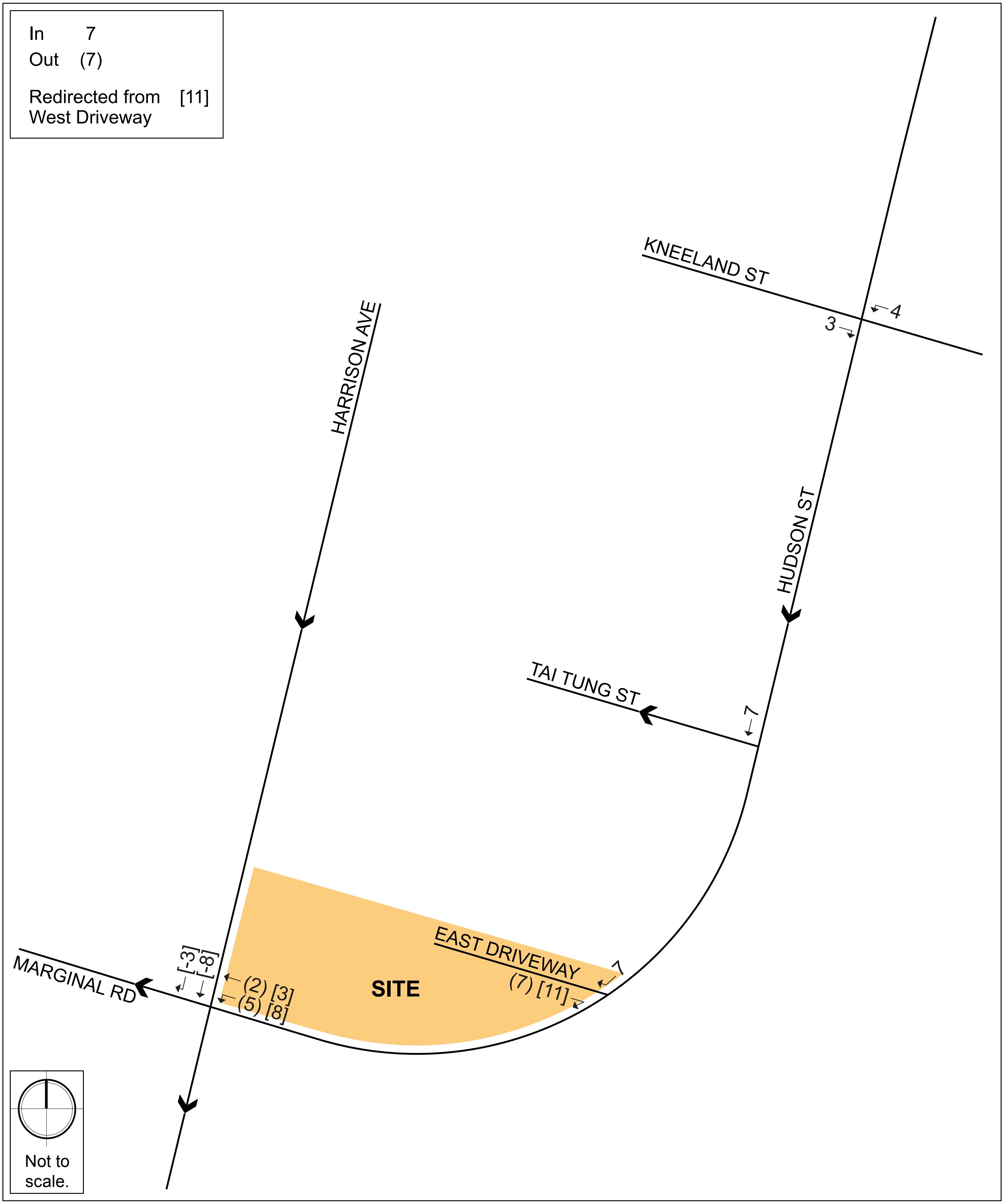

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Figure 2-16
Project Generated Condition Traffic Volumes, Weekday p.m. Peak Hour

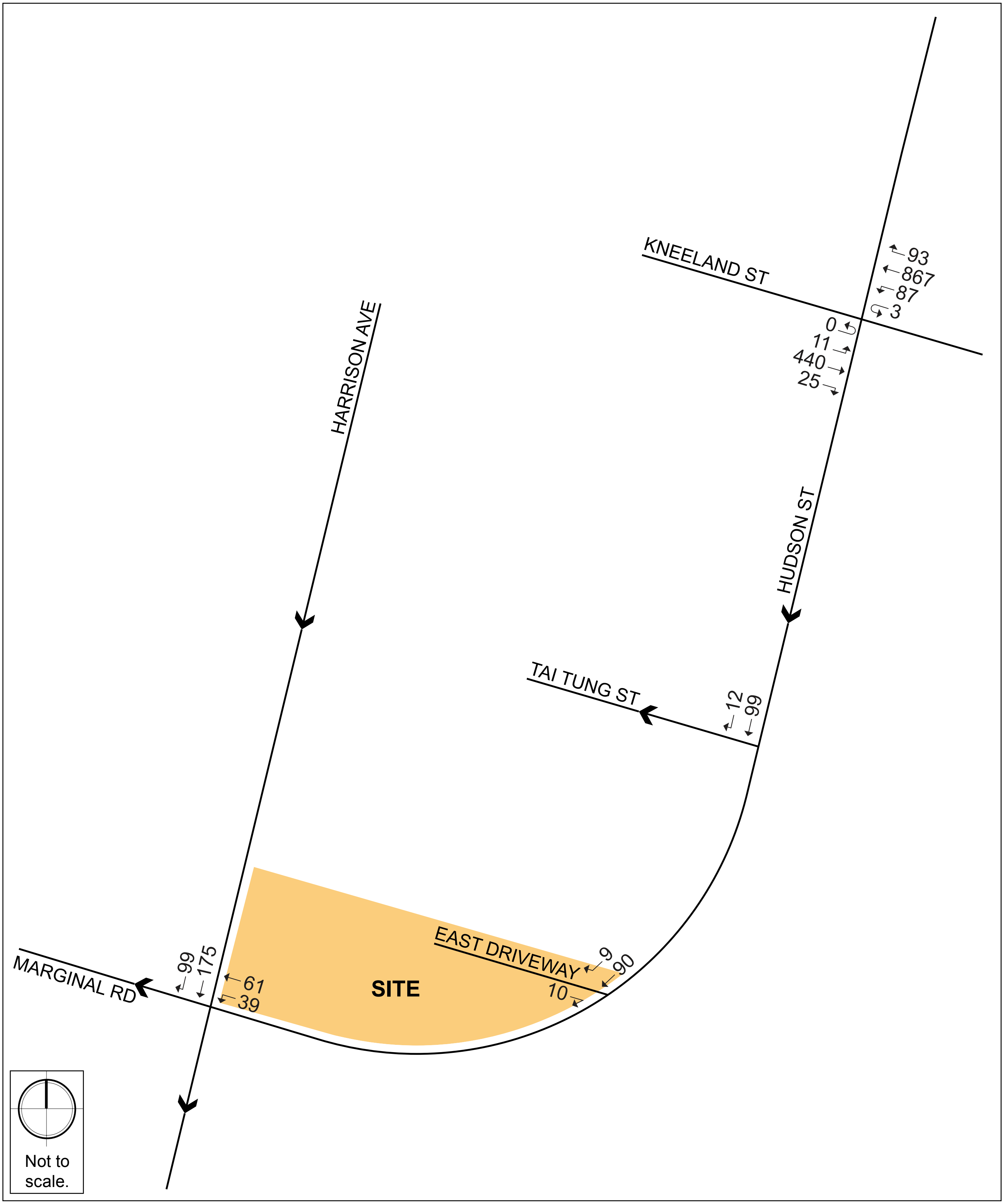

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Figure 2-17
Build (2026) Condition Traffic Volumes, Weekday a.m. Peak Hour

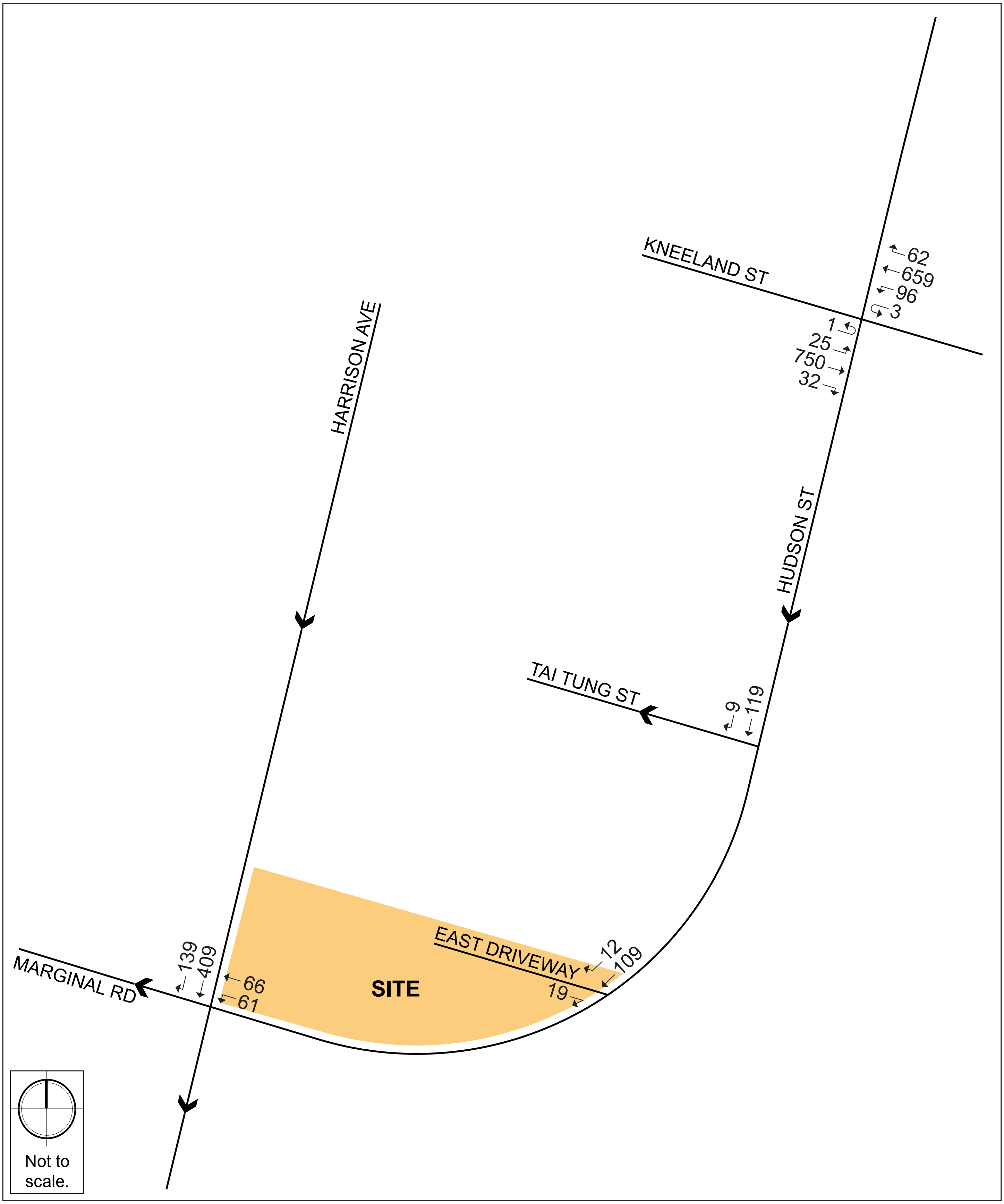

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Figure 2-18
Build (2026) Condition Traffic Volumes, Weekday p.m. Peak Hour

2.5 Traffic Capacity Analysis

The criterion for evaluating traffic operations is level of service (LOS), which is determined by assessing average delay experienced by vehicles at intersections and along intersection approaches. Trafficware's Synchro (version 9) software package was used to calculate average delay and associated LOS at the study area intersections. This software is based on the traffic operational analysis methodology of the Transportation Research Board's 2000 Highway Capacity Manual (HCM). Field observations were performed by HSH to collect intersection geometry such as number of turning lanes, lane length, and lane width that were then incorporated into the operations analysis.

LOS designations are based on average delay per vehicle for all vehicles entering an intersection. Table 2-5 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 during the peak hours of traffic in urban and suburban settings. However, LOS E or F is often typical for a stop-controlled minor street that intersects a major roadway and does not necessarily indicate that the operations at the intersection are poor or failing.

Table 2-5 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 volume-to-capacity ratio (v/c ratio) is a measure of congestion at an intersection approach. A v/c ratio below one indicates that the intersection approach has adequate capacity to process the arriving traffic volumes over the course of an hour. A v/c ratio of one or greater indicates that the traffic volume on the intersection approach exceeds capacity.
- The 50th percentile queue length, measured in feet, represents the maximum queue length during a cycle of the traffic signal with typical (or median) entering traffic volumes.

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

Table 2-6 and Table 2-7 present, respectively, the a.m. and p.m. peak hour capacity analysis for the study area intersections under each analysis condition: Existing (2019) Condition, No-Build (2026) Condition, and the Build (2026) Condition. The detailed analysis sheets are provided in Appendix C. The sections below present results for each condition.

2.5.1 Existing Condition

As shown under the Existing Condition of Table 2-6 and Table 2-7, all of the study area intersections and approaches operate at a level of service C or better, indicating that little delay and congestion occur at these intersections.

2.5.2 No-Build (2026) Condition

As shown under the No-Build (2026) Condition of Table 2-7 and Table 2-8, all of the study area intersections continue to operate at the same overall LOS as under the Existing Condition. Incorporating the City's new bicycle facilities along Harrison Avenue (see Section 2.3.3) results in a slight increase in delays at the Harrison Avenue intersections. Levels of service, however, remain the same as under the Existing Condition.

2.5.3 Build (2026) Condition

As shown under the Build (2026) Condition of Table 2-7 and Table 2-8, all intersections continue to operate at the same overall LOS as under the No-Build (2026) Condition, indicating that the Project will not affect traffic operations in the area.

Table 2-6 Capacity Analysis Summary, Weekday a.m. Peak Hour

Intersection/Movement	Existing Condition					No-Build (2026) Condition					Build (2026) Condition				
	LOS	Delay (s)	V/C Ratio	Queues (ft) 50th	Queues (ft) 95th	LOS	Delay (s)	V/C Ratio	Queues (ft) 50th	Queues (ft) 95th	LOS	Delay (s)	V/C Ratio	Queues (ft) 50th	Queues (ft) 95th
Signalized															
Harrison Avenue/Hudson Street & Marginal Road	**B**	**14.0**	**-**	**-**	**-**	**C**	**21.0**	**-**	**-**	**-**	**C**	**20.9**	**-**	**-**	**-**
Hudson St WB left/thru	B	12.1	0.18	17	54	B	12.5	0.18	18	56	B	13.5	0.20	23	63
Harrison Ave SB thru | thru	C	20.3	0.14	38	62	-	-	-	-	-	-	-	-	-	-
Harrison Ave SB right	A	4.7	0.16	0	33	-	-	-	-	-	-	-	-	-	-
Harrison Ave SB thru/right	-	-	-	-	-	C	23.9	0.49	125	205	C	23.7	0.49	123	202
Unsignalized															
Kneeland Street/Hudson Street	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kneeland St EB left/thru	A	0.7	0.02	-	1	A	0.7	0.02	-	1	A	0.7	0.02	-	1
Kneeland St EB thru/right	A	0.0	0.15	-	0	A	0.0	0.16	-	0	A	0.0	0.16	-	0
Kneeland St WB left/thru	A	2.2	0.08	-	6	A	2.3	0.09	-	7	A	2.4	0.09	-	7
Kneeland St WB thru/right	A	0.0	0.31	-	0	A	0.0	0.32	-	0	A	0.0	0.32	-	0
Hudson Street/Tai Tung Street	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hudson St SB thru/right	A	0.0	0.07	-	0	A	0.0	0.07	-	0	A	0.0	0.07	-	0
Hudson Street/Existing East Driveway	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
East Driveway EB right	A	9.0	0.00	-	0	A	9.0	0.00	-	0	A	9.2	0.04	-	3
Hudson St SB thru/right	A	0.0	0.09	-	0	A	0.0	0.09	-	0	A	0.0	0.10	-	0
Harrison Avenue/Existing West Driveway	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
West Driveway WB left	B	10.7	0.01	-	1	B	10.8	0.01	-	1	-	-	-	-	-
Harrison Avenue SB thru | thru	A	0.1	0.00	-	0	A	0.1	0.00	-	0	-	-	-	-	-

Table 2-7 Capacity Analysis Summary, Weekday p.m. Peak Hour

Intersection/Movement	Existing (2019) Condition					No-Build (2026) Condition					Build (2026) Condition				
	LOS	Delay (s)	V/C Ratio	Queues (ft) 50th	95th	LOS	Delay (s)	V/C Ratio	Queues (ft) 50th	95th	LOS	Delay (s)	V/C Ratio	Queues (ft) 50th	95th
Signalized															
Harrison Avenue/Hudson Street & Marginal Road	**B**	**14.8**	**-**	**-**	**-**	**C**	**31.0**	**-**	**-**	**-**	**C**	**30.0**	**-**	**-**	**-**
Hudson St WB left/thru	B	17.0	0.25	28	73	B	17.5	0.26	31	76	B	19.4	0.31	41	92
Harrison Ave SB thru | thru	B	18.1	0.27	87	122	-	-	-	-	-	-	-	-	-	-
Harrison Ave SB right	A	3.4	0.19	0	34	-	-	-	-	-	-	-	-	-	-
Hudson St SB thru/right	-	-	-	-	-	C	33.7	0.81	313	#511	C	32.6	0.80	303	#463
Unsignalized															
Kneeland Street/Hudson Street	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kneeland St EB left/thru	A	0.9	0.03	-	2	A	0.9	0.03	-	2	A	0.9	0.03	-	2
Kneeland St EB thru/right	A	0.0	0.23	-	0	A	0.0	0.24	-	0	A	0.0	0.25	-	0
Kneeland St WB left/thru	A	3.3	0.11	-	9	A	3.4	0.12	-	10	A	3.6	0.13	-	11
Kneeland St WB thru/right	A	0.0	0.22	-	0	A	0.0	0.24	-	0	A	0.0	0.24	-	0
Hudson Street/Tai Tung Street	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hudson St SB thru/right	A	0.0	0.08	-	0	A	0.0	0.08	-	0	A	0.0	0.09	-	0
Hudson Street/Existing East Driveway	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
East Driveway EB right	A	8.8	0.00	-	0	A	8.9	0.00	-	0	A	9.2	0.08	-	7
Hudson St SB thru/right	A	0.0	0.07	-	0	A	0.0	0.07	-	0	A	0.0	0.08	-	0
Harrison Avenue/Existing West Driveway	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
West Driveway WB left	B	12.6	0.03	-	3	B	12.9	0.03	-	3	-	-	-	-	-
Harrison Avenue SB thru | thru	A	0.1	0.00	-	0	A	0.1	0.00	-	0	-	-	-	-	-

2.6 Travel Demand Management

The Proponent is committed to implementing Transportation Demand Management (TDM) measures to reduce dependence on autos. TDM will be facilitated by the Project's proximity to available transit services, including the Orange Line (Tufts Medical Center and Chinatown) and the Silver Line MBTA service.

Because the Project is primarily residential, its trip generation is already lower than that of an office or retail use project. TDM will be facilitated by the nature and location of the proposed Project. The Site's proximity to workplaces, shopping, and transit will help reduce auto use by residents and visitors alike. The Proponent is committed to implementing a TDM program that supports the City's efforts to reduce dependency on the automobile by encouraging travelers to use alternatives to driving alone, especially during peak time periods, through the following TDM commitments listed below:

- Limited Parking: While 40 spaces of parking will be provided on-site, the intent is for this parking to continue to serve current users of the existing parking lot and not residents of the Project. Auto ownership among new Project residents is expected to be extremely low.
- Public Transportation:
  - Include language in new leases for the non-residential space to encourage tenants to promote public transportation and consider subsidizing employee use of public transit.
  - Provide orientation packets to new residents containing information on the available transportation choices, including transit routes and schedules.
- Bicycle Spaces: Secure bicycle storage will be made available to tenants and visitors to encourage bicycling as an alternative mode of transportation. In accordance with BTD guidelines, the Proponent will provide one secure/covered bicycle parking space for each residential unit. Bicycle racks, signs, and parking areas will conform to BTD standards and be sited in safe, secure locations.
- Provide electric vehicle charging stations to accommodate 25 percent of the total number of parking spaces and sufficient infrastructure capacity for future accommodations.
- Transportation Coordinator: The Proponent will designate a transportation coordinator to manage loading and service activities and provide alternative transportation materials to residents and all Project tenants.
- A Transportation Access Plan Agreement (TAPA) will be entered into between the Proponent and BTD. The TAPA will codify the specific measures and agreements between the Proponent and the City of Boston relative to the Project.

2.7 Evaluation of Short-term Construction Impacts

Please see Section 3.11.

Chapter 3.0

Environmental Review Component

3.0 ENVIRONMENTAL REVIEW COMPONENT

3.1 Wind

3.1.1 Introduction

Rowan Williams Davies & Irwin Inc. (RWDI) prepared a qualitative assessment of the potential pedestrian level wind impact of the proposed Project (see Figure 3.1-1). The qualitative assessment is based on the following:

- A review of the regional long-term wind data from Boston Logan International Airport;
- Design drawings and documents received by RWDI on July 3, 2019;
- Wind-tunnel studies undertaken by RWDI for similar projects in the Boston area;
- RWDI's engineering judgement and knowledge of wind flows around buildings[1][2][3]; and,
- Use of software developed by RWDI (*WindEstimator*[2]) for estimating the potential wind conditions around generalized building forms.

This qualitative approach provides a screening-level estimation of potential wind conditions. Conceptual wind control measures to improve wind comfort are recommended, if necessary.

3.1.2 Building and Site Information

The Project will consist of a six-story residential building, to be located at the northeast corner of the intersection of Harrison Avenue and Hudson Street in Boston. The Site is currently a parking lot on the south side of the four existing residential buildings A through D at Tai Tung Village (see Figure 3.1-1).

The 3D rendering of the Project looking northeast and the ground floor plan are shown in Figure 3.1-2 and Figure 3.1-3. The west portion of the ground floor includes the residential lobby, and non-residential space along Harrison Avenue, while the east portion is allocated to parking spaces (see the ground floor plan in Figure 3.1-3).

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[1] H. Wu and F. Kriksic (2012). "Designing for Pedestrian Comfort in Response to Local Climate", Journal of Wind Engineering and Industrial Aerodynamics, vol.104-106, pp.397-407.

[2] H. Wu, C.J. Williams, H.A. Baker and W.F. Waechter (2004), "Knowledge-based Desk-Top Analysis of Pedestrian Wind Conditions", ASCE Structure Congress 2004, Nashville, Tennessee.

[3] C.J. Williams, H. Wu, W.F. Waechter and H.A. Baker (1999), "Experience with Remedial Solutions to Control Pedestrian Wind Problems", 10th International Conference on Wind Engineering, Copenhagen, Denmark.

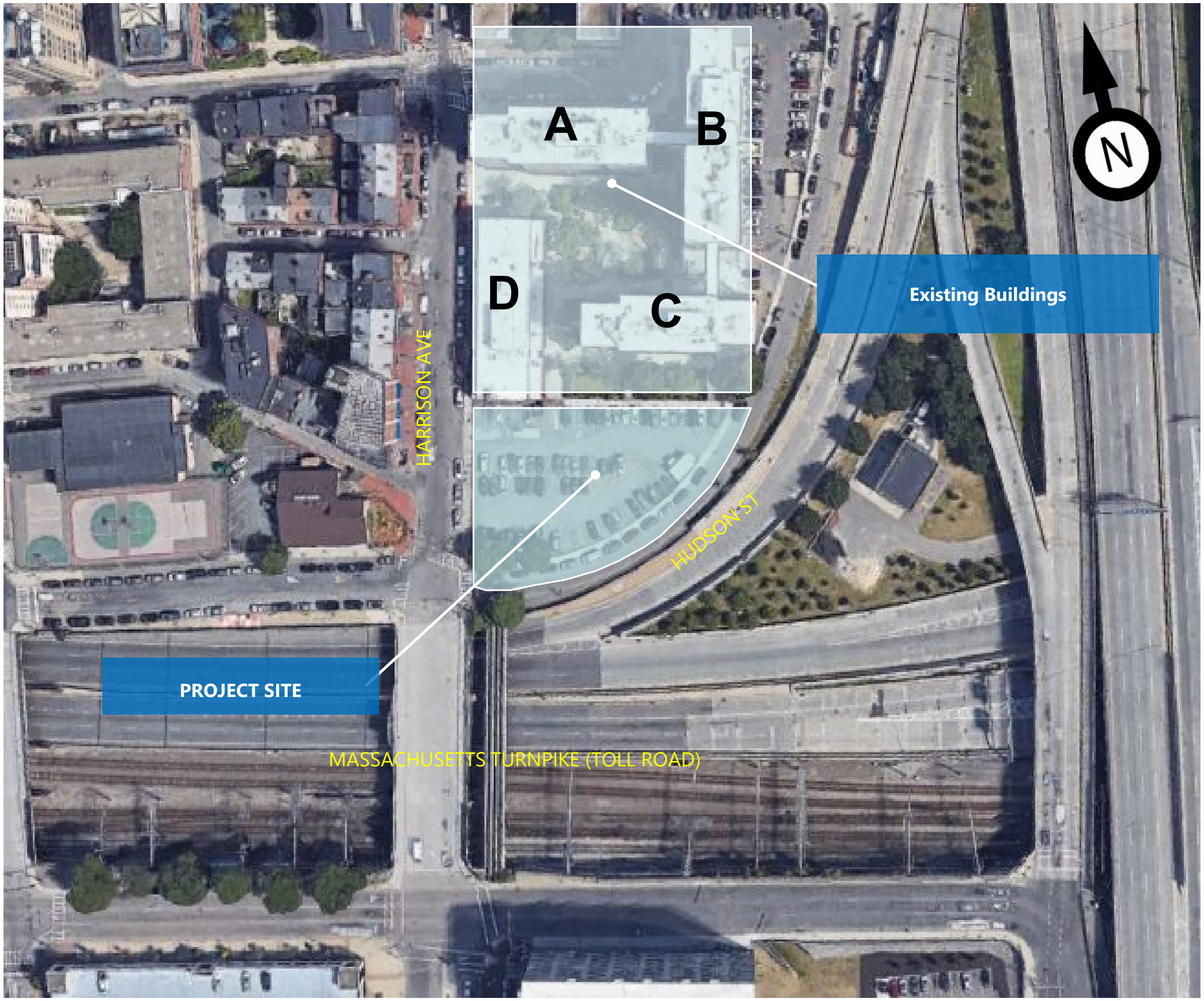

Figure 3.1-1

Aerial View of the Site and Surroundings

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Figure 3.1-2
Rendering of the Proposed Development Looking Northeast

Figure 3.1-3
Ground Floor Plan

The Site is immediately surrounded by mid to high-rise buildings to the northwest quadrant, Massachusetts Turnpike to the south and highways to the northeast and southeast quadrants. Away from the immediate surroundings, there are high-rise buildings of downtown Boston to the northeast and low to mid rise buildings in all other directions.

Pedestrian areas of interest include the main entrance to the building, non–residential entrances, public sidewalks along Harrison Avenue and Hudson Street, and pedestrian areas between the existing buildings and the Project.

3.1.3 Local Wind Data

Wind statistics at Boston Logan International Airport between 1995 and 2017 were analyzed for the four seasons and for the annual period. Figure 3.1-4 graphically depicts the distributions of wind frequency and directionality. When all winds are considered (regardless of speed), winds from the northwest and southwest quadrants are predominant. Northeasterly winds are also relatively more frequent in the spring.

Strong winds with mean speeds greater than 20 mph (red bands in the wind roses) are prevalent from the west-northwest direction throughout the year, while the strong winds from the southwest and northeast are also common. These are critical wind directions focused on in the following discussions.

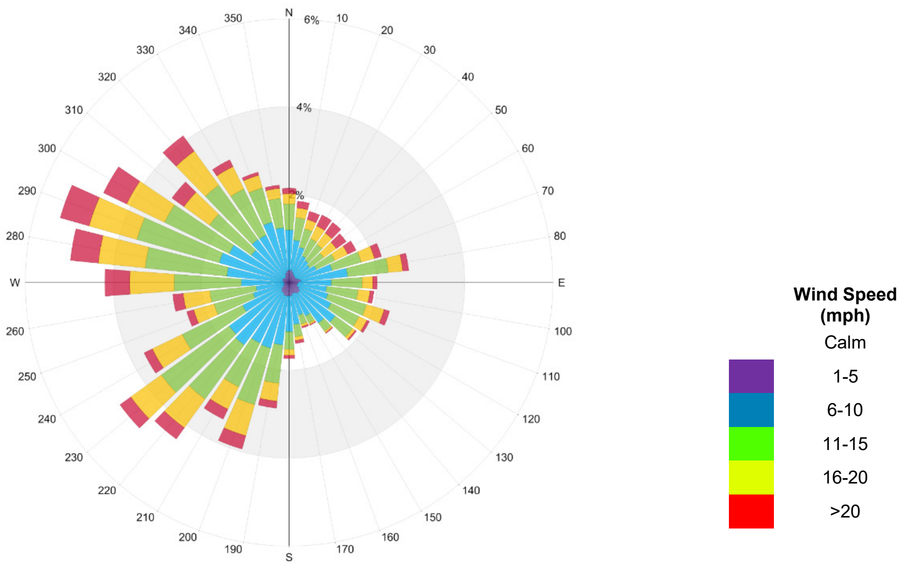
3.1.4 Pedestrian Wind Criteria

The Boston Planning & Development Agency (BPDA) has adopted two standards for assessing the relative wind comfort of pedestrians.

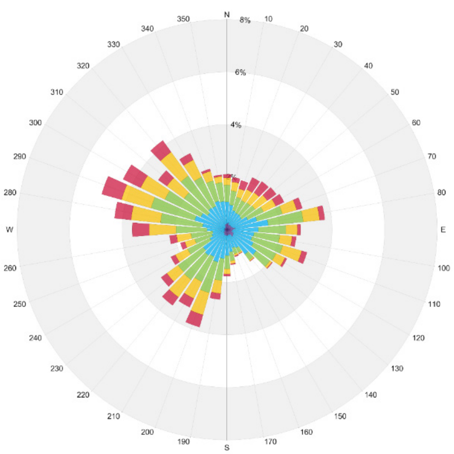
First, the BPDA wind design guidance criterion states that an effective gust velocity (hourly-mean wind speed + 1.5 times the root mean square wind speed) of 31 mph should not be exceeded more than one percent (1%) of the time. This criterion is hereby referred to as the “effective gust criterion.”

The second set of criteria used by the BPDA to determine the acceptability of specific locations is based on the work of Melbourne[4]. This set of criteria (hereby referred to as the “mean wind speed criteria”) are used to determine the relative level of pedestrian wind comfort for activities such as sitting, standing and walking. The criteria are expressed in terms of benchmarks for the 1-hour mean wind speed exceeded 1% of the time (i.e., the 99-percentile mean wind speed). They are as follows:

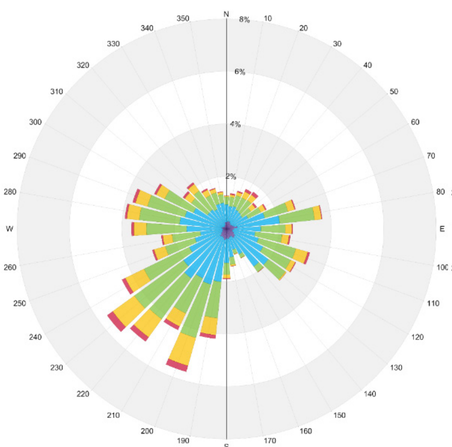
[4] Melbourne, W.H., 1978, "Criteria for Environmental Wind Conditions", Journal of Industrial Aerodynamics, 3 (1978) 241 - 249.



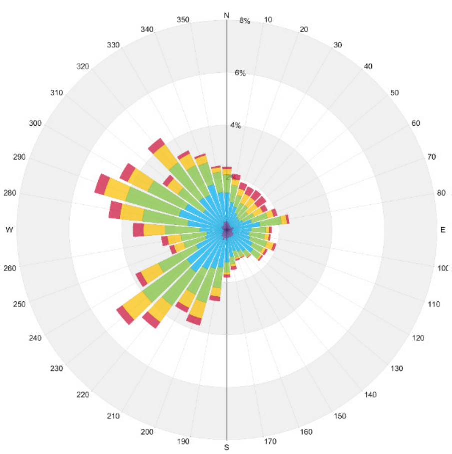
Annual Winds



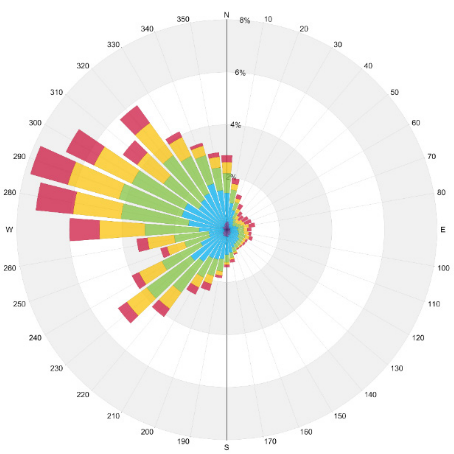
Spring (March to May)



Summer (June to August)



Fall (September to November)



Winter (December to February)

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Figure 3.1-4

Directional Distribution of Winds Approaching Boston Logan International Airport (1995 to 2017)

Table 3.1-1 BPDA Mean Wind Criteria*

Comfort Category	Mean Wind Speed (mph)
Dangerous	> 27
Uncomfortable for Walking	> 19 and < 27
Comfortable for Walking	> 15 and < 19
Comfortable for Standing	> 12 and < 15
Comfortable for Sitting	< 12

*Applicable to the mean wind speed exceeded on percent (1%) of the time.

Pedestrians on walkways and parking lots will be active and wind speeds comfortable for walking are appropriate at these locations. Lower wind speeds comfortable for standing are desired for building entrances where people are apt to linger. For any outdoor seating areas, at and above ground, low wind speeds comfortable for sitting are desired in the summer months when such amenity spaces are typically in use.

The following discussion on pedestrian wind conditions is based on the annual wind climate. Typically, the summer and fall winds tend to be more comfortable than the annual winds while the winter and spring winds are less comfortable than the annual winds.

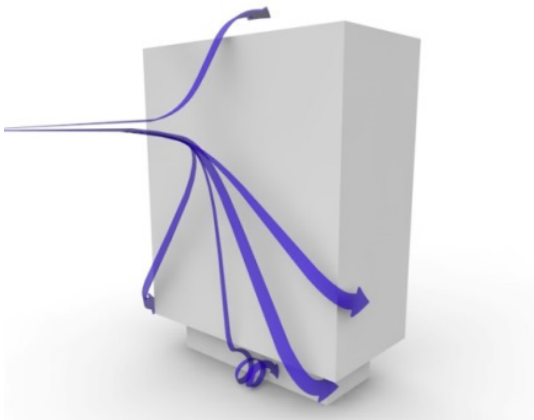
3.1.5 Pedestrian Wind Conditions

3.1.5.1 Background

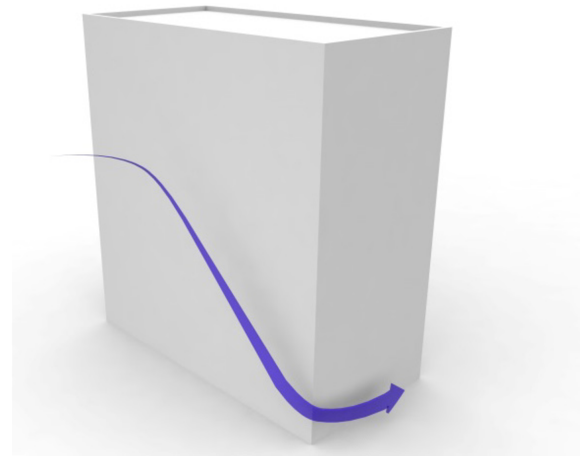
Predicting wind speeds and occurrence frequencies is complicated. It involves building geometry, orientation, position and height of surrounding buildings, upstream terrain and the local wind climate. Over the years, RWDI has conducted thousands of wind-tunnel model studies regarding pedestrian wind conditions around buildings, yielding a broad knowledge base. This knowledge has been incorporated into RWDI's proprietary software that allows, in many situations, for a qualitative, screening-level numerical estimation of pedestrian wind conditions without wind tunnel testing.

The Project is exposed to the southwesterly winds, while the mid to high-rise terrain to the northwest protects the Project from prevailing northwesterly winds.

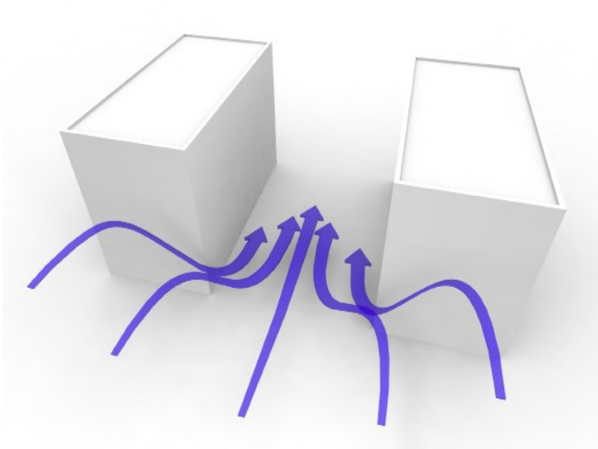
Tall buildings tend to intercept the stronger winds at higher elevations and redirect them to the ground level. Such a Downwashing Flow (see Image a in Figure 3.1-5) is the main cause for increased wind activity around tall buildings at the pedestrian level, especially at building corners (see Image b in Figure 3.1-5). The downwashed winds may also channel between side-by-side buildings and create windy areas along the narrow gap (Image c in Figure 3.1-5). If these building/wind combinations occur for prevailing winds, there is a greater potential for increased wind activity.



(a) Downwashing



(b) Corner Acceleration



(c) Channeling

Figure 3.1-5

General Wind Flow Patterns

3.1.5.2 No-Build Scenario

The wind environment for the existing site conditions is expected to comply with both the mean wind speed and effective gust criteria, given the open site conditions and also the sheltering provided by the surrounding buildings to the northwest quadrant.

3.1.5.3 Build Scenario

Since the Project is not taller than most of its surrounding buildings, wind conditions are not expected to be significantly affected by the addition of the Project. However, the exposure to southwesterly winds and the localized wind flows impacted by the new building may result in some areas of elevated wind speeds.

In Figure 3.1-6, the annual wind rose is shown relative to the proposed Site conditions. Detailed discussions on the potential wind comfort conditions at key pedestrian areas are provided in the following sections.

The effective gust criterion is expected to be met within the full study area.

Sidewalks

Calmer wind speeds comfortable for walking or better are predicted to continue for the public sidewalks along Hudson Street and Harrison Avenue. Elevated wind speeds, potentially uncomfortable for walking are expected around the northwest, southwest and southeast corners. The wind conditions are expected to generally be comfortable for walking in the summer and fall when pedestrian activity is greatest. The exposure to winds from southwest through northwest is expected to result in the downwashing and subsequent acceleration of these winds around the southwest and southeast building corners. The channeling of northwesterly winds between the Project and the existing Building D is also expected to cause elevated wind speeds around the northwest corner. Wind conditions are expected to generally be comfortable for walking in the summer and fall when pedestrian activity is greatest. The elevated conditions are mostly expected to occur in the winter and spring when wind speeds are higher.

The predicted flow patterns and wind speeds on the sidewalks are graphically illustrated in Figure 3.1-7. With appropriate mitigation as discussed below, wind speeds are expected to be comfortable for walking.

Entrances

The main entrance to the Project is located on the west side (marked by a green triangle in Figure 3.1-8). Wind speeds at this location are expected to be suitable for the intended use throughout the year. The recessed design of the main entrance is a positive consideration; additionally, this entrance is equipped with a vestibule that provides an area for pedestrians to take shelter at on windy days. These features are helpful from the pedestrian wind perspective.

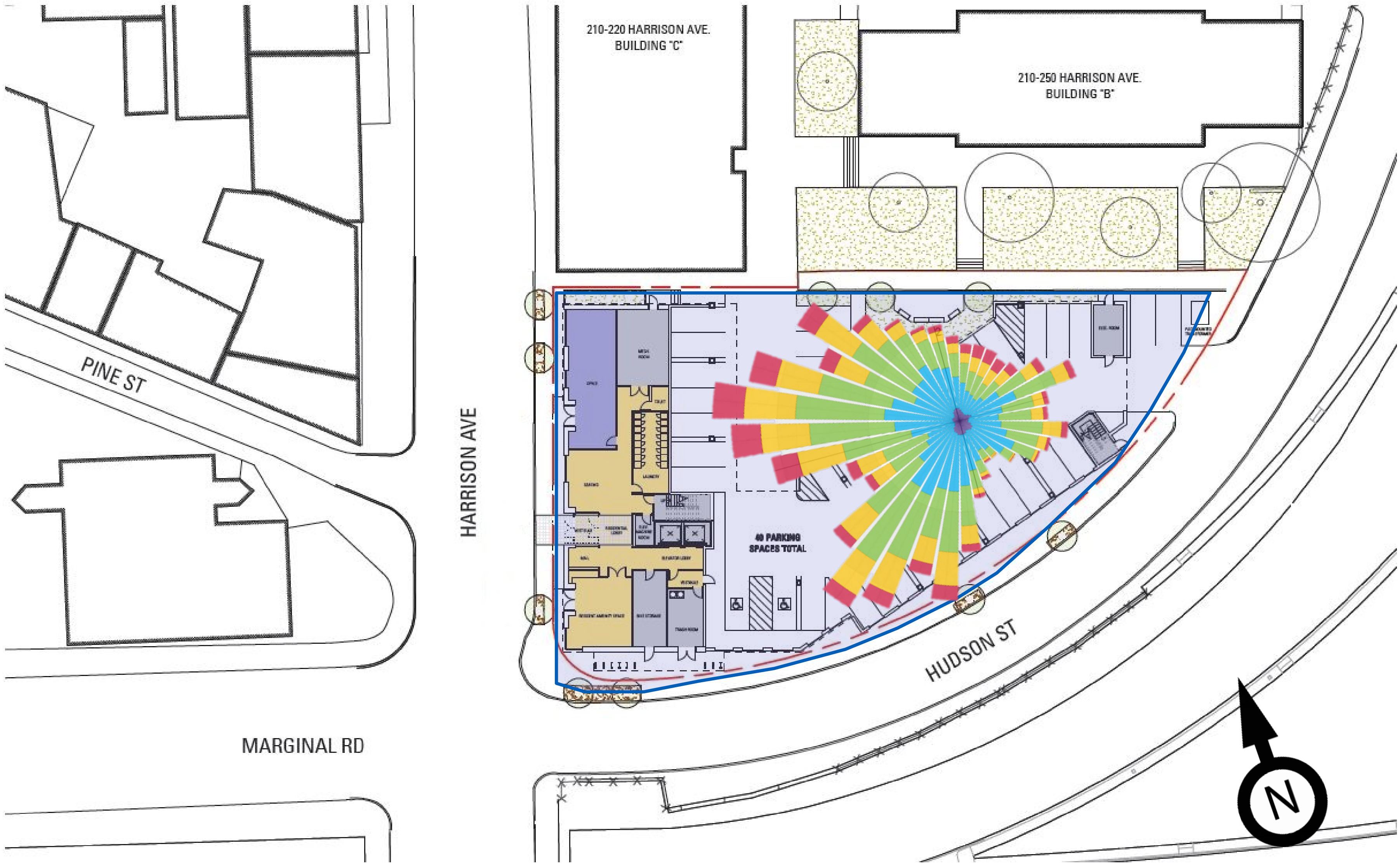


Figure 3.1-6

Exposure of the Site to Annual Winds

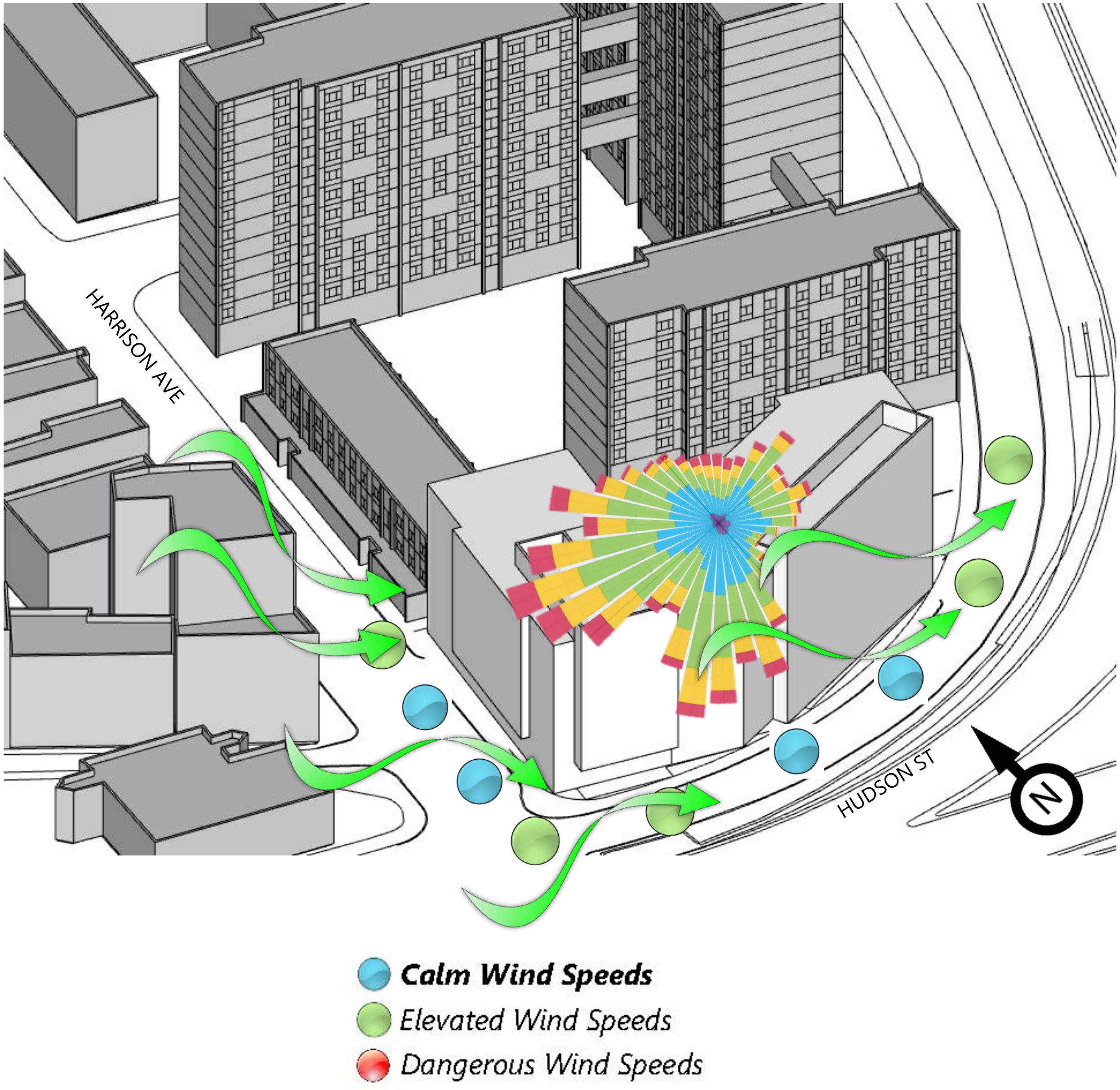


Figure 3.1-7

Wind Conditions on the Sidewalks

Figure 3.1-8

Grade Level Entrance Locations

There is a non-residential space at the southwest corner of the ground level. The entrance to this space is situated along Harrison Avenue (marked by blue triangle in Figure 3.1-8) and is also recessed from the façade. Suitable wind conditions are predicted at this entrance location all year round.

The entrance to the northwest non-residential space (marked by a red triangle in Figure 3.1-8) is also recessed. Wind speeds appropriate for the intended use of the area are expected at this location throughout the year.

Pedestrian Areas to the North

In general, wind conditions at the existing courtyard (between the Project and the existing Building C) are expected to improve after the addition of the Project. This is primarily due to the sheltering from the southwesterly winds to be provided by the Project. Calm wind speeds comfortable for sitting/standing are expected at the courtyard. Similar conditions are predicted for the parking area of the new building.

Channeling of northwesterly winds between the Project and Building D to its north are expected to create higher wind speeds potentially uncomfortable for walking along the narrow gap between the two buildings (see Figure 3.1-9). It should be noted that this narrow gap represents a back alley which is not expected to be used frequently by pedestrians. Thus, slightly higher wind speeds might be considered acceptable.

Downwashing is predicted to occur off the north façade toward the east end of the Project causing higher wind speeds (see Figure 3.1-9).

3.1.6 Conceptual Wind Control Measures

In order to deflect the downwashed winds and prevent them from reaching the ground level, especially near the southwest corner, potential wind mitigation solutions in the form of coniferous/marcescent landscaping close to the building corners, corner canopy, or porous wind screens will be considered by the Proponent as the design of the Project continues to progress.

3.1.7 Summary

This qualitative wind assessment for the Project is based on the current design drawings, existing surroundings, local wind data, and RWDI's experience with similar projects in the Boston area.

In general, appropriate wind conditions are expected for the sidewalks, main building entrance, grade-level non-residential entrances, and the green space to the north. Higher wind speeds are predicted at the sidewalks at the corners of the building. With implementation of suitable wind control measures, desirable wind conditions can be achieved throughout the Site.

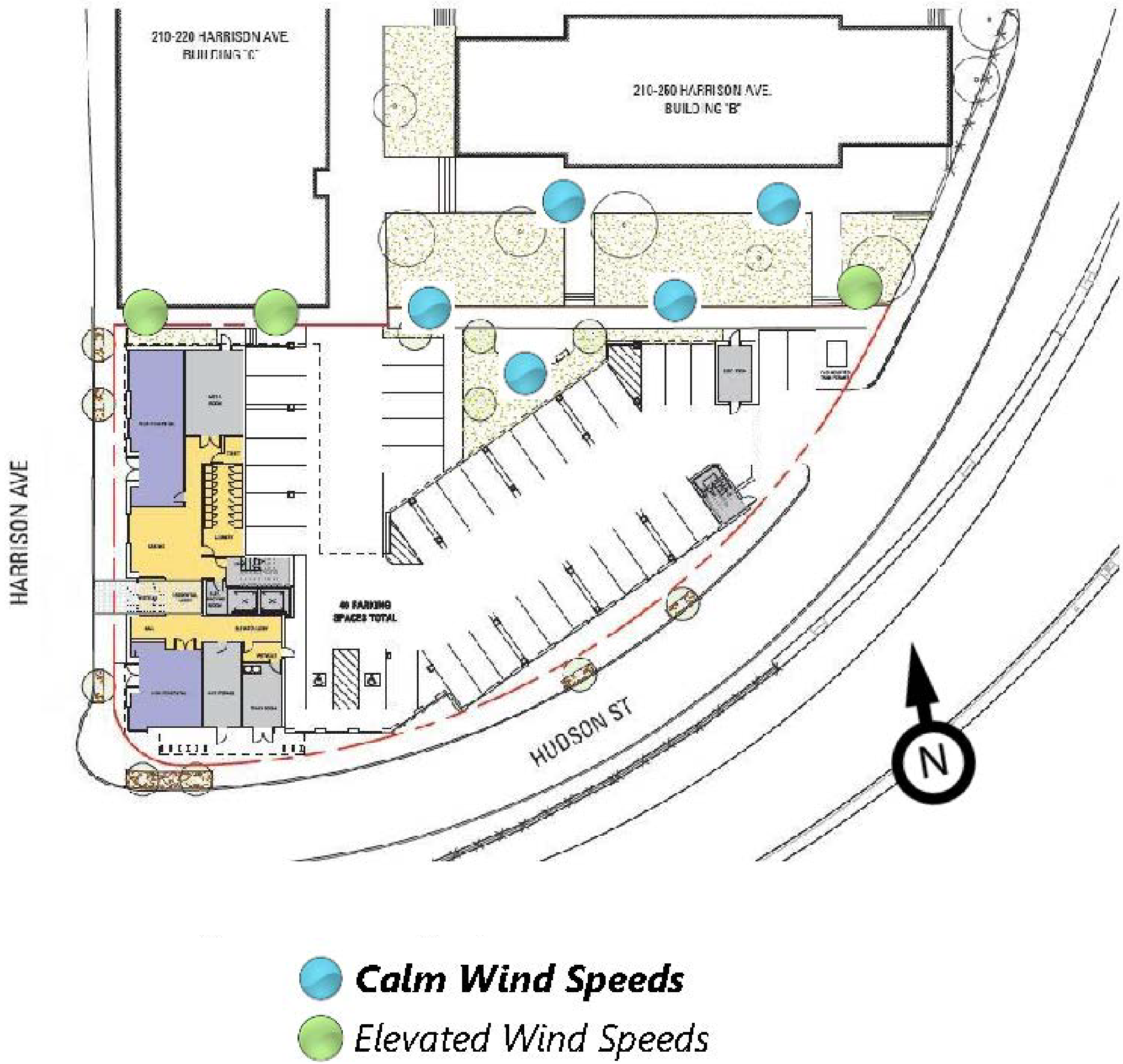


Figure 3.1-9

Grade Level Amenity Spaces

3.2 Shadow

3.2.1 Introduction and Methodology

As typically required by the BPDA, a shadow impact analysis was conducted to investigate shadow impacts from the Project during three time periods (9:00 a.m., 12:00 noon, and 3:00 p.m.) during the vernal equinox (March 21), summer solstice (June 21), autumnal equinox (September 21), and winter solstice (December 21). In addition, shadow studies were conducted for the 6:00 p.m. time period during the summer solstice and autumnal equinox.

The shadow analysis presents the existing shadow and new shadow that would be created by the proposed Project, illustrating the incremental impact of the Project. The analysis focuses on nearby open spaces, sidewalks and bus stops adjacent to and in the vicinity of the Site. Figures showing the net new shadow from the Project are provided in Figures 3.2-1 to 3.2-14 at the end of this section.

During the fourteen time periods studied, no new shadow from the Project will be cast onto open spaces in the vicinity of the Site. There are no bus stops located in the study area included for the shadow impact analysis.

3.2.2 Vernal Equinox (March 21)

No new shadow will be cast onto nearby open spaces during the time periods studied.

At 9:00 a.m. during the vernal equinox, shadow from the Project will be cast to the northwest onto Harrison Avenue and its sidewalks and onto Pine Street and its sidewalks.

At 12:00 p.m., shadow from the Project will be cast to the north onto a sliver of Harrison Avenue and its eastern sidewalk.

At 3:00 p.m., shadow from the Project will be cast to the northeast onto a sliver of Hudson Street and its northern sidewalk.

3.2.3 Summer Solstice (June 21)

No new shadow will be cast onto nearby open spaces during the time periods studied.

At 9:00 a.m. during the summer solstice, shadow from the Project will be cast to the west onto Harrison Avenue and its sidewalks.

At 12:00 p.m., shadow from the Project is minimal and will be cast to the north onto a sliver of Harrison Avenue's eastern sidewalk.

At 3:00 p.m., shadow from the Project will be cast to the east onto Hudson Street and its northern sidewalk.

At 6:00 p.m., most of the surrounding area is under existing shadow. Shadow from the Project will be cast to the southeast onto Hudson Street and its sidewalks.

3.2.4 Autumnal Equinox (September 21)

No new shadow will be cast onto nearby open spaces during the time periods studied.

At 9:00 a.m., shadow from the Project will be cast to the northwest onto Pine Street and its sidewalks and onto Harrison Avenue and its sidewalks.

At 12:00 p.m., shadow from the Project will be cast to the north onto a sliver of Harrison Avenue and its eastern sidewalk.

At 3:00 p.m., shadow from the Project will be cast to the northeast onto a sliver of Hudson Street and its northern sidewalk.

At 6:00 p.m., most of the surrounding area is under existing shadow. New shadow will be cast onto a sliver of Hudson Street.

3.2.5 Winter Solstice (December 21)

The winter solstice creates the least favorable conditions for sunlight in New England. The sun angle during the winter is lower than in any other season, causing the shadows in urban areas to elongate and be cast onto large portions of the surrounding area.

No new shadow will be cast onto nearby open spaces during the time periods studied.

At 9:00 a.m., shadow from the Project will be cast to the northwest onto Pine Street and its sidewalks and onto Harrison Avenue and its sidewalks.

At 12:00 p.m., shadow from the Project will be cast to the north onto Harrison Avenue and its sidewalks and onto a small portion of Johnny Court and its southern sidewalk.

At 3:00 p.m., most of the surrounding area is under existing shadow. No new shadow will be cast onto nearby streets and sidewalks.

3.2.6 Conclusions

The shadow impact analysis looked at net new shadow created by the Project during 14 time periods and shows that new shadow from the Project will be limited to the streets and sidewalks adjacent to the Project site. No new shadow from the Project will be cast onto open spaces in the vicinity of the Project site. Additionally, there are no bus stops located in the study area for the shadow impact analysis; no new shadow will be cast onto nearby bus stops.

Figure 3.2-1

Shadow Study, March 21, 9:00 a.m.

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Bruner/Cott ARCHITECTS

Figure 3.2-2

Shadow Study, March 21, 12:00 p.m.

Figure 3.2-3

Shadow Study, March 21, 3:00 p.m.

Figure 3.2-4

Shadow Study, June 21, 9:00 a.m.

Figure 3.2-5

Shadow Study, June 21, 12:00 p.m.

Figure 3.2-6

Shadow Study, June 21, 3:00 p.m.

Figure 3.2-7

Shadow Study, June 21, 6:00 p.m.

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Figure 3.2-8

Shadow Study, September 21, 9:00 a.m.

Figure 3.2-9

Shadow Study, September 21, 12:00 p.m.

Figure 3.2-10

Shadow Study, September 21, 3:00 p.m.

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Bruner/Cott
ARCHITECTS

Figure 3.2-11

Shadow Study, September 21, 6:00 p.m.

Figure 3.2-12

Shadow Study, December 21, 9:00 a.m.

Figure 3.2-13

Shadow Study, December 21, 12:00 p.m.

Figure 3.2-14

Shadow Study, December 21, 3:00 p.m.

3.3 Daylight Analysis

3.3.1 Introduction

The purpose of the daylight analysis is to estimate the extent to which a proposed project will affect the amount of daylight reaching the streets and the sidewalks in the immediate vicinity of a project site. Because the Site currently consists of surface parking, the Project will inherently increase daylight obstruction compared to the existing condition. However, the resulting conditions will be similar or lower than the daylight obstruction values within the surrounding area and typical of densely built urban areas

3.3.2 Methodology

The daylight analysis was performed using the Boston Redevelopment Authority Daylight Analysis (BRADA) computer program[5]. This program measures the percentage of sky-dome that is obstructed by a project and is a useful tool in evaluating the net change in obstruction from existing to build conditions at a specific site.

Using BRADA, a silhouette view of the building is taken at ground level from the middle of the adjacent city streets or pedestrian ways centered on the proposed building. The façade of the building facing the viewpoint, including heights, setbacks, corners and other features, is plotted onto a base map using lateral and elevation angles. The two-dimensional base map generated by BRADA represents a figure of the building in the "sky dome" from the viewpoint chosen. The BRADA program calculates the percentage of daylight that will be obstructed on a scale of 0 to 100 percent based on the width of the view, the distance between the viewpoint and the building, and the massing and setbacks incorporated into the design of the building; the lower the number, the lower the percentage of obstruction of daylight from any given viewpoint.

Since the Site currently contains surface parking, the analysis compares the proposed conditions to the context of the area.

Three viewpoints were chosen to evaluate the daylight obstruction for the proposed conditions, one from Harrison Avenue and two from Hudson Street. Three area context points were considered in order to provide a basis of comparison to existing conditions in the surrounding area. The viewpoints and area context viewpoints were taken in the following locations and are shown on Figure 3.3-1.

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[5] Method developed by Harvey Bryan and Susan Stuebing, computer program developed by Ronald Fergle, Massachusetts Institute of Technology, Cambridge, MA, September 1984.

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Figure 3.3-1
Viewpoint Locations

- **Viewpoint 1:** View from the center of Harrison Avenue facing east toward the Site.
- **Viewpoint 2:** View from the center of Hudson Street facing north toward the Site.
- **Viewpoint 3:** View from the center of Hudson Street facing northwest toward the Site.
- **Area Context Viewpoint AC1:** View from the center of Washington Street facing east toward 888 Washington Street.
- **Area Context Viewpoint AC2:** View from the center of Harrison Avenue facing west toward 231 Harrison Avenue.
- **Area Context Viewpoint AC3:** View from the center of Harrison Avenue facing east toward 150 Harrison Avenue.

3.3.3 Results

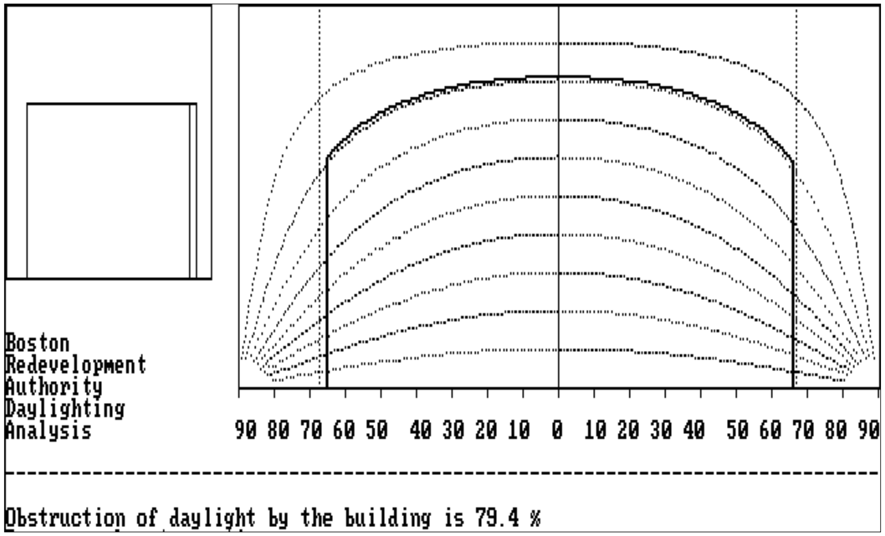
The results for each viewpoint are described in Table 3.3-1. Figures 3.3-2 and 3.3-3 illustrate the BRADA results for each analysis.

Table 3.3-1 Daylight Analysis Results

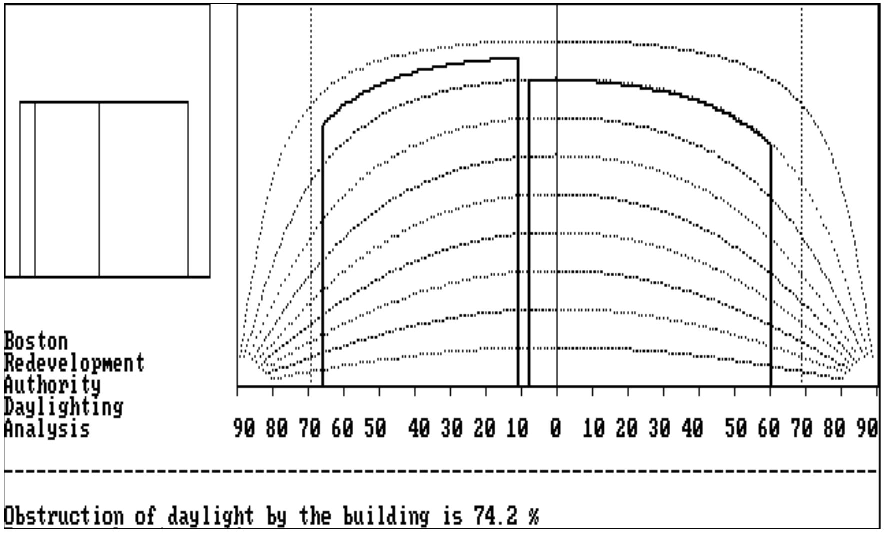
Viewpoint Locations		Existing Conditions	Proposed Conditions
Viewpoint 1	View from the center of Harrison Avenue facing east toward the Project site.	0%	79.4%
Viewpoint 2	View from the center Hudson Street facing north toward the Project site.	0%	74.2%
Viewpoint 3	View from the center of Hudson Street facing northwest toward the Project site.	0%	71.2%
Area Context Points			
AC1	View from the center of Washington Street facing east toward 888 Washington Street.	70.4%	N/A
AC2	View from the center of Harrison Avenue facing west toward 231 Harrison Avenue.	69.2%	N/A
AC3	View from the center of Harrison Avenue facing east toward 150 Harrison Avenue.	90.1%	N/A

Harrison Avenue – Viewpoint 1

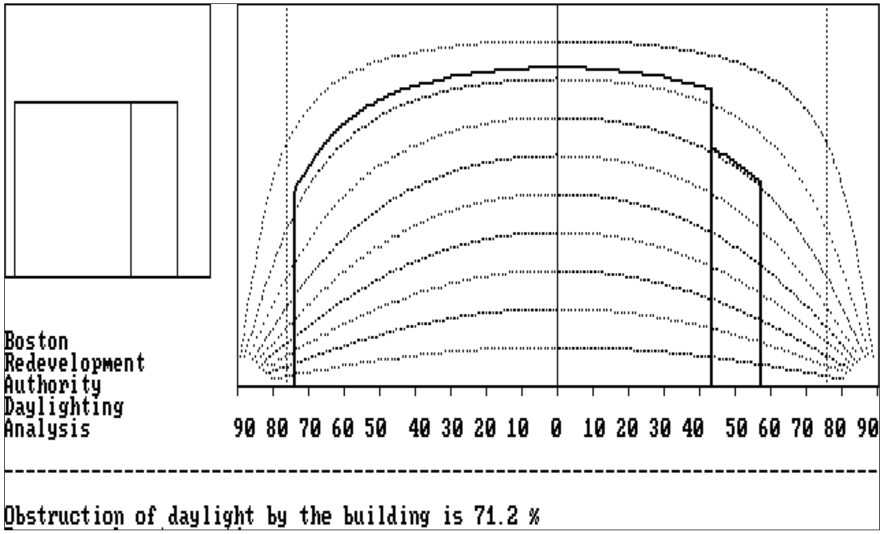
Harrison Avenue runs along the western edge of the Site. Viewpoint 1 was taken from the center of Harrison Avenue facing east toward the Site. The development of the Project will increase the daylight obstruction value to 79.4%. The daylight obstruction value is typical of urban settings, including the Area Context buildings.



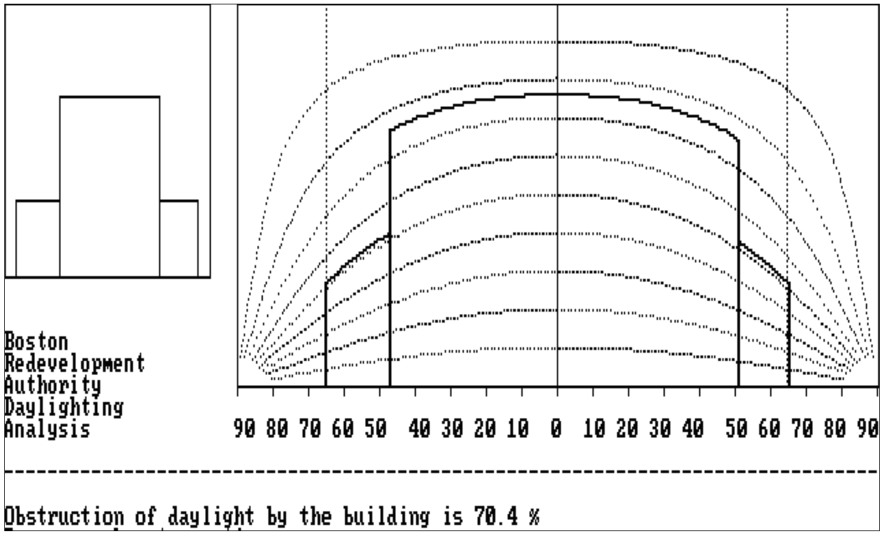
Viewpoint 1: View from Harrison Avenue facing east toward the Project site



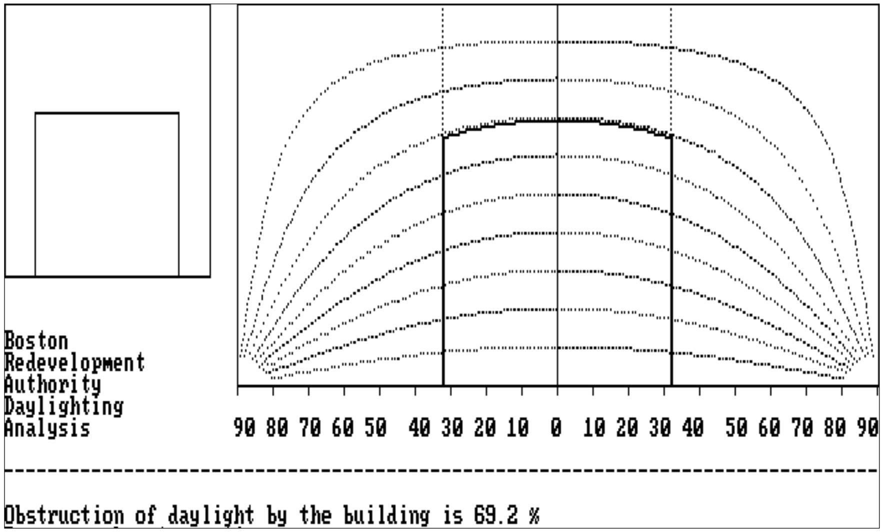
Viewpoint 2: View from Hudson Street facing north toward the Project site



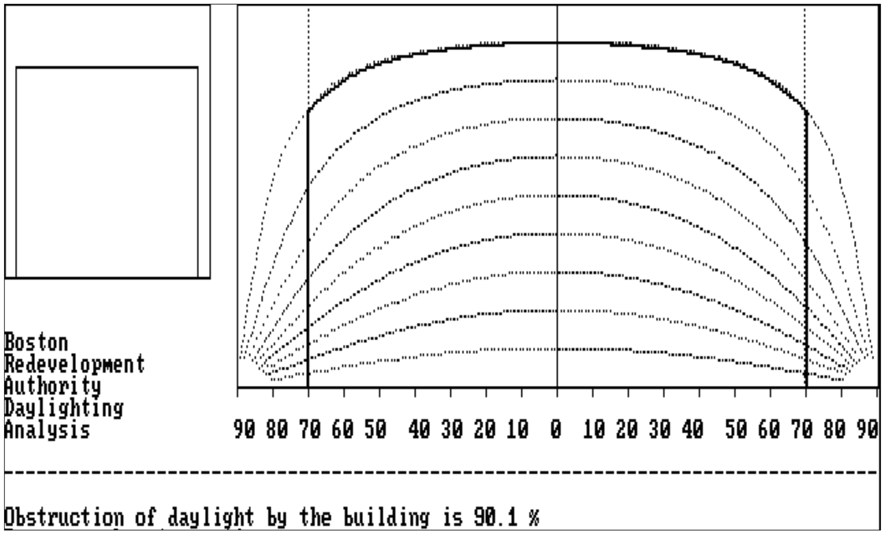
Viewpoint 3: View from Hudson Street facing northwest toward the Project site



AC1: View from Washington Street facing east toward 888 Washington Street



AC2: View from Harrison Avenue facing west toward 231 Harrison Avenue



AC3: View from Harrison Avenue facing east toward 150 Harrison Avenue

Hudson Street – Viewpoint 2 and Viewpoint 3

Hudson Street runs along the southern and southeastern edges of the Site. Viewpoints 2 and 3 were taken from the center of Hudson Street facing north toward the Site for Viewpoint 2, and northwest toward the Site for Viewpoint 3. The development of the Project will increase the daylight obstruction values to 74.2% for Viewpoint 2 and 71.2% for Viewpoint 3. The daylight obstruction values are consistent with other buildings in the area, including the Area Context buildings.

Area Context

The Project area consists primarily of mid- to high-rise commercial, institutional and residential buildings. To provide a larger context for comparison of daylight conditions, obstruction values were calculated for the three Area Context viewpoints described above and shown on Figure 3.3-1. The daylight obstruction values ranged from 69.2% for AC2 to 90.1% for AC3. Daylight obstruction values for the Project are consistent with or lower than the Area Context values.

3.3.4 Conclusions

The daylight analysis conducted for the Project describes proposed daylight obstruction conditions at the Site and existing conditions in the surrounding area. The results of the BRADA analysis indicate that although the Project will result in increased daylight obstruction over existing conditions, the resulting conditions will be similar or lower than the daylight obstruction values within the surrounding area. The increased daylight obstruction is a result of developing on a site that is currently used as a surface parking lot.

3.4 Solar Glare

It is not anticipated that the 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 from the Project.

3.5 Air Quality Analysis

The BPDA requires that project-induced impacts to ambient air quality be addressed. A microscale analysis is used to determine the effect on air quality of the increase in traffic generated by the Project. This microscale analysis may be required for a project at intersections where 1) project traffic would impact intersections or roadway links currently operating at Level of Service (LOS) D, E, or F or would cause LOS to decline to D, E, or F; 2) project traffic would increase traffic volumes on nearby roadways by 10% or more (unless the increase in traffic volume is less than 100 vehicles per hour); or, 3) the project will generate 3,000 or more new average daily trips (ADT) on roadways providing access to a single location.

The proposed Project does not generate 3,000 ADT, nor does it increase traffic volumes by 10 percent or 100 vehicles per hour. As discussed in Chapter 2, all intersections studied will continue to operate at the same LOS as under the No Build conditions during both the a.m. and p.m. peak hours. Therefore, no quantitative analysis is required. Given the generally well-operating intersections, and the small increases in volume at the worst intersections, it is expected that there would be no violations of the NAAQS for CO at any intersections associated with Project-related traffic.

3.6 Stormwater/Water Quality

Please see Section 8.4.

3.7 Flood Hazard Zones/ Wetlands

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for the site located in the City of Boston - Community Panel Number 25025C0077J (2016) indicates the FEMA Flood Zone Designations for the site area. The map shows that the Project is located in a Zone X, "Areas determined to be outside the 0.2% annual chance floodplain."

The site does not contain wetlands.

3.8 Geotechnical Impacts

3.8.1 Subsurface Soil and Bedrock Conditions

In general, the Site is underlain by an approximate 8.5 to 12-foot thickness of granular fill which generally consists a compact to very dense, dark brown to black, sand and gravel, with trace to some silt varying to a well-graded mixture of silt, sand, and gravel also containing variable amounts of asphalt, concrete, and brick.

Underlying the granular fill material is a natural organic deposit representative of the original bottom of South Cove prior to landfilling. The organic deposit was typically observed to be about 6 to 11 feet in thickness and consist of very soft to firm, black to brown organic silt with trace sand, containing frequent peat fibers and occasional shells extending to depths ranging from about 17 to 20 feet below the existing ground surface, corresponding to about Elevation +1.3 to Elevation -1.2.

Underlying the natural organic deposit is an extensive marine clay deposit consisting of soft to stiff silty clay extending to depths ranging from about 65 to 84.5 feet below the existing ground surface. The marine clay deposit was observed to have a stiff to very stiff over consolidated upper crust which is generally considered to be the result of desiccation during a period of significantly lower ocean levels in the geologic past.

Within the upper 5-foot thickness of the deposit, the consistency of the silty clay decreases from very stiff to firm and the lower portion of the marine clay deposit generally consists of a firm to soft, normally consolidated, silty clay. The total thickness of the marine clay deposit was observed to range from 46 to 67.5 feet.

Beneath the marine clay deposit is a glacial till deposit at depths between 65 and 84.5 feet below the ground surface, corresponding to Elevation -50.3 and Elevation -66.5, respectively. The glacial till deposit was observed to consist of a very dense gravel with some silt and trace sand varying to a sand and gravel with trace to some silt.

3.8.2 Groundwater

Stabilized groundwater levels are anticipated to range from depths of 8.2 to 12 feet below ground surface, corresponding to Elevation +10 to Elevation +8.3. The groundwater level at the Site may vary due to factors such as normal seasonal changes, runoff particularly during or following periods of heavy precipitation, and alterations of existing drainage patterns.

The Site is located within the Groundwater Conservation Overlay District (GCOD) and accordingly, the Project will comply with requirements of Article 32 of the City of Boston Zoning Code. The Project will promote infiltration of stormwater into the ground by capturing within a suitably designed system, a volume of rainfall equivalent to no less than 1-inch across the impervious portion of the site. The Project is not expected to have any negative impact on groundwater levels in the surrounding area.

3.8.3 Project Impacts and Foundation Consideration

Based on the results of the subsurface explorations, the surface of the marine clay deposit is anticipated to be located at depths of approximately 17 to 20 feet below the existing ground surface. Foundation support for the Project recommended to be provided by spread footing foundations in conjunction with slab-on-grade construction. The footings and slabs should bear on the existing fill soil that has been improved utilizing Rigid Inclusions (RIs), a ground improvement method. The foundation methodology for the Project will be developed as the design progresses.

3.8.4 Monitoring Program

Due to the Project location and proximity to surrounding buildings, a monitoring program will be developed and implemented prior to the start of construction. Prior to implementation of the monitoring program, performance criteria will be established to protect adjacent structures and included in the contract documents. Construction activities will be required to comply with the established criteria based on the data collected from the monitoring.

3.9 Solid and Hazardous Waste

3.9.1 Hazardous Waste

A Phase II Environmental Site Assessment was performed for the Site by McPhail Associates, LLC to assess the potential presence of hazardous materials at the Site. A subsurface exploration program consisting of chemical testing of soil and groundwater at the Site did not find evidence that Recognized Environmental Conditions have impacted the Site.

Any excess soils generated as a result of the planned construction will be managed, transported and disposed of in accordance with applicable regulations, including the Massachusetts Contingency Plan (MCP). A soil management plan will be developed and included in the contract documents defining requirements for execution of the work.

3.9.2 Solid and Hazardous Waste Generation from Project Operations

The Project will generate solid waste typical of residential and retail uses. Solid waste is expected to include wastepaper, cardboard, glass bottles and food. Recyclable materials will be recycled through a program implemented by the property manager. The Project is expected to generate approximately 136 tons of solid waste per year.

With the exception of household hazardous wastes typical of residential developments (e.g., cleaning fluids and paint), the Project will not involve the generation, use, transportation, storage, release, or disposal of potentially hazardous materials.

3.9.3 Recycling

A dedicated recyclables storage and collection program will facilitate the reduction of waste generated by building occupants and non-residential tenants that is hauled to and disposed of in landfills. Each residential floor will have a trash chute and a recycling chute. A tenant education program will be implemented to ensure that community members understand the benefits of recycling and how to recycle appropriately.

3.10 Noise Impacts

3.10.1 Introduction

A sound level assessment was conducted that included a baseline sound monitoring program to measure existing sound levels in the vicinity of the Project, computer modeling to predict operational sound levels from the Project's proposed mechanical equipment, and a comparison of future Project sound levels to applicable City of Boston Zoning District Noise Standards.

This analysis, which is consistent with BPDA requirements for noise studies, indicates that with appropriate noise controls, predicted sound levels from the Project will comply with local noise regulations.

3.10.2 Noise Terminology

There are several ways in which sound (noise) levels are measured and quantified. All of them use the logarithmic decibel (dB) scale. The following information defines the sound level measurement terminology used in this analysis.

The decibel scale is logarithmic to accommodate the wide range of sound intensities observed in the environment. A property of the decibel scale is that the sound pressure levels of two or more separate sounds are not directly additive. For example, if a sound of 50 dB is added to another sound of 50 dB, the total is only a three-dB increase (53 dB), which is equal to doubling in sound energy but not equal to a doubling in quantity (100 dB). Thus, every three-dB change in sound level represents a doubling or halving of sound energy. Relative to this characteristic, a change in sound levels of less than three dB is imperceptible to the human ear.

Another property of decibels is that if one source of noise is 10 dB (or more) louder than another source, then the total combined sound level is simply that of the higher-level source (i.e., the quieter source contributes negligibly to the overall sound level). For example, a sound source at 60 dB plus another sound source at 47 dB is equal to 60 dB.

A sound level meter (SLM) that is used to measure noise is a standardized instrument.[6] It contains "weighting networks" to adjust the frequency response of the instrument to approximate that of the human ear under various circumstances. The most commonly used weighting network is the A-weighting (there are also C-, and Z-weighting networks) because it most closely approximates how the human ear responds to sound at various frequencies, described in Hertz (Hz). The A-weighting network is the accepted scale used for community sound level measurements, and sounds are frequently reported as detected with a sound level meter with this weighting. A-weighted sound levels emphasize middle frequency sounds (i.e., middle pitched – around 1,000 Hz), and de-emphasize low and high frequency sounds. A-weighted sound levels are reported in decibels designated as "dBA".

Because the sounds in the environment vary with time, many different sound metrics may be used to quantify them. There are two typical methods used for describing variable sounds. These are exceedance levels and equivalent levels, both of which are derived from a large number of moment-to-moment A-weighted sound pressure level measurements. Exceedance levels are values from the cumulative amplitude distribution of all of the sound levels observed during a measurement period. Exceedance levels are designated L_n, where "n" can have a value between 0 and 100 in terms of percentage. Equivalent levels are designated L_{eq} and quantify a hypothetical steady sound that would have the same energy as the actual fluctuating sound observed. The several sound level metrics that are commonly reported in community noise monitoring and are presented in this report are described below.

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6 *American National Standard Specification for Sound Level Meters*, ANSI S1.4-1983, published by the Standards Secretariat of the Acoustical Society of America, Melville, NY.

- L_{90} is the sound level in dBA exceeded 90 percent of the time during a measurement period. The L_{90} is close to the lowest sound level observed. It is essentially the same as the residual sound level, which is the sound level observed when there are no obvious nearby intermittent noise sources.

- L_{50} is the median sound level, the sound level in dBA exceeded 50 percent of the time during the measurement period.

- L_{10} is the sound level in dBA exceeded only 10 percent of the time. It is close to the maximum level observed during the measurement period. The L_{10} is sometimes called the intrusive sound level because it is caused by occasional louder noises like those from passing motor vehicles.

- L_{max} is the maximum instantaneous sound level observed over a given period.

- L_{eq} is a sound pressure level commonly A-weighted and presented in dBA. The equivalent level represents the time average of the fluctuating sound pressure, but because sound is represented on a logarithmic scale and the averaging is done with time-averaged mean square sound pressure values, the L_{eq} is primarily controlled by loud noises if there are fluctuating sound levels.

- In the design of noise controls, which do not function quite like the human ear, it is important to understand the frequency spectrum of the noise source of interest. The spectra of noises are usually stated in terms of octave-band sound pressure levels, in dB, with the frequency bands being those established by standard (American National Standards Institute [ANSI] S1.11, 1986). To facilitate the noise control design process, the estimates of noise levels in this analysis are also presented in terms of octave-band sound pressure levels. Octave-band measurements and modeling are used in assessing compliance with the City of Boston noise regulations.

3.10.3 Noise Regulations and Criteria

The City of Boston has both a noise ordinance and noise regulations. Chapter 16 §26 of the Boston Municipal Code sets the general standard for noise that is unreasonable or excessive: louder than 50 decibels between the hours of 11:00 p.m. and 7:00 a.m., or louder than 70 decibels at all other hours. The Boston Air Pollution Control Commission (BAPCC) has adopted regulations based on the city's ordinance - "Regulations for the Control of Noise in the City of Boston", which distinguish among residential, business, and industrial districts in the City. In particular, BAPCC Regulation 2 is applicable to the sounds from the Project and is considered in this noise study.

Table 3.10-1 below presents the "Zoning District Noise Standards" contained in Regulation 2.5 of the BAPCC "Regulations for the Control of Noise in the City of Boston," adopted December 17, 1976. These maximum allowable sound pressure levels apply at the property line of the receiving property. The "Residential Zoning District" limits apply to any lot located within a residential zoning district or to any residential use located in another zone except an Industrial Zoning District, according to Regulation 2.2. Similarly, per Regulation 2.3, business limits apply to any lot located within a business zoning district not in residential or institutional use.

Table 3.10-1 City Noise Standards, Maximum Allowable Sound Pressure Levels

Octave-band Center	Residential Zoning District		Residential Industrial Zoning District		Business Zoning District	Industrial Zoning District
Frequency (Hz)	Daytime (dB)	All Other Times (dB)	Daytime (dB)	All Other Times (dB)	Anytime (dB)	Anytime (dB)
32	76	68	79	72	79	83
63	75	67	78	71	78	82
125	69	61	73	65	73	77
250	62	52	68	57	68	73
500	56	46	62	51	62	67
1000	50	40	56	45	56	61
2000	45	33	51	39	51	57
4000	40	28	47	34	47	53
8000	38	26	44	32	44	50
A-Weighted (dBA)	**60**	**50**	**65**	**55**	**65**	**70**

Notes:
1. Noise standards from Regulation 2.5 "Zoning District Noise Standards", City of Boston Air Pollution Control Commission, "Regulations for the Control of Noise in the City of Boston", adopted December 17, 1976.
2. All standards apply at the property line of the receiving property.
3. dB and dBA based on a reference pressure of 20 micropascals.
4. Daytime refers to the period between 7:00 a.m. and 6:00 p.m. daily, except Sunday.

3.10.4 Existing Conditions

A background noise level survey was conducted to characterize the existing "baseline" acoustical environment in the vicinity of the Project. Existing noise sources around the Project include: highway traffic on nearby Interstate 90 and Interstate 93, vehicular and truck traffic along local streets, pedestrian traffic, mechanical and ventilation noise from surrounding structures, A/C noise from a nearby residence, construction noise from nearby projects, overhead planes and helicopters, wind, birds, and the general city soundscape.

3.10.5 Noise Monitoring Methodology

Since noise impacts from the Project on the community will be highest when background noise levels are the lowest, the study was designed to measure community noise levels under conditions typical of a "quiet period" for the area. Therefore, daytime measurements were scheduled to avoid peak traffic conditions. Sound level measurements were made on Monday, July 22, 2019 during the daytime (12:15 p.m. to 2:10 p.m.) and on Tuesday, July 30, 2019 during nighttime hours (1:55 a.m. to 3:30 a.m.). All measurements were 20 minutes in duration.

Sound levels were measured at publicly accessible locations at a height of five feet (1.5 meters) above ground level, under low wind conditions, and with dry roadway surfaces. Wind speed, temperature, and humidity measurements were made with a Kestrel 3000 Pocket Wind Meter, which is equipped with an electronic wind speed indicator, temperature thermistor, and humidity sensor. Unofficial observations about meteorology or land use in the community were made solely to characterize the existing sound levels in the area and to estimate the noise sensitivity at properties near the Project.

3.10.6 Noise Monitoring Locations

The selection of the noise monitoring locations was based upon a review of zoning and land use in the Project Area. Five noise monitoring locations were selected as representative sites to obtain a sampling of the ambient baseline noise environment. These measurement locations are depicted on Figure 3.10-1 and described below.

- **Location 1** is located on the sidewalk in front of 249 Harrison Avenue, west of the Project. This location is representative of the Boston Chinese Evangelical Church and surrounding residential receptors west of the Project.

- **Location 2** is located on the sidewalk in front of 231 Harrison Avenue, northwest of the Project. This location is representative of the City Fruit Co. supermarket and the surrounding residential receptors northwest of the Project.

- **Location 3** is located on the northern sidewalk of Oak Street, in front of 200 Harrison Avenue, north of the Project. This location represents residential receptors north of the Project.

- **Location 4** is located on the sidewalk of Tai Tung Village in between 230 Harrison Avenue and 244 Harrison Avenue, immediately adjacent and northeast of the Project. This location is representative of the closest residential receptors northeast of the Project.

3.10.7 Noise Monitoring Equipment

A Larson Davis Model 831 sound level meter equipped with a PCB PRM831 preamplifier, a PCB 377B20 half-inch microphone, and manufacturer-provided windscreen was used to collect background sound pressure level data. This instrumentation meets the "Type 1 - Precision" requirements set forth in ANSI S1.4 for acoustical measuring devices. The measurement equipment was calibrated in the field before and after the surveys with a Larson Davis CAL200 acoustical calibrator which meets the standards of IEC 942 Class 1L and ANSI S1.40-1984. Statistical descriptors (e.g., L_{eq}, L_{90}, etc.) were measured for each 20-minute sampling period, with octave-band sound levels corresponding to the same data set processed for the broadband levels.

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Data Source: Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, Information Technology Division

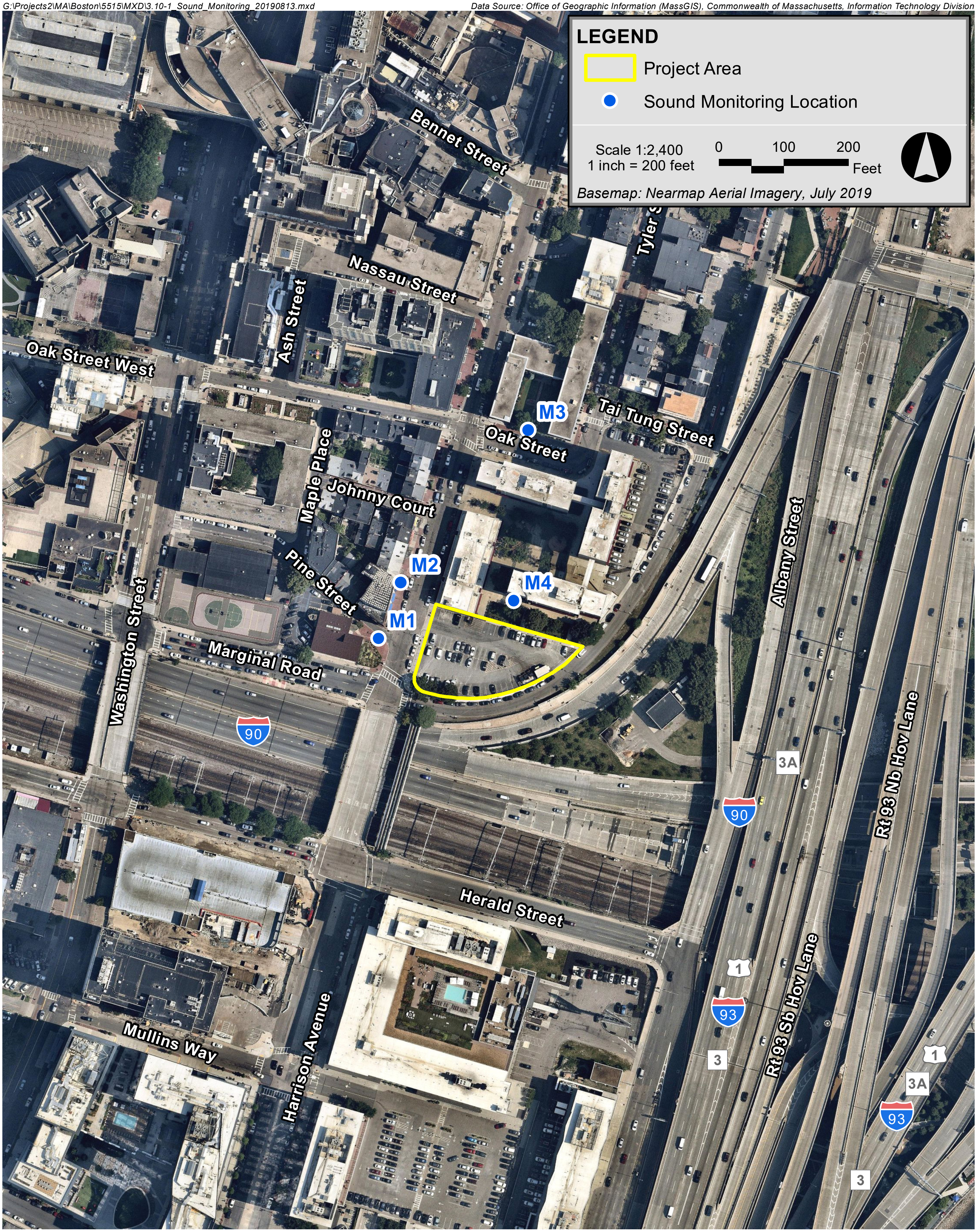

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Figure 3.10-1

Sound Monitoring Locations

3.10.8 Measured Background Sound Levels

Baseline noise monitoring results are presented in Table 3.10-2 and summarized below:

- The daytime residual background (L_{90}) measurements ranged from 61 to 68 dBA;
- The nighttime residual background (L_{90}) measurements ranged from 54 to 57 dBA;
- The daytime equivalent level (L_{eq}) measurements ranged from 63 to 73 dBA;
- The nighttime equivalent level (L_{eq}) measurements ranged from 57 to 59 dBA.

Table 3.10-2 Summary of Measured Background Noise Levels – July 22, 2019 (Daytime) & July 30, 2019 (Nighttime)

Location	Period	Start Time	L_{eq}	L_{max}	L_{10}	L_{50}	L_{90}	L_{90} Sound Pressure Level by Octave-Band Center Frequency (Hz)									
								31.5	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**16000**
			dBA	dBA	dBA	dBA	dBA	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB
1	Day	12:14 PM	73	77	74	74	68	70	72	71	66	64	65	60	54	48	45
2	Day	12:37 PM	67	84	68	65	64	67	66	64	61	59	60	55	47	37	28
3	Day	1:03 PM	68	91	65	62	61	66	65	61	58	58	56	51	46	36	27
4	Day	1:47 PM	63	69	64	63	62	66	67	63	61	59	58	52	45	39	31
1	Night	1:55 AM	58	77	59	56	54	60	60	57	53	51	49	43	35	25	23
2	Night	2:16 AM	59	72	59	57	56	59	60	60	56	54	51	46	39	31	25
3	Night	2:39 AM	57	69	58	57	56	63	60	59	57	54	51	46	40	32	26
4	Night	3:11 AM	59	66	60	58	57	60	62	59	56	53	52	47	44	40	34

Note: Sound pressure levels are rounded to the nearest whole decibel.

Weather Conditions:

	Date	Temp	RH	Sky	Wind
Daytime	Monday, July 22, 2019	82°F	46%	Cloudy	SW 5-9 mph
Nighttime	Tuesday, July 30, 2019	80°F	77%	Clear	SW 4-6 mph

Monitoring Equipment Used:

	Manufacturer	Model	S/N
Sound Level Meter	Larson Davis	LD831	4373
Microphone	Larson Davis	377C20	165061
Preamp	Larson Davis	PRM831	46514
Calibrator	Larson Davis	CAL200	13676

3.10.9 Future Conditions – Overview of Potential Project Noise Sources

The primary sources of continuous sound exterior to the Project are expected to consist of ventilation, heating/air-conditioning, and emergency power noise sources. Multiple noise sources are anticipated to be located at rooftop level. These noise sources on the rooftop, will discharge sound at various heights with respect to the Project.

Table 3.10-3 provides an anticipated list of the major sources of sound. Sound power levels used in the acoustical modeling of each piece of equipment are presented in Table 3.10-4. Sound power level data were provided by the manufacturer of each piece of equipment or assumed by Epsilon and based on comparable equipment. The sound power level for the two-varying outdoor Variable Refrigerant Flow (VRF) air source heat pumps were calculated using the broadband sound pressure level provided at a reference distance. This was applied to both Heat Pump Control Unit - 1(HPCU-1) & HPCU-2. The sound power level for the energy recovery ventilation unit was calculated combining the sound power levels provided for the supply and exhaust fans on the unit.

The Project includes select noise-control measure in order to achieve compliance with the applicable noise regulations. As the design progresses, specifications for mechanical equipment may change; however, appropriate measures will be taken to ensure compliance with the City Noise Standards. It is expected that the emergency generator's sound levels will be controlled using a sound attenuated Level 2 enclosure on the rooftop. To further limit impacts from the standby generator, required periodic, routine testing will be conducted during daytime hours, when background sound levels are highest. A summary of potential noise mitigation considered for the Project is presented in Table 3.10-5.

Table 3.10-3 Modeled Noise Sources

Noise Source	Quantity	Approximate Location & Elevation	Size/Capacity
VRF Air Source Heat Pumps (ASHPs)	4	2 HPCU-1 units & 2 HPCU-2 units each towards the southern end of the Rooftop Level	HPCU-1 (8 ton): 7,400 CFM HPCU-2 (10 ton): 8,300 CFM
Emergency Generator	1	1 unit towards the southwest corner of the Rooftop Level	200 kW
Energy Recovery Ventilation (ERVs)	2	1 unit towards the center of the Rooftop Level with an additional unit towards the eastern end of the Rooftop Level	3,060 CFM

Table 3.10-4 Modeled Sound Power Levels per Noise Source

Noise Source	Broad-band (dBA)	Sound Level (dB) per Octave-Band Center Frequency (Hz) 31.5	63	125	250	500	1k	2k	4k	8k
VRF Air Source Heat Pump (ASHP) HPCU-1[2]	68	75[1]	75	72	68	66	62	58	57	48
VRF Air Source Heat Pump (ASHP) HPCU-2[3]	70	78[1]	78	76	71	68	64	60	58	55
Emergency Generator[4]	102	66	83	94	95	96	97	95	93	93
ERV[5]	84	97[1]	97	91	83	80	77	75	73	69

Notes: Sound power levels include mitigation identified in Table 3.10-5.

1. No data provided by manufacturer. Octave-band sound level assumed to be equal to the 63 Hz band level.
2. Mitsubishi Electric Corporation HPCU-1: PURY-P96T(Y)NU-A(-BS); Sound power levels calculated from sound pressure level data measured at a distance of 1 meter.
3. Mitsubishi Electric Corporation HPCU-2: PURY-P120T(Y)NU-A(-BS); Sound power levels calculated from sound pressure level data measured at a distance of 1 meter.
4. Cummins C200D6D QSB7-G5 NR3 60 Hz Diesel F217-2 Sound Attenuated Level 2 Enclosure.
5. Greenheck ERCH-45-30L-8P-EIG-01 (Supply & Exhaust Fans Combined).

Table 3.10-5 Attenuation Values Applied to Mitigate Each Noise Source

Noise Source	Form of Mitigation	Sound Level (dB) per Octave-Band Center Frequency (Hz) 31.5	63	125	250	500	1k	2k	4k	8k
Emergency Generator	Enclosure[1]	-4	2	8	14	12	12	11	10	6

Notes: Additional attenuation from Cummins Weather Aluminum enclosure to the Cummins Sound Attenuated Level 2 enclosure. This attenuation is included in Table 3.10-4 sound power levels.

3.10.10 Noise Modeling Methodology

The noise impacts associated with the Project were predicted at the nearest and most representative receptors using the CadnaA noise calculation software developed by DataKustik GmbH. This software uses the ISO 9613-2 international standard for sound propagation (Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation). The benefits of this software are a refined set of computations due to the inclusion of topography, ground attenuation, multiple building reflections, drop-off with distance, and atmospheric absorption. The CadnaA software allows for octave-band calculation of noise from multiple noise sources, as well as computation of diffraction around building edges.

3.10.11 Future Sound Levels – Nighttime

The analysis of sound levels at night included all the mechanical equipment operating at maximum loads, except the emergency generator, to simulate worst-case nighttime operation conditions at nearby receptors. Seven modeling locations (A-G) were included in the analysis

(See Figure 3.10-2). Six of the seven of the modeling receptors (A-E & G) represented nearby residential/institutional zoned locations. One of the seven (F) represented nearby commercially zoned locations. Modeling location A represents monitoring location 1 on the western sidewalk of Harrison Avenue in front of the Boston Chinese Evangelical Church, west of the Project. This location is representative of the closest residential/institutional receptors west of the Project. Modeling location B represents monitoring location 2 on the sidewalk in front of 231 Harrison Avenue, northwest of the Project. This location represents the surrounding residential receptors northwest of the Project. Modeling location C represents monitoring location 3 on the northern sidewalk of Oak Street, in front of 200 Harrison Avenue, north of the Project. This location represents the closest residential/institutional receptors north of the Project. Modeling location D represents monitoring location 4 on the sidewalk of Tai Tung Village, in between 230 and 244 Harrison Avenue, immediately adjacent to the northeast of the Project. This location is representative of the closest residential receptors northeast of the Project. Modeling location E represents the western sidewalk of Washington Street, in front of 885 Washington Street, west of the Project. This location is representative of additional residential receptors west of the Project. Modeling location F represents the northern façade of a parking garage along Herald Street at 321 Harrison Avenue specifically, which will be directly southwest of the Project. Modeling location G represents the northern façade of a residential building along Herald Street at 300 Harrison Avenue specifically, which will be directly south of the Project. The modeling receptors, which correspond to residential/institutional and business uses in the community, are depicted in Figure 3.10-2. The predicted exterior Project-only sound levels range from 14 to 34 dBA at nearby receptors. The City of Boston Residential and Business limits have been applied to the appropriate locations. Predicted sound levels from Project-related equipment are within the broadband and octave-band nighttime limits under the City Noise Standards at the modeling locations. The evaluation results are presented in Table 3.10-6.

Table 3.10-6 Comparison of Future Predicted Project-Only Nighttime Sound Levels to the City of Boston Limits

Modeling Location ID	Zoning / Land Use	Broadband (dBA)	Sound Level (dB) per Octave-Band Center Frequency (Hz)								
			31.5	63	125	250	500	1k	2k	4k	8k
A	Institutional	30	50	49	41	31	26	21	16	12	4
B	Residential	32	51	49	42	33	28	24	20	17	6
C	Residential	14	37	33	25	14	9	5	1	0	0
D	Residential	29	50	48	40	29	23	19	15	13	4
E	Residential	32	46	46	40	32	28	25	22	17	0
F	Business	31	46	46	40	32	28	24	19	14	0
G	Residential	34	48	48	42	34	31	28	24	20	5
City of Boston Limits	Residential/Institutional	50	68	67	61	52	46	40	33	28	26
	Business	65	79	78	73	68	62	56	51	47	44

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Data Source: Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, Information Technology Division

288 Harrison Residences Boston, Massachusetts

Epsilon ASSOCIATES INC.

Figure 3.10-2

Sound Modeling Locations

3.10.12 Future Sound Levels – Daytime

As previously noted, the emergency generator will only operate during the day for brief, routine testing when the background sound levels are high, or during an interruption of power from the electrical grid. A second analysis combined noise from the Project's anticipated mechanical equipment and its emergency generator to reflect worst-case conditions during a period of equipment testing. The sound levels were calculated at the same receptors, as in the nighttime analysis and then evaluated against daytime limits. The predicted exterior Project-only daytime sound levels range from 25 to 51 dBA at nearby receptors. Predicted sound levels from Project-related equipment are within the daytime broadband and octave-band limits under the City Noise Standards at each of the modeled locations. This evaluation is presented in Table 3.10-7.

Table 3.10-7 Comparison of Future Predicted Project-Only Daytime Sound Levels to City Noise Standards

Modeling Location ID	Zoning / Land Use	Broadband (dBA)	Sound Level (dB) per Octave-Band Center Frequency (Hz)								
			31.5	63	125	250	500	1k	2k	4k	8k
A	Institutional	43	50	49	44	42	40	38	34	30	26
B	Residential	40	51	50	44	40	37	35	32	28	23
C	Residential	25	37	34	27	22	21	21	18	13	1
D	Residential	35	50	48	41	34	30	29	26	22	17
E	Residential	49	46	46	44	43	44	45	42	36	22
F	Business	51	46	46	46	46	46	47	44	40	29
G	Residential	51	48	48	47	46	47	48	45	40	30
City of Boston Limits	Residential/Institutional	60	76	75	69	62	56	50	45	40	38
	Business	65	79	78	73	68	62	56	51	47	44

3.10.13 Conclusions

Baseline noise levels were measured in the vicinity of the Project during the day and at night. At these and additional locations, future Project-only sound levels were calculated based on information provided on the expected mechanical equipment and assumed sound levels of similar equipment. Project-only sound levels were compared to applicable limits.

Predicted mechanical equipment noise levels from the Project at each receptor location, taking into account attenuation due to distance, structures, and noise-control measures, will be at or below the octave-band daytime and nighttime requirements of the City Noise Standards. The predicted sound levels from Project-related equipment, as modeled, are expected to remain below 50 dBA at residences and below 65 dBA at businesses during the nighttime and below 60 dBA and 65dBA during the daytime; therefore, within the nighttime and daytime residential and business zoning limits for the City of Boston at the nearest residential and business receptors.

The results indicate that the Project can operate without substantial impact on the existing acoustical environment.

At this time, while the mechanical equipment and noise controls have been refined, they are still conceptual in nature. During the final design phase of the Project, mechanical equipment and noise controls will be specified and designed to meet the applicable broadband limit and the corresponding octave-band limits of the City Noise Standards.

3.11 Construction Impacts

3.11.1 Introduction

A Construction Management Plan (CMP) in compliance with the City's Construction Management Program will be submitted to the Boston Transportation Department (BTD) once final plans are developed and the construction schedule is fixed. The CMP to be executed with the City prior to commencement of construction will document all committed measures. The construction contractor will be required to comply with the details and conditions of the approved CMP.

Proper pre-planning with the City and neighborhood will be essential to the successful construction of the Project. Construction methodologies, which ensure public safety and protect nearby residences and businesses, will be employed. Techniques such as barricades, walkways and signage will be used.

During the construction phase of the Project, the Proponent will provide the name, telephone number and address of a contact person to communicate with on issues related to the construction.

3.11.2 Construction Transportation Impacts

As the design of the Project progresses, the Proponent will meet with BTD to discuss the specific location of barricades, the need for lane closures, pedestrian walkways, and truck queuing areas. Secure fencing, signage, and covered walkways may be employed to ensure the safety and efficiency of all pedestrian and vehicular traffic flows. In addition, sidewalk areas and walkways near construction activities will be well marked and lighted to protect pedestrians and ensure their safety. Public safety for pedestrians on abutting sidewalks will also include covered pedestrian walkways when appropriate. If required by BTD and the Boston Police Department, police details will be provided to facilitate traffic flow.

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

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

- 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.

3.11.3 Construction Schedule

The Proponent anticipates that the Project will commence construction in 2020 and last for approximately 18-20 months.

Typical construction hours will be from 7:00 am to 6:00 pm, Monday through Friday, with most shifts ordinarily ending at 3:30 pm. No substantial sound-generating activity will occur before 7:00 am. If longer hours, additional shifts, or Saturday work is required, the construction manager will place a work permit request to the Boston Air Pollution Control Commission and BTD in advance. Notification should occur during normal business hours, Monday through Friday. It is noted that some activities such as finishing activities could run beyond 6:00 pm to ensure the structural integrity of the finished product; certain components must be completed in a single pour, and placement of concrete cannot be interrupted.

3.11.4 Construction Staging/Access

Access to the site and construction staging areas will be provided in the CMP.

Although specific construction and staging details have not been finalized, the Proponent and its construction management consultant will work to ensure that staging areas will be located to minimize impacts to pedestrian and vehicular flow. Secure fencing and barricades will be used to isolate construction areas from pedestrian traffic adjacent to the site. Construction procedures will be designed to meet all Occupational Safety and Health Administration (OSHA) safety standards for specific site construction activities.

3.11.5 Construction Mitigation

The Proponent will follow City and MassDEP guidelines which will direct the evaluation and mitigation of construction impacts. As part of this process, the Proponent and construction team will evaluate the Commonwealth's Clean Air Construction Initiative.

"Don't Dump - Drains to Charles River" plaques will be installed at storm drains that are replaced or installed as part of the Project.

3.11.6 Construction Employment and Worker Transportation

The number of workers required during the construction period will vary. It is anticipated that approximately 350 construction jobs will be created over the length of construction. The Proponent will make reasonable good-faith efforts to have at least 51% of the total employee work hours of journey people and apprentices in each trade be for Boston residents, at least 40% of total employee work hours of journey people and of apprentices in each trade be for minorities and at least 12% of the total employee work hours of journey people and of apprentices in each trade be for women. The Proponent will enter into jobs agreements with the City of Boston.

To reduce vehicle trips to and from the construction site, minimal construction worker parking will be available at the site and all workers will be strongly encouraged to use public transportation and ridesharing options. The general contractors will work aggressively to ensure that construction workers are well informed of the public transportation options serving the area. Space on-site will be made available for workers' supplies and tools so they do not have to be brought to the site each day.

3.11.7 Construction Truck Routes and Deliveries

Truck traffic will vary throughout the construction period, depending on the activity. The construction team will manage deliveries to the site during morning and afternoon peak hours in a manner that minimizes disruption to traffic flow on adjacent streets. Construction truck routes to and from the site for contractor personnel, supplies, materials, and removal of excavations required for the development will be coordinated with BTD. Traffic logistics and routing will be planned to minimize community impacts. Truck access during construction will be determined by the BTD as part of the CMP. These routes will be mandated as a part of all subcontractors' contracts for the development. The construction team will provide subcontractors and vendors with Construction Vehicle & Delivery Truck Route Brochures in advance of construction activity.

"No Idling" signs will be included at the loading, delivery, pick-up and drop-off areas.

3.11.8 Construction Air Quality

Short-term air quality impacts from fugitive dust may be expected during demolition, excavation and the early phases of construction. Plans for controlling fugitive dust during demolition, excavation and construction include mechanical street sweeping, wetting portions of the site during periods of high wind, and careful removal of debris by covered trucks. The construction contract will provide for a number of strictly enforced measures to be used by contractors to reduce potential emissions and minimize impacts, pursuant to the CMP. These measures are expected to include:

- ♦ Using wetting agents on areas of exposed soil on a scheduled basis;

- Using covered trucks;
- Minimizing spoils on the construction site;
- Monitoring of actual construction practices to ensure that unnecessary transfers and mechanical disturbances of loose materials are minimized;
- Minimizing storage of debris on the site; and
- Periodic street and sidewalk cleaning with water to minimize dust accumulations.

3.11.9 Construction Noise

The Proponent is committed to mitigating noise impacts from the construction of the Project. Increased community sound levels, however, are an inherent consequence of construction activities. Construction work will comply with the requirements of the City of Boston Noise Ordinance. Every commercially reasonable effort will be made to minimize the noise impact of construction activities.

Mitigation measures are expected to include:

- Instituting a proactive program to ensure compliance with the City of Boston noise limitation policy;
- Using appropriate mufflers on all equipment and ongoing maintenance of intake and exhaust mufflers;
- Muffling enclosures on continuously running equipment, such as air compressors and welding generators;
- Replacing specific construction operations and techniques by less noisy ones where feasible;
- Selecting the quietest of alternative items of equipment where feasible;
- Scheduling equipment operations to keep average noise levels low, to synchronize the noisiest operations with times of highest ambient levels, and to maintain relatively uniform noise levels;
- Turning off idling equipment; and
- Locating noisy equipment at locations that protect sensitive locations by shielding or distance.

3.11.10 Construction Vibration

Means and methods for performing work at the Site will be evaluated for potential vibration impacts on adjoining property, utilities, and adjacent existing structures. Acceptable vibration criteria will be established prior to construction, and vibration will be monitored, if required, during construction to ensure compliance with the agreed-upon standard.

3.11.11 Construction Waste

The Proponent will take an active role with regard to the reprocessing and recycling of construction waste. The disposal contract will include specific requirements that will ensure that construction procedures allow for the necessary segregation, reprocessing, reuse and recycling of materials when possible. For those materials that cannot be recycled, solid waste will be transported in covered trucks to an approved solid waste facility, per MassDEP Regulations for Solid Waste Facilities, 310 CMR 16.00. This requirement will be specified in the disposal contract. Construction will be conducted so that materials that may be recycled are segregated from those materials not recyclable to enable disposal at an approved solid waste facility.

3.11.12 Protection of Utilities

Existing public and private infrastructure located within the public right-of-way will be protected during construction. The installation of proposed utilities within the public way will be in accordance with the Massachusetts Water Resources Authority, Boston Water and Sewer Commission, Boston Public Works, Dig Safe, and the governing utility company requirements. All necessary permits will be obtained before the commencement of the specific utility installation. Specific methods for constructing proposed utilities where they are near to, or connect with, existing water, sewer and drain facilities will be reviewed by BWSC as part of its site plan review process.

3.11.13 Rodent Control

A rodent extermination certificate will be filed with the building permit application for the Project. Rodent inspection monitoring and treatment will be carried out before, during, and at the completion of all construction work for the Project, in compliance with the City's requirements.

3.11.14 Wildlife Habitat

The Project Site is in an established urban neighborhood. There are no wildlife habitats in or adjacent to the Site.

Chapter 4.0

Sustainable Design and Climate Change Resilience

4.0 SUSTAINABLE DESIGN AND CLIMATE CHANGE RESILIENCE

4.1 Sustainable Design

To measure the results of its sustainability initiatives with Article 37, the Proponent has used the framework of the Leadership in Energy and Environmental Design (LEED) rating system promulgated by the US Green Building Council (USGBC). The Project will use LEED for Homes Multifamily v4 as the rating system to demonstrate compliance with Article 37. The LEED rating system tracks the sustainable features of a project by achieving points in the following categories: Location and Transportation, Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, Indoor Environmental Quality, Innovation and Design Process, and Regional Priority Credits.

The Project team is currently targeting a LEED silver level. A LEED checklist for the Project is included at the end of this section, and details the credits the Project anticipates achieving. This is a preliminary evaluation of the LEED checklist, and applicable credits may change as the Project design advances. The following narrative describes the Project team's approach to achieving LEED certifiability at the Silver level for the building.

Integrative Process

<u>IP Integrative Process:</u> The Proponent has assembled a comprehensive design team that includes an architect, civil engineer, MEP engineer, and green building consultant. The team will meet on a regular basis during the schematic design stage and will continue to meet weekly throughout construction. During the design phase, the team holds a regular call every one to two weeks to review Project status and resolve issues.

<u>IP Trades Training:</u> The Proponent has contracted a third party to carry out a trades training for subcontractors relevant to LEED, including plumbing, mechanical systems, insulation, framing, and air sealing.

Location and Transportation

<u>LT Floodplain Avoidance (Required):</u> The Site does not lie within the 100-year floodplain according to the FEMA Flood Map Database.

<u>LT Sensitive Land Protection:</u> The Site is located on a previously developed lot, located in Chinatown, Boston, satisfying the credit conditions for Path 1: Previously Developed.

<u>LT Infill Development:</u> The Project is located in an urban setting in which all of the land within 0.5 miles (excluding parks and water bodies per the credit language) is previously developed land.

<u>LT Open Space:</u> The Project is within 0.5 miles of Peters Park, part of the City of Boston's park system. Peters Park is approximately 4 acres, meeting the requirement.

LT Street Network: The Project is located in an urban area dense in publicly accessible roads. According to the Center for Neighborhood Technology's H+T Index, the Site is surrounded by a density of 1,423 intersections per square mile.

LT Compact Development: The Project will include approximately 85 units on 0.54 buildable acres of land, resulting in approximately 159 units per acre. This exceeds the threshold of 80 units per acre set out for LEED for Homes Midrise v4.

LT Community Resources: The Site is located within an urban area with several community resources within walking distance. The Project team has documented twelve for two points.

LT Access to Transit: The Project site is located within 0.5 miles of the MBTA's Orange and Green Lines, and to three MBTA bus routes (#9, #15, and #43). These routes provide enough rides per day to exceed the LEED thresholds and qualify the Project for two points.

Sustainable Sites

SS Construction Activity Pollution Prevention (Required): The Project's construction documents will include a Soil Erosion and Sedimentation Control Plan to be developed in accordance with the EPA Construction General Permit of the NPDES. A Stormwater Pollution Prevention Plan (SWPPP) will also be developed for the site in accordance with the requirements for the US EPA's National Pollutant Discharge Elimination System Construction General Permit. These documents will be used to comply with this prerequisite.

SS No Invasive Plants (Required): The Project team is committed to meeting this prerequisite and complying with US Department of Agriculture's GRIN Taxonomy for Plants database, the National Association of Exotic Pest Plant Council, or the UMass Extension school list.

SS Heat Island Reduction: The Project team will pursue this point through high albedo Energy Star materials for the roof, and will include shading of the property to total more than 50% of the property. An additional point will be pursued for at least 75% of the property meeting the requirement.

SS Rainwater Management: The design will earn one point by installing rainwater management systems sized to accommodate the 80th percentile storm. The team will assess opportunities to size to the 85th percentile storm in for an additional point, considered "maybe" for now. Coal tar sealants shall not be used in systems managing rainwater.

SS Non-toxic Pest Control: The Project will earn two points by the following:

- The Project will include solid concrete foundation walls to deter movement of pests into the building from the surrounding ground [0.5 pt];
- The contractor will seal all external cracks, penetrations, edges, and entry points. Screens will be installed on all openings greater than ¼" [0.5 pt];

- The Project will design all discharge points for rain gutters and AC condensate lines at least 24 inches from the foundation [0.5 pt]; and

- The Project will design landscape features to provide at least 18 inches between the plantings and exterior of the building [0.5 pt].

Water Efficiency

WE Water Metering (Required): The Project will comply with the requirements of this credit by installing a water meter in the building.

WE Indoor Water Use: The Project will reduce demand for water through high efficiency fixtures by using efficient fixtures such as:

- Shower: 1.5 GPM [2 points]

- Bath Lavatory: 0.5 GPM [2 points]

- Toilet: 0.8 GPF [1 point]

- Clothes Washers: Energy Star rated models [1 point]

WE Outdoor Water Use: The Project will install less than 60% turf grass and at least 25% native or adapted plants as a percentage of landscaped area, earning one point for this credit. An additional point will be pursued if possible.

Energy and Atmosphere

EA Minimum Energy Performance (Required): The Project will comply with this prerequisite by meeting the following requirements:

- Energy Star: The project will demonstrate a HERS Index rating of 55 or lower, per Massachusetts Energy Code 9th Edition. This will comply with LEED's requirement to meet or exceed the Energy Star HERS Index Target. Please see Appendix A for a sample of worst-case HERS certificates showing compliance. Early results indicate a range between HERS 40 and 44.

- A third-party commissioning agent will commission the mechanical systems in the building according to LEED standards.

- Ducts will be sealed to the threshold required by LEED, and tested during construction by a third-party rater.

- Construction documents will contain air sealing details as required.

- The LEED Thermal Enclosure Checklist will be completed during construction.

EA Energy Metering (Required): The Project will include an electricity meter for each apartment, and a gas meter for the entire building.

EA Education of the Homeowner, Tenant, or Building Manager (Required): The Project will comply with this prerequisite by providing to the owner an operations and maintenance manual with all LEED/sustainability related requirements.

EA Annual Energy Use: The Project will achieve additional energy savings beyond the Energy Star HERS Index Target. The building will achieve at least HERS 55 to comply with MA Stretch Energy Code. The team conservatively assumes that 13 points are achievable through this credit, with 3 points as "maybes".

Materials and Resources

MR Certified Tropical Wood (Required): The Project team is committed to using non-tropical woods, or when tropical woods are required, to use only FSC Certified woods.

MR Durability Management (Required): The Project team is committed to complying with this prerequisite to promote durability and performance of the building enclosure and its components and systems through compliance with the measures below as outlined by the USGBC including:

- Use of non-paper faced backer board in specific bath areas, meeting ASTM D3273;
- Use of water-resistant flooring in kitchen and baths;
- No carpet within 3 feet of exterior doors; and
- A drain and drain pan or floor drain for all clothes washers; clothes dryers ducted to the exterior.

MR Construction Waste Management: The Project is committed to reducing construction waste by at least 50% for one point. The team will attempt to get to 75% for an additional point.

Indoor Environmental Quality

EQ Ventilation (Required): The Project will meet all requirements of ASHRAE Standard 62.2-2010 (with errata). Fresh air will be mechanically supplied directly to each unit and exhausted from kitchens and bathrooms through a central ERV.

EQ Combustion Venting (Requirement): The Project will meet the requirements of this prerequisite by installing only sealed combustion equipment. Carbon Monoxide detectors will be installed in each unit. No fireplaces are planned for the Project.

EQ Garage Pollutant Protection (Not Applicable): The Project will include an open air garage, open to the outside on all but one side of the building. This meets the requirement.

EQ Radon Resistant Construction (Not Applicable): The Project is located in EPA radon Zone 3, which means this prerequisite does not apply.

EQ Air Filtering (Required): The Project will comply with the requirements of this prerequisite by installing air filters rated to MERV 6 for all central ERV systems and air filters rated to MERV 8 in each unit.

EQ Environmental Tobacco Smoke (required): The Project will comply with the requirements of this prerequisite by prohibiting smoking in all common areas, and outside the building except for within 25 feet of entries, intakes, and windows. Signs will be posted.

EQ Compartmentalization (Required): The Project will comply with the requirements of this prerequisite by using a 3rd party to verify that the constructed buildings meet the LEED v4 standard of 0.30 CFM50 per square foot of enclosure (please see USGBC interpretation #10465).

EQ Enhanced Ventilation: The Project will comply with the requirements of this credit by installing continuously operating Energy Recovery Ventilation (ERV) units, by meeting ASHRAE 62.2-2010 Standard and by not exceeding ASHRAE requirements by more than 10%.

EQ Balancing of Heating & Cooling Distribution Systems: The average unit size across the Project is 792 SF, which is below the maximum threshold of 1200 SF, earning 1 'yes' point per Case 1 Option 1. The team will pursue two additional points for Case 1 Option 2 (Supply Air Flow Testing), and Case 1 Option 3 (Pressure Balancing). Testing will occur during the final stages of construction to confirm points.

EQ Enhanced Combustion Venting: The Project will comply with the requirements of this credit by not installing fireplaces or wood stoves in any of the units.

EQ Enhanced Garage Pollutant Protection: The Project complies with this this credit by including an open-air garage for the Project.

EQ Low Emitting Products: The Project team will install finishing products that are compliant with the credit standard: California Department of Public Health Standard Method V1.1–2010, using CA Section 01350, Appendix B, New Single-Family Residence Scenario. This standard regulates Volatile Organic Chemicals (VOC) emissions levels for the following items to be installed in this Project:

- Adhesives and sealants
- Paints and coatings
- Flooring and flooring adhesives

EQ No Environmental Tobacco Smoke: The Project will be entirely non-smoking, to be instituted through lease language. Smoking will be prohibited within 25-feet of all building entries, air intakes, and operable windows.

Innovation in Design

ID Preliminary Rating (Required): The Project has achieved a preliminary rating using the LEED for Homes checklist and will assign accountable parties for each credit, meeting this requirement.

ID Innovation: The Project will gain additional points through the following:

- ♦ Innovation: Housing Types & Affordability: The Project earns one point for being 100% affordable according to the credit language.

ID LEED Accredited Professional: Michael Brod, LEED AP, is coordinating the Article 37 Compliance process and LEED certification for this Project.

Regional Priority

The Project meets the threshold for at least two Regional Priority credit points, including:

- ♦ EA Nontoxic Pest Control [threshold 2 points]
- ♦ EA Access to Transit [threshold 1 point]

4.2 Climate Change Preparedness

4.2.1 Introduction

The Project team examined two areas of concern related to climate change: drought conditions and increased number of high-heat days. Due to the Project's location, elevation and topography, sea level rise will not impact the Project site, and impacts from heavy rain events are anticipated to be minimal. A copy of the preliminary Climate Change Checklist is included in Appendix E.

4.2.2 Drought Conditions

Under a global high emissions scenario that would increase the potential climate change impacts, the occurrence of droughts lasting one to three months could go up by as much as 75% over existing conditions by the end of the century. To minimize the Project's susceptibility to drought conditions the landscape design is anticipated to incorporate native and adaptive plant materials and high efficiency irrigation systems will be installed. Aeration fixtures and appliances will be chosen for water conservation qualities, conserving potable water supplies.

4.2.3 Extreme Heat Events

The Climate Ready Boston report predicts that in Boston, there may be between 25 to 90 days over 90 degrees by 2070, compared to an average of 11 days per year over 90 degrees between 1971 to 2000. The Project design will include measures to adapt to these conditions, including a high performance building envelope, high-efficiency mechanical and lighting systems, and Energy Star labeled appliances to reduce the overall building energy usage. The Project design aims to include a combination of white roof area with a high SRI, and green space with planting in the triangular area at the north end of the Project to reduce the urban heat island effect..

LEED v4 for Building Design and Construction: Multifamily Midrise

Project Checklist

Project Name: **288 Harrison Residences**
Date: **7/31/2019**

Y	?	N			
2			Credit	Integrative Process	**2**

15	**0**	**0**		**Location and Transportation**	**15**
Y			Prereq	Floodplain Avoidance	Required
				PERFORMANCE PATH	
		-	Credit	LEED for Neighborhood Development Location	15
				PRESCRIPTIVE PATH	
8			Credit	Site Selection	8
3			Credit	Compact Development	3
2			Credit	Community Resources	2
2			Credit	Access to Transit	2

4	**2**	**2**		**Sustainable Sites**	**7**
Y			Prereq	Construction Activity Pollution Prevention	Required
Y			Prereq	No Invasive Plants	Required
1	1		Credit	Heat Island Reduction	2
1	1	1	Credit	Rainwater Management	3
2			Credit	Non-Toxic Pest Control	2

7	**1**	**0**		**Water Efficiency**	**12**
Y			Prereq	Water Metering	Required
				PERFORMANCE PATH	
		-	Credit	Total Water Use	12
				PRESCRIPTIVE PATH	
6			Credit	Indoor Water Use	6
1	1		Credit	Outdoor Water Use	4

13	**5**	**19**		**Energy and Atmosphere**	**37**
Y			Prereq	Minimum Energy Performance	Required
Y			Prereq	Energy Metering	Required
Y			Prereq	Education of the Homeowner, Tenant or Building Manager	Required
13	3	14	Credit	Annual Energy Use	30
	2	3	Credit	Efficient Hot Water Distribution	5
		2	Credit	Advanced Utility Tracking	2

1	**2**	**6**		**Materials and Resources**	**9**
Y			Prereq	Certified Tropical Wood	Required
Y			Prereq	Durability Management	Required
	1		Credit	Durability Management Verification	1
		5	Credit	Environmentally Preferable Products	5
1	1	1	Credit	Construction Waste Management	3

9	**2.5**	**4**		**Indoor Environmental Quality**	**16**
Y			Prereq	Ventilation	Required
Y			Prereq	Combustion Venting	Required
Y			Prereq	Garage Pollutant Protection	Required
Y			Prereq	Radon-Resistant Construction	Required
Y			Prereq	Air FIltering	Required
Y			Prereq	Environmental Tobacco Smoke	Required
Y			Prereq	Compartmentalization	Required
3			Credit	Enhanced Ventilation	3
		2	Credit	Contaminant Control	2
1	2		Credit	Balancing of Heating and Cooling Distribution Systems	3
		1	Credit	Enhanced Compartmentalization	1
2			Credit	Enhanced Combustion Venting	2
1			Credit	Enhanced Garage Pollutant Protection	1
1	0.5	1	Credit	Low Emitting Products	3
1			Credit	No Environmental Tobacco Smoke	1

2	**0**	**4**		**Innovation**	**6**
Y			Prereq	Preliminary Rating	Required
1		4	Credit	Innovation	5
1			Credit	LEED AP Homes	1

2	**0**	**2**		**Regional Priority**	**4**
1			Credit	Regional Priority: Access to Transit	1
1			Credit	Regional Priority: Nontoxic Pest Control	1
		1	Credit	Regional Priority: Specific Credit	1
		1	Credit	Regional Priority: Specific Credit	1

55.0	**12.5**	**37.0**	**TOTALS**	Possible Points:	**108**

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

Chapter 5.0

Urban Design

5.0 URBAN DESIGN

5.1 Neighborhood Context

The Site is located at the corner of Harrison Avenue and Hudson Street, a prominent corner of the Chinatown neighborhood. When Tai Tung Village was first built in 1971, the parking lot was strategically located near the highway, facing the industrial uses across the Massachusetts Turnpike within the New York Streets area of the South End. That area of the South End has since been transformed into a vibrant mixed-use neighborhood. A well-designed building at the Site will become a beacon to Chinatown from the south. In addition, a new Josiah Quincy Upper School to be constructed across the street from the Site on Harrison Avenue, will further add to the prominence of the Site. The six-story Project will fit well within the three to fifteen story composition of the existing Tai Tung Village, and will provide a scaled transition to the Massachusetts Turnpike and the existing low-rise fabric across Harrison Avenue to the west.

5.2 Urban Design

The Project has been designed with a focus on several urban design goals:

- Create a contemporary gateway to the neighborhood from the south;
- Create a residential building that is woven into the existing Tai Tung Village context, yet has its own identity;
- Continue the vibrancy along Harrison Avenue; and
- Be a model for resilient planning and sustainable design in 21st century Boston.

The proposed building follows the curve of Hudson Street to the south in order to allow maximum distance from the existing residential buildings to the north, while continuing the street wall frontage along Harrison Avenue (see Figures 5-1 and 5-2). On the ground floor facing Harrison Avenue there will be a residential lobby and amenity space as well as non-residential space, reinforcing the active street life of Chinatown. Parking areas will be oriented towards the section of Hudson Street across from the edge of the depressed highway, in an area with minimum pedestrian usage.

The exterior materials have been chosen to mediate between the exposed concrete of the existing buildings of Tai Tung Village, and masonry buildings on the other side of Harrison Avenue. A mixture of fiber cement and metal panels will be used on the upper levels, while a warm greyish masonry plinth acknowledges the concrete tone of the existing Tai Tung complex while also providing the scale and texture of the more traditional masonry appearance (see Figure 5-3). At the south-facing facades, sun shading will be utilized to reduce heat gains and add textures and colors to the building (see Figure 5-4). The pattern of the sunshades will be designed to simulate a traditional Chinese screen, thus paying homage to the predominant cultural identity of the neighborhood.

288 Harrison Residences   Boston, Massachusetts

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Figure 5-1

View from Harrison Avenue and Herald Street facing Northeast

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Figure 5-2
View from Harrison Avenue facing South

Figure 5-3

West Elevation Materials

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Bruner/Cott
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Figure 5-4
South Elevation Materials

Chapter 6.0

Historic and Archaeological Resources

6.0 HISTORIC AND ARCHAEOLOGICAL RESOURCES

This section describes the historic and archaeological resources within and in the vicinity of the Site.

6.1 Project Site

The South Cove neighborhood in which the Site is located was constructed on filled tidal land created between 1805 and 1843 by State-chartered private corporations in two major building campaigns. Due to the presence of the Old Colony Railroad Depot, the Boston and Worcester Railroad, and other industries, by the mid-19th century land values had declined such that the construction of single-family houses in the area waned. The South Cove thus developed mainly as a neighborhood of boarding houses and lodging houses, densely constructed multifamily row houses, and a range of restaurants, grocery stores, and theaters. Commercial buildings were historically concentrated along Harrison Avenue, Beach Street, and Kneeland Street. The majority of the brick rowhouses that make up the neighborhood's building stock today were constructed between 1840 and 1850.

The neighborhood is home to the third largest Chinatown in the United States, extending across approximately 115 acres in the South Cove area. The area has associations with Chinese immigrants as early as the 1870s, beginning as a small enclave at the first block of Harrison Avenue and on Beach Street containing restaurants, laundries, Chinese goods merchants, and residences. The area has served as the economic, social, cultural, and political hub for Chinese Americans regionally for over one hundred years and is home to Chinese American social service agencies, family associations, cultural and religious institutions, and Chinese-oriented wholesale and retail businesses. According to City data, as of 2010 approximately 77 percent of the neighborhood's population is of Asian descent.

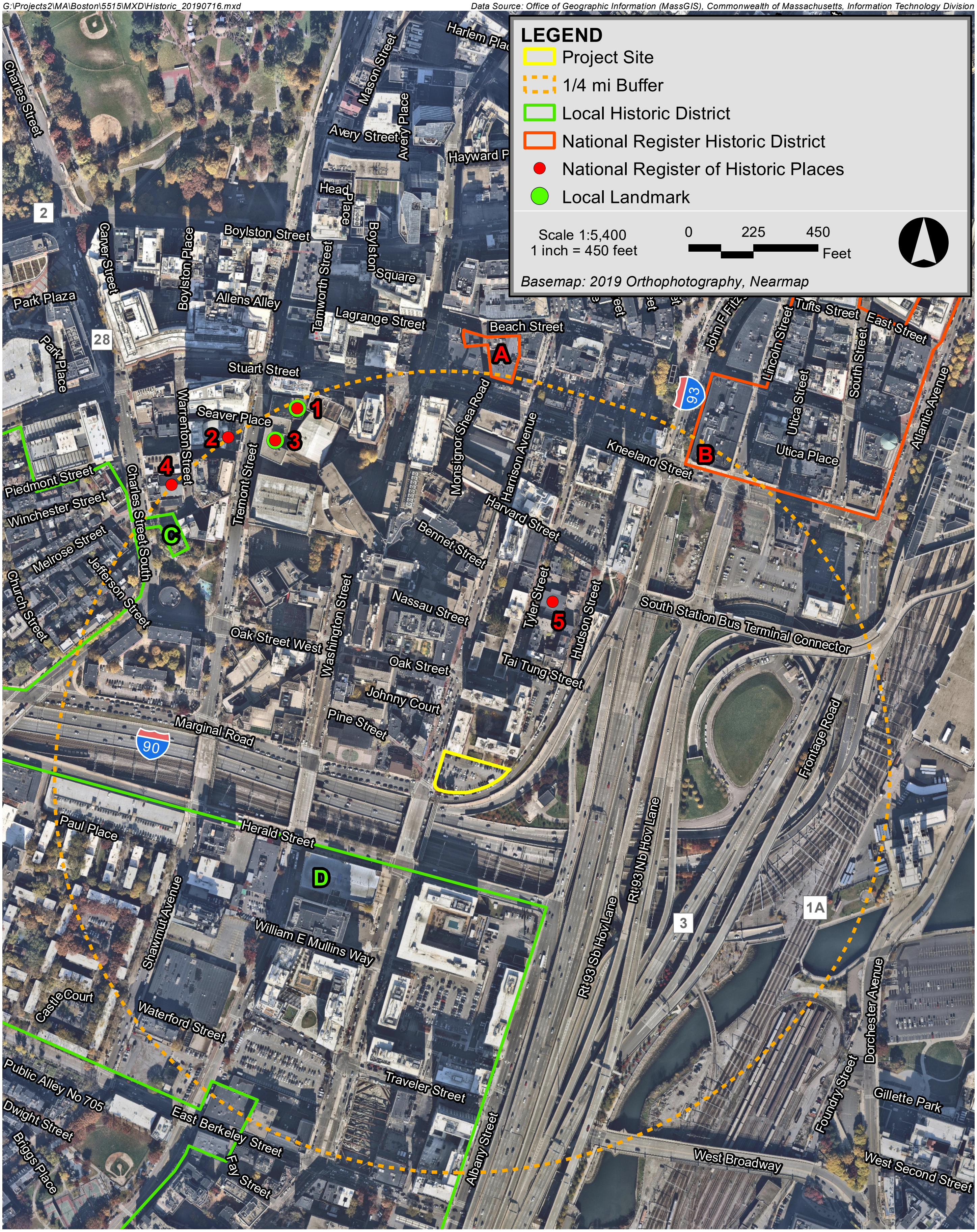
6.1.1 Historic Resources within the Project Site

No historic resources are present on the Site. The Site is presently a surface parking lot at the Tai Tung Village development, which was completed in 1973. The construction of the existing serving was undertaken under by a private firm acting pursuant to the Boston Redevelopment Authority's South Cove Urban Renewal Plan.

The Site and related buildings of the Tai Tung Village development are not listed in either the State Register of Historic Places or the National Register of Historic Places.

6.1.2 Historic Resources in the Vicinity of the Project Site

Historic resources in the vicinity of the Site include several historic districts and local landmarks, listed in Table 6-1 and depicted in Figure 6-1.



288 Harrison Residences Boston, Massachusetts

Figure 6-1
Historic Resources Map

Table 6-1 Historic Resources

Label	Historic Resource	Designation
A	Beach – Knapp Historic District	NRDIS, NRMRA
B	Leather District	NRDIS
C	Bay Village Historic District	LHD
D	South End Landmark District Protection Area	LHD
1	Wilbur Theatre, 244-248 Tremont Street	LL, NRIND, NRMRA
2	Shubert Theater, 263-265 Tremont Street	NRIND, NRMRA
3	Metropolitan Theatre/Music Hall, 252-272 Tremont Street	LL, NRIND, NRMRA
4	Charles Playhouse, 76-78 Warrenton Street	NRIND, NRMRA
5	Quincy Grammar School, 88-90 Tyler Street	NRIND, NRMPS
Designation Legend:		
NRDIS	National Register of Historic Places district	
NRIND	National Register of Historic Places individual property	
NRMPS	National Register of Historic Places Multiple Property Submission	
NRMRA	National Register of Historic Places Multiple Resource Area	
LHD	Local Historic District	
LL	Local Landmark	

6.1.3 Archaeological Resources on the Project Site

A review of the MACRIS archaeological base maps on June 27, 2019 revealed no known archaeological sites located at the Site.

6.2 Impacts to Historic Resources

Potential urban design and shadow impacts of the new construction on nearby historic resources were considered and are summarized below.

6.2.1 Urban Design

Located at a prominent corner in Boston's Chinatown, the new approximately 86,100 sf six-story building will replace an existing surface parking lot. While the parking lot formerly faced industrial areas to the south, the New York Streets area has been transformed in recent years into a vibrant mixed-use neighborhood. Hence, the Project will act as a prominent gateway to Chinatown for both pedestrians and drivers.

The building is complementary in height to the adjacent high-rise Tai Tung Village development, providing a scaled transition from Tai Tung Village to the low-rise buildings on the west side of Harrison Avenue. The selected exterior materials mediate between the brick masonry surfaces of historic buildings along Harrison Avenue and the monolithic concrete surfaces of Tai Tung Village. The design team intends to install patterned sunshades on south facing elevations that will evoke traditional Chinese screens, appropriately referencing the historic and cultural character of the neighborhood.

6.2.2 Shadow Impacts

Shadow impact analyses were conducted to demonstrate the anticipated impacts from the Project. These consisted of standard shadow studies done for March 21, June 21, September 21, and December 21 at 9:00 a.m., 12:00 p.m., and 3:00 p.m. as well as at 6:00 p.m. during the summer solstice and vernal equinox.

As discussed in Section 3.2, the shadow analysis for the Project demonstrates that net new shadow will be limited in extent and duration. New shadow from the Project will be limited to the streets and sidewalks adjacent to the Site, and no new shadow will be cast onto open spaces in the vicinity of the site.

The results of these shadow studies are included in Section 3.2 and shown in Figures 3.2-1 to 3.2-14.

Chapter 7.0

Infrastructure

7.0 INFRASTRUCTURE

7.1 Introduction

This Chapter outlines the existing utilities surrounding the Site, the connections required to provide service to the Project, and any impacts on the existing utility systems that may result from the construction of the Project. The following utility systems are discussed herein:

- Sewer
- Domestic water
- Fire protection
- Drainage
- Natural gas
- Electricity
- Telecommunications

The Project includes the construction of a six-story residential building located at the intersection of Harrison Avenue and Hudson Street in Boston. The Site is bounded by Hudson Street to the south and east, Harrison Avenue to the west, and Tai Tung Village to the north.

7.2 Wastewater

7.2.1 Sewer Infrastructure

There is an existing Boston Water and Sewer Commission (BWSC) dedicated 24-inch sewer main in Harrison Avenue which flows in the northerly direction before joining a 24-inch by 36-inch sewer main in Oak Street, which continues into Tyler Street and transitions into a 24-inch sewer main. The flow then heads southeasterly and joins a 32-inch by 42-inch combined sewer main in Harvard Street and joins a 36-inch by 54-inch combined sewer main in Hudson Street. This flows northeasterly before heading easterly into a 54-inch combined sewer main that connects into a 72-inch combined sewer main that eventually connects into the New East Side Interceptor which ultimately flows to the MWRA Deer Island Waste Water Treatment Plant for treatment and disposal.

7.2.2 Wastewater Generation

The Site currently contains surface parking and does not generate sewer flows.

310 CMR 15.00 lists typical sewage generation values for the proposed building uses, as shown in Table 7-1. Typical generation values are conservative values for estimating the sewage flows from new construction. As shown in Table 7-1, the Project is expected to generate an increase in wastewater flows of approximate 17,448 gallons per day.

The Project is a mid-rise residential building with a total of approximately 155 bedrooms and approximately 1,400 sf of non-residential space.

Table 7-1 Proposed Project Wastewater Generation

Use	Size/Unit	310 CMR Value (gpd/unit)	Total Flow (gpd)
Existing Building Program			
Parking Lot	-	-	0
	Total Existing Sewer Flows		**0**
Proposed Residential Building (using average 310 CMR values)			
Non-Residential*	1,400 SF	97/1,000 SF	136
Total Bedrooms	155 Bedrooms	110/bedroom	17,050
		Total Proposed Sewer Flows	**17,186**

Increase in Sewer Flows (gpd):	**17,186**

*Note: The Non-Residential space uses have not yet been determined. In order to provide a conservative estimate the area was treated as a supermarket, which has the highest wastewater generation value based on the square footage, and which has a 310 CMR 15.00 of 97 gpd per 1,000 square feet.

7.2.3 Sewage Capacity & Impacts

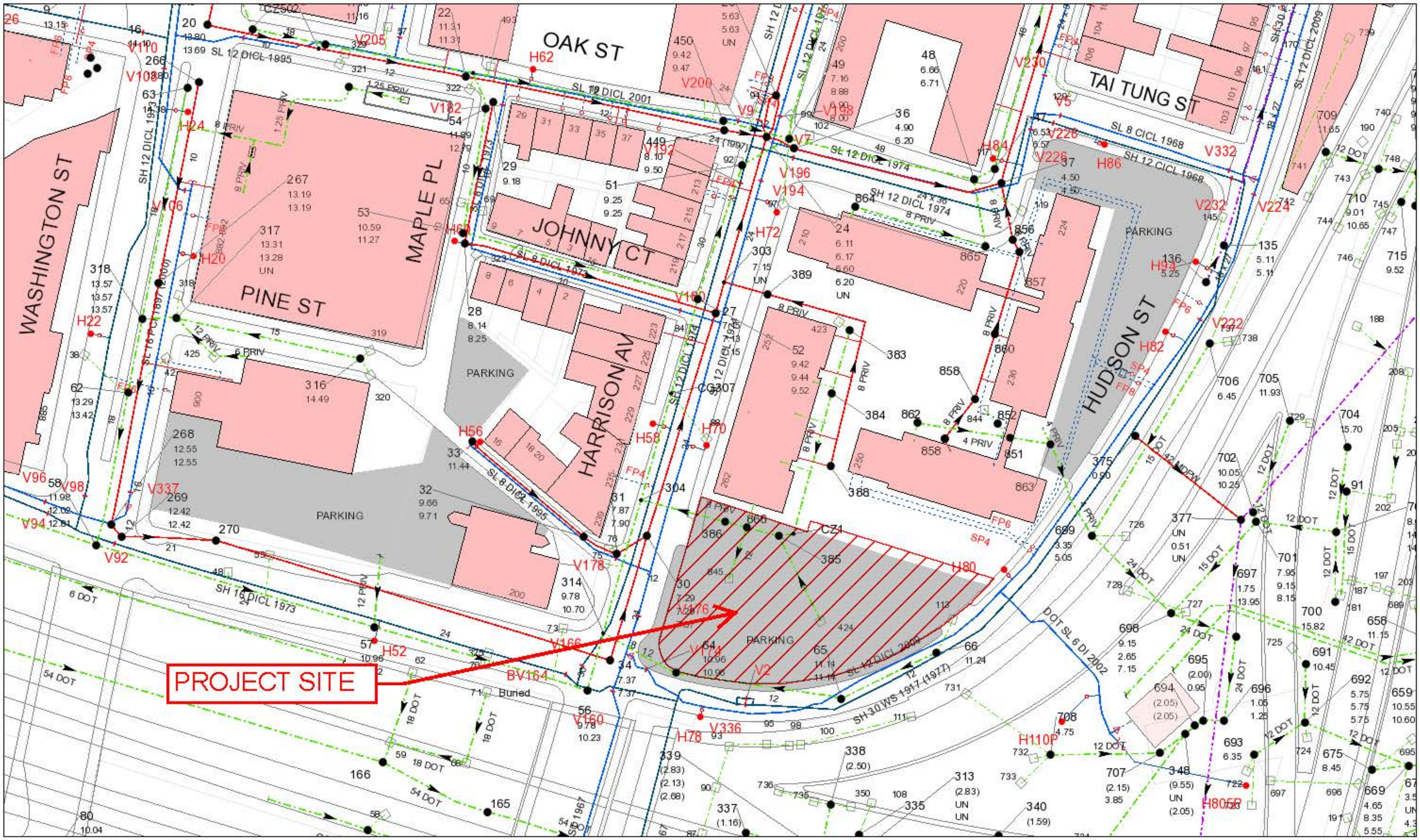
The Project's impact on the existing BWSC sewer mains in Harrison Avenue were analyzed. The existing sewer system capacity calculations are presented in Table 7-2.

Table 7-2 Sewer Hydraulic Capacity Analysis

Manhole (BWSC Number)	Distance (feet)	Invert Elevation (up)	Invert Elevation (down)	Slope (%)	Dia. (in)	Manning's Number	Flow Capacity (cfs)	Flow Capacity (MGD)
Harrison Avenue								
34 to 30	97	7.37	7.29	0.08%	24	0.013	6.50	4.20
30 to 27	179	7.29	7.133	0.09%	24	0.013	6.76	4.37
						Minimum Flow Analyzed:	6.50	4.20

Notes:

1. Manhole numbers and inverts taken from BWSC Sewer system GIS Map received on July 9, 2019. Pipe lengths taken from a plan entitled "Partial Conditions Plan Showing Proposed Lot Line, 262 Harrison Avenue", prepared by Feldman Land Surveyors, dated July 15, 2019
2. Flow Calculations based on Manning Equation



BOSTON WATER AND SEWER

N W E S

0 30 60 120 180 240 Feet

288 Harrison Residences Boston, Massachusetts

Figure 7-1

Existing Storm, Sewer, and Water Systems

Nitsch Engineering

Table 7-2 indicates the hydraulic capacity of the existing 24-inch sewer main in Harrison Avenue. The minimum hydraulic capacity is 4.20 million gallons per day (MGD) or 6.50 cubic feet per second (CFS) for the 24-inch main.

Based on an average daily flow estimate for the Project of 17,186 GPD or 0.01719 MGD; and with a factor of safety estimate of 10 (total estimate = 0.01719 MGD x 10 = 0.1719 MGD), no capacity problems are expected within the BWSC sewer systems in Harrison Avenue.

7.2.4 Proposed Conditions

The Proponent will coordinate with the BWSC on the design and capacity of the proposed connections to the sewer system. Approval for the increase in sanitary flow will come from BWSC.

New sewer services resulting from the Project will connect to the existing sanitary sewer mains in Harrison Avenue and/or Hudson Street.

Improvements and connections to BWSC infrastructure will be reviewed as part of the BWSC's Site Plan Review process for the Project. This process will include a comprehensive design review of the existing and proposed service connections, an assessment of Project demands and system capacity, and the establishment of service accounts.

7.3 Water Supply

7.3.1 Water Infrastructure

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

In Harrison Avenue, there is a 12-inch southern low main and a 12-inch southern high main. In Hudson Street, there is an 8-inch southern low main and a 30-inch southern high.

The existing water system is illustrated in Figure 7-1.

7.3.2 Water Consumption

The Project's water demand estimate for domestic services is based on the Project's estimated sewage generation, described above. A conservative factor of 1.1 (10%) is applied to the estimated average daily wastewater flows calculated with 314 CMR 15.00 values to account for consumption, system losses and other usages to estimate an average daily water demand. The Project's estimated domestic water demand is 18,905 gpd. The water for the Project will be supplied by the BWSC systems in Harrison Avenue and/or Hudson Street.

The existing Site was a parking lot and did not have an existing BWSC water account, and a new one will be opened during the site plan review process.

7.3.3 Existing Water Capacity and Impacts

BWSC record flow test data containing actual flow and pressure for hydrants within the vicinity of the Project site was requested by the Proponent. Hydrant flow data was available for one hydrant near the Site. The existing hydrant flow data is shown in Table 7-3.

Table 7-3 Existing Hydrant Flow Data

Flow Hydrant Number	Date of Test	Static Pressure (psi)	Residual Pressure	Total Flow
H80 (Hudson St)	7/29/2019	76	72	2,004

Note: Data provided by BWSC on August 7, 2019

Water capacity problems are not anticipated within this system as a result of the Project's construction.

7.3.4 Proposed Project

The domestic and fire protection water services for the Project will connect to the existing BWSC water mains in Harrison Avenue and/or Hudson Street.

The proposed Project's impacts to the existing water system will be reviewed as part of the BWSC's Site Plan Review process.

The domestic and fire protection water service connections required for the Project will meet the applicable City and State codes and standards, including cross-connection backflow prevention. Compliance with the standards for the domestic water system service connection will be reviewed as part of BWSC's Site Plan Review Process. This review will include sizing of domestic water and fire protection services, calculation of meter sizing, backflow prevention design, and location of hydrants and siamese connections that conform to BWSC and Boston Fire Department requirements.

Efforts to reduce water consumption will be made. Aeration fixtures and appliances will be chosen for water conservation qualities. If there are public restrooms, sensor operated faucets and toilets will be installed.

New water services will be installed in accordance with the latest local, state, and federal codes and standards. Backflow preventers will be installed at both domestic and fire protection service connections. New meters will be installed with Meter Transmitter Units (MTU's) as part of the BWSC's Automatic Meter Reading (AMR) system.

7.4 Stormwater

There are existing BWSC storm drain mains in Hudson Street and Harrison Avenue adjacent to the Site. There is an existing 12-inch BWSC storm drain in Hudson Street that flows easterly into the 30-inch BWSC storm drain in Harrison Avenue, which flows northerly before connecting easterly to a 48-inch storm drain in Oak Street, which continues through Tyler Street before flowing into the same 32-inch by 42-inch combined sewer as the proposed Site's sewer flows.

The existing BWSC storm drain system is illustrated in Figure 7-1.

Stormwater at the Site is currently captured by catch basins that direct the surface runoff to the mains in Hudson Street and Harrison Avenue. A portion of the roof and surface runoff from the adjacent property to the north is routed through an 8-inch drain through the Site before connecting to the drain in Harrison Avenue. The relocation of this drain will be coordinated with BWSC during the Site Plan Review process

7.4.1 Proposed Project

Stormwater improvements will be reviewed as part of the BWSC Site Plan Review process. This process includes a comprehensive design review of the proposed service connections, assessment of Project demands and system capacity, and establishment of service accounts. The proposed management system will collect site runoff and 1-inch of rainfall over the Project's impervious area, per BWSC's requirements and since the Project is located within the Boston Groundwater Overlay District (GCOD). The Project's storm drainage system will discharge to the BWSC storm drain in Harrison Avenue.

Site runoff will be collected by a closed drainage system and treated before overflowing to the BWSC storm drainage system. The recharge system will be below the basement slab.

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

7.4.2 Stormwater Measures During construction

The Project will not affect the water quality of nearby water bodies. Erosion and sediment control measures will be implemented during construction to minimize the transport of site soils to off-site areas and BWSC storm drain systems. During construction, existing catch basins will be protected with filter fabric, straw bales and/or crushed stone, to provide for sediment removal from runoff. These controls will be inspected and maintained throughout the construction phase until the areas of disturbance have been stabilized through the placement of pavement, structure, or vegetative cover.

All necessary dewatering will be conducted in accordance with applicable MWRA and BWSC discharge permits. Once construction is complete, the Project will be in compliance with local and state stormwater management policies, as described below.

7.4.3 Groundwater Recharge Measures/Smart Utilities

The Site is located within the City of Boston's Groundwater Conservation Overlay District and therefor subject to Article 32 of the Code. The purpose of the article is to prevent deterioration of and, where necessary, promote the restoration of, groundwater levels in the city of Boston, to protect and enhance the city's historic neighborhoods and structures, reduce surface water runoff and water pollution and maintain public safety. Article 32 requires that the Project captures and infiltrates no less than 1.0 inch across the portion of impervious surface area of the lot to be occupied by the Project.

The Project will comply with both Article 32 and Article 80 by capturing within a suitably-designed system a volume of rainfall on the lot equivalent to no less than 1.0 inch across that portion of the surface area of the lot to be occupied by the Project. The Project will result in no negative impact on groundwater levels within the lot in question or adjacent lots, subject to the terms of any dewatering permit.

Due to the Project's size, the Green Infrastructure requirements of the BPDA's Smart Utilities Policy do not apply.

7.4.4 MassDEP Stormwater Management Policy Standards

In March 1997, MassDEP adopted a Stormwater Management Policy to address non-point source pollution. In 1997, MassDEP published the Massachusetts Stormwater Handbook as guidance on the Stormwater Policy, which was revised in February 2008. The Policy prescribes specific stormwater management standards for development projects, including urban pollutant removal criteria for projects that may impact environmental resource areas. Compliance is achieved through the implementation of Best Management Practices (BMPs) in the stormwater management design. The Policy is administered locally pursuant to MGL Ch. 131, s. 40.

A brief explanation of each Policy Standard and the system compliance is provided below:

Standard #1: No new stormwater conveyances (e.g., outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

Compliance: The Project will comply with this Standard. The design will incorporate the appropriate stormwater treatment and no new untreated stormwater will be directly discharged to, nor will erosion be caused to wetlands or waters of the Commonwealth as a result of stormwater discharges related to the Project.

Standard #2: Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR.

Compliance: The Project will comply with this Standard. The existing discharge rate will be met or decreased as a result of the improvements associated with the Project.

Standard #3: Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures including environmental sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

Compliance: The Project will comply with this Standard to the maximum extent practicable.

Standard #4: Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This Standard is met when:

a. Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained;

b. Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and

c. Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.

Compliance: The Project will comply with this Standard. Within the Project's limit of work, there will be mostly building roof, paved sidewalk, parking, and roadway areas. Runoff from paved areas that would contribute unwanted sediments or pollutants to the existing storm drain system will be collected by deep sump, hooded catch basins and conveyed through water quality units before discharging into the BWSC system.

Standard #5: For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention all land uses with higher potential pollutant loads cannot be completely protected from exposure to rain, snow, snow melt, and stormwater runoff, the proponent shall use the specific structural stormwater BMPs determined by the Department to be suitable for such uses as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from land uses with higher potential pollutant loads shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53 and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.

Compliance: The Project will comply with this Standard. The Project is not associated with Higher Potential Pollutant Loads (per the Policy, Volume I, page 1-6).

Standard #6: Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area, require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A "storm water discharge" as defined in 314 CMR 3.04(2)(a)1 or (b) to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of a public water supply.

Compliance: The Project will comply with this Standard. The Project will not discharge untreated stormwater to a sensitive area or any other area.

Standard #7: A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural stormwater best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

Compliance: The Project is a new development and thus this Standard is not applicable.

Standard #8: A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.

Compliance: The Project will comply with this Standard. Sedimentation and erosion controls will be incorporated as part of the design of the Project and employed during construction.

Standard 9: A Long-Term Operation and Maintenance (O&M) Plan shall be developed and implemented to ensure that stormwater management systems function as designed.

Compliance: The Project will comply with this Standard. An O&M Plan including long-term BMP operation requirements will be prepared for the Project and will assure proper maintenance and functioning of the stormwater management system.

Standard 10: All illicit discharges to the stormwater management system are prohibited.

Compliance: The Project will comply with this Standard. There will be no illicit connections associated with the Project.

7.5 Electrical Service

Electrical service will be coordinated with National Grid, the local provider.

7.6 Telecommunications Systems

Telecommunication service will be coordinated with the telecommunication providers.

7.7 Gas Systems

Natural gas service will be coordinated with the National Grid, the local provider.

Chapter 8.0

Coordination with other Governmental Agencies

8.0 COORDINATION WITH OTHER GOVERNMENTAL AGENCIES

8.1 Architectural Access Board Requirements

The Project will comply with the requirements of the Massachusetts Architectural Access Board and will be designated to comply with the standards of the Americans with Disabilities Act. See Appendix F for the completed Accessibility Checklist.

8.2 Massachusetts Environmental Policy Act (MEPA)

A project is subject to the Massachusetts Environmental Policy Act (MEPA) review when the following two conditions are met: (1) a project is subject to MEPA jurisdiction, and (2) a MEPA review threshold is exceeded. The Project does anticipate pursuing state funding, however, no MEPA review thresholds will be exceeded.

8.3 Massachusetts Historical Commission

As a result of the anticipated use of state funding, the Project will be subject to review by the Massachusetts Historical Commission (MHC) in accordance with State Register Review regulations (Chapter 254). At the appropriate time the Proponent will file an MHC Project Notification Form to initiate MHC's review of the Project.

8.4 Boston Civic Design Commission

The Project will comply with the provisions of Article 28 of the Boston Zoning Code. An application will be submitted to the Boston Civic Design Commission by the BPDA as part of the Article 80 process.

Appendix A

Floor Plans and Elevations

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Typical Floor Plan

0 10 20

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West Elevation

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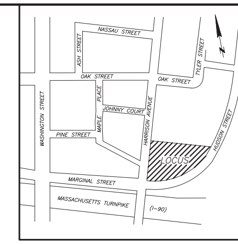
South Elevation

288 Harrison Residences Boston, Massachusetts

Southeast Elevation

Appendix B

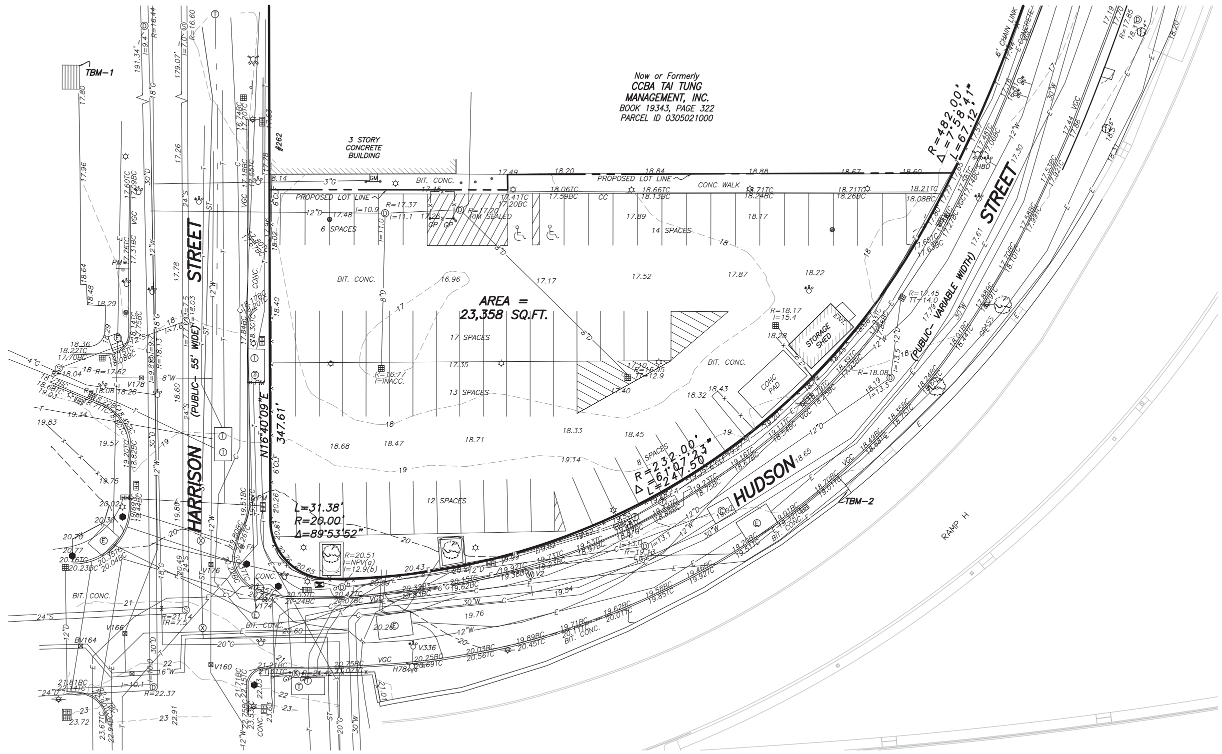
Site Survey



LOCUS MAP NOT TO SCALE

LEGEND

	CABLE TV MANHOLE
	DRAIN MANHOLE
	ELECTRIC MANHOLE
	SEWER MANHOLE
	STEAM MANHOLE
	TELEPHONE MANHOLE
	WATER MANHOLE
	GAS SHUT OFF/GAS GATE
	WATER SHUT OFF/WATER GATE
	BOSTON WATER VALVE
	HYDRANT
	LIGHT POLE
	CATCH BASIN
	ELECTIC HANDHOLE
	TRAFFIC SIGNAL
	TRAFFIC CONTROL BOX
•GP	GATE POST
○PM	PARKING METER
GM	GAS METER
	DECIDUOUS TREE
	BOLLARD
	HANDICAP PARKING SPACES
FA	FIRE ALARM
BIT	BITUMINOUS
CLF	CHAIN LINK FENCE
CC	CONCRETE CURB
CONC	CONCRETE
I=	INVERT ELEVATION
NVP	NO VISIBLE PIPES
INACC.	INACCESSIBLE
R=	RADIUS OR RIM ELEVATION
SQ. FT.	SQUARE FEET
TBM	TEMPORARY BENCHMARK
TT=	TOP OF TRAP
TR=	CENTERLINE OF TROUGH
VGC	VERTICAL GRANITE CURB
—x—x—	CHAIN LINK FENCE
—C—	CABLE TELEVISION
—D—	DRAIN
—G—	GAS
—S—	SEWER
—ST—	STEAM
—L—	STREET LIGHTING
—T—	TELEPHONE
—W—	WATER



NOTES:

1) BENCH MARK INFORMATION:

BENCH MARK USED:
THE RIGHT OUTER CORNER OF THE LOWER CONCRETE STEP AT THE HARVARD STREET ENTRANCE TO THE TUFTS SCHOOL OF VETERINARY MEDICINE #136 HARRISON AVENUE. ELEVATION = 16.86

TEMPORARY BENCH MARKS SET:

TBM–1: RIGHT OUT CORNER OF LOWER GRANITE STEP AT #229 HARRISON AVENUE, ELEVATION = 17.97.

TBM–2: FRONT RIGHT ANCHOR BOLT FOR FENCE ON TOP OF 4 FOOT WALL, ELEVATION = 22.47.

2) ELEVATIONS REFER TO BOSTON CITY BASE.

3) CONTOUR INTERVAL EQUALS ONE (1) FOOT.

4) BY GRAPHIC PLOTTING ONLY, THE PARCEL SHOWN HEREON LIES WITHIN A ZONE "X" (UNSHADED), AN AREA OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOOD, AS SHOWN ON THE FEDERAL EMERGENCY MANAGEMENT AGENCY (F.E.M.A) FLOOD INSURANCE RATE MAP (F.I.R.M.) FOR SUFFOLK COUNTY, MASSACHUSETTS, MAP NUMBER 25025C0081J AND MAP NUMBER 25025C0077J, CITY OF BOSTON COMMUNITY NUMBER 250286, PANEL NUMBER 0081J & 0077J, BOTH HAVING AN EFFECTIVE DATE OF MARCH 16, 2016.

5) UTILITY INFORMATION SHOWN IS BASED ON BOTH A FIELD SURVEY AND PLANS OF RECORD. THE LOCATIONS OF UNDERGROUND PIPES AND CONDUITS HAVE BEEN DETERMINED FROM THE AFOREMENTIONED RECORD PLANS AND ARE APPROXIMATE ONLY. WE CANNOT ASSUME RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES THAT ARE OMITTED OR INACCURATELY SHOWN ON SAID RECORD PLANS, SINCE SUBSURFACE UTILITIES CANNOT BE VISIBLY VERIFIED. BEFORE PLANNING FUTURE CONNECTIONS, THE PROPER UTILITY ENGINEERING DEPARTMENT SHOULD BE CONSULTED AND THE ACTUAL LOCATION OF SUBSURFACE STRUCTURES SHOULD BE DETERMINED IN THE FIELD. CALL, TOLL FREE, THE DIG SAFE CALL CENTER AT 1–888–344–7233 SEVENTY–TWO HOURS PRIOR TO EXCAVATION.

6) THIS DOCUMENT IS AN INSTRUMENT OF SERVICE OF FELDMAN LAND SURVEYORS ISSUED TO OUR CLIENT FOR PURPOSES RELATED DIRECTLY AND SOLELY TO FELDMAN LAND SURVEYORS' SCOPE OF SERVICES UNDER CONTRACT TO OUR CLIENT FOR THIS PROJECT. ANY USE OR REUSE OF THIS DOCUMENT FOR ANY REASON BY ANY PARTY FOR PURPOSES UNRELATED DIRECTLY AND SOLELY TO SAID CONTRACT SHALL BE AT THE USER'S SOLE AND EXCLUSIVE RISK AND LIABILITY, INCLUDING LIABILITY FOR VIOLATION OF COPYRIGHT LAWS, UNLESS WRITTEN CONSENT IS PROVIDED BY FELDMAN LAND SURVEYORS.

I CERTIFY THAT THIS PLAN IS BASED ON AN ACTUAL FIELD SURVEY AND THE LATEST PLANS AND DEEDS OF RECORD.

KARL A. MCCARTHY, PLS (MA# 38714)
kam@feldmansurveyors.com

DATE

8-19-2019	AREA REVISED

PARTIAL EXISTING CONDITIONS PLAN
262 HARRISON AVENUE
BOSTON, MASS.

FELDMAN LAND SURVEYORS
152 HAMPDEN STREET
BOSTON, MASS. 02119
PHONE: (617)357-9740
www.feldmansurveyors.com

JULY 28, 2017

FELDMAN
LAND SURVEYORS

20 0 10 20 40 80

SCALE: 1"=20'

RESEARCH	FIELD CHIEF GD	PROJ MGR KAM	APPROVED	SHEET NO. 1 OF 1
CALC SCH	CADD MDS	FIELD CHECKED	CRD FILE 15773	JOB NO. 15773

FILENAME: S:\PROJECTS\15700s\15773\DWG\15773-EC.dwg

Appendix C

Transportation

Appendix C – Transportation

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

- Existing (2019) Condition
- No-Build (2026) Condition
- Build (2026) Condition

Vehicle, Pedestrian, and Bicycle Counts

Client:	Melissa Restrepo
Project #:	411_C23_HSH
BTD #:	Location 1
Location:	Boston, MA
Street 1:	Kneeland Street
Street 2:	Hudson Street
Count Date:	6/25/2019
Day of Week:	Tuesday
Weather:	Mostly Cloudy, 65°F

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

PASSENGER CARS & HEAVY VEHICLES COMBINED

	Hudson Street Northbound				Hudson Street Southbound				Kneeland Street Eastbound				Kneeland Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	0	0	0	0	0	0	0	0	82	3	0	14	183	13
7:15 AM	0	0	0	0	0	0	0	0	0	1	95	4	0	12	210	15
7:30 AM	0	0	0	0	0	0	0	0	0	1	88	3	0	21	218	20
7:45 AM	0	0	0	0	0	0	0	0	0	2	93	3	0	22	215	26
8:00 AM	0	0	0	0	0	0	0	0	0	2	104	8	2	18	207	18
8:15 AM	0	0	0	0	0	0	0	0	0	5	97	6	1	23	212	27
8:30 AM	0	0	0	0	0	0	0	0	0	2	115	6	0	19	197	19
8:45 AM	0	0	0	0	0	0	0	0	0	4	93	8	0	20	206	18

	Hudson Street Northbound				Hudson Street Southbound				Kneeland Street Eastbound				Kneeland Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	0	0	0	0	0	0	0	3	181	10	0	19	154	10
4:15 PM	0	0	0	0	0	0	0	0	0	2	177	9	2	20	142	17
4:30 PM	0	0	0	0	0	0	0	0	1	6	172	8	2	23	157	15
4:45 PM	0	0	0	0	0	0	0	0	0	6	183	5	0	20	153	16
5:00 PM	0	0	0	0	0	0	0	0	0	8	175	6	1	22	146	15
5:15 PM	0	0	0	0	0	0	0	0	0	4	179	8	0	24	156	14
5:30 PM	0	0	0	0	0	0	0	0	0	5	152	6	0	23	143	10
5:45 PM	0	0	0	0	0	0	0	0	0	4	143	5	1	22	152	9

AM PEAK HOUR 7:45 AM to 8:45 AM	Hudson Street Northbound				Hudson Street Southbound				Kneeland Street Eastbound				Kneeland Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**11**	**409**	**23**	**3**	**82**	**831**	**90**
PHF	**0.00**				**0.00**				**0.90**				**0.96**			
HV %	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**8.1%**	**4.3%**	**0.0%**	**3.7%**	**7.2%**	**4.4%**

PM PEAK HOUR 4:30 PM to 5:30 PM	Hudson Street Northbound				Hudson Street Southbound				Kneeland Street Eastbound				Kneeland Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**24**	**709**	**27**	**3**	**89**	**612**	**60**
PHF	**0.00**				**0.00**				**0.98**				**0.97**			
HV %	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**3.0%**	**0.0%**	**0.0%**	**3.4%**	**4.6%**	**1.7%**

Client: Melissa Restrepo
Project #: 411_C23_HSH
BTD #: Location 1
Location: Boston, MA
Street 1: Kneeland Street
Street 2: Hudson Street
Count Date: 6/25/2019
Day of Week: Tuesday
Weather: Mostly Cloudy, 65°F

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

HEAVY VEHICLES

	Hudson Street Northbound				Hudson Street Southbound				Kneeland Street Eastbound				Kneeland Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	0	0	0	0	0	0	0	0	12	0	0	0	15	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	7	0	0	0	16	1
7:30 AM	0	0	0	0	0	0	0	0	0	0	8	0	0	1	15	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	9	0	0	1	14	1
8:00 AM	0	0	0	0	0	0	0	0	0	0	10	0	0	1	17	1
8:15 AM	0	0	0	0	0	0	0	0	0	0	6	1	0	1	16	1
8:30 AM	0	0	0	0	0	0	0	0	0	0	8	0	0	0	13	1
8:45 AM	0	0	0	0	0	0	0	0	0	0	5	0	0	1	12	1

	Hudson Street Northbound				Hudson Street Southbound				Kneeland Street Eastbound				Kneeland Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	0	0	0	0	0	0	0	0	3	0	0	1	4	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	3	0	0	1	4	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	6	0	0	0	7	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	1	9	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	7	0	0	1	5	1
5:15 PM	0	0	0	0	0	0	0	0	0	0	6	0	0	1	7	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	4	1
5:45 PM	0	0	0	0	0	0	0	0	0	0	4	0	0	1	6	0

AM PEAK HOUR 7:30 AM to 8:30 AM	Hudson Street Northbound				Hudson Street Southbound				Kneeland Street Eastbound				Kneeland Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**33**	**1**	**0**	**4**	**62**	**3**
PHF	**0.00**				**0.00**				**0.85**				**0.91**			

PM PEAK HOUR 4:30 PM to 5:30 PM	Hudson Street Northbound				Hudson Street Southbound				Kneeland Street Eastbound				Kneeland Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**21**	**0**	**0**	**3**	**28**	**1**
PHF	**0.00**				**0.00**				**0.75**				**0.80**			

Client: Melissa Restrepo
Project #: 411_C23_HSH
BTD #: Location 1
Location: Boston, MA
Street 1: Kneeland Street
Street 2: Hudson Street
Count Date: 6/25/2019
Day of Week: Tuesday
Weather: Mostly Cloudy, 65°F

BOSTON
TRAFFIC DATA
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PEDESTRIANS & BICYCLES

	Hudson Street Northbound					Hudson Street Southbound					Kneeland Street Eastbound					Kneeland Street Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
7:00 AM	0	0	1	32		0	0	0	30		0	3	0	3		0	2	0	2	
7:15 AM	0	0	0	35		0	0	0	34		0	2	0	0		0	4	0	1	
7:30 AM	1	0	0	38		0	0	0	36		1	7	0	1		0	1	0	0	
7:45 AM	0	0	3	44		0	0	0	40		0	3	0	0		0	3	0	1	
8:00 AM	0	0	1	40		0	0	0	42		0	3	0	1		0	4	0	3	
8:15 AM	0	1	1	42		0	0	0	45		0	4	0	0		1	3	0	0	
8:30 AM	0	0	0	45		0	0	0	50		2	10	0	1		3	6	0	1	
8:45 AM	0	0	0	48		0	0	0	52		1	7	0	0		0	4	0	1	

	Hudson Street Northbound					Hudson Street Southbound					Kneeland Street Eastbound					Kneeland Street Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
4:00 PM	0	0	1	45		1	1	0	48		0	1	0	0		0	3	0	1	
4:15 PM	0	0	0	48		1	0	0	50		0	2	0	2		0	6	0	0	
4:30 PM	0	0	0	52		1	0	0	52		0	1	0	0		0	2	0	1	
4:45 PM	0	0	2	50		0	0	0	55		0	5	1	0		2	9	1	2	
5:00 PM	0	0	0	54		0	0	1	60		0	3	0	1		3	9	0	0	
5:15 PM	0	0	1	58		0	1	0	64		0	4	1	0		0	12	0	0	
5:30 PM	0	0	0	62		0	1	0	68		0	1	0	0		4	8	0	1	
5:45 PM	0	0	0	68		0	1	0	72		0	3	1	1		5	9	0	0	

AM PEAK HOUR[1] 7:45 AM to 8:45 AM	Hudson Street Northbound					Hudson Street Southbound					Kneeland Street Eastbound					Kneeland Street Westbound				
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	1	5	171		0	0	0	177		2	20	0	2		4	16	0	5	

PM PEAK HOUR[1] 4:30 PM to 5:30 PM	Hudson Street Northbound					Hudson Street Southbound					Kneeland Street Eastbound					Kneeland Street Westbound				
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	0	3	214		1	1	1	231		0	13	2	1		5	32	1	3	

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

Client:	Melissa Restrepo
Project #:	411_C23_HSH
BTD #:	Location 2
Location:	Boston, MA
Street 1:	Hudson Street
Street 2:	Tai Tung Street
Count Date:	6/25/2019
Day of Week:	Tuesday
Weather:	Mostly Cloudy, 65°F

BOSTON TRAFFIC DATA

PO BOX 1723, Framingham, MA 01701
Office: 978-746-1259
DataRequest@BostonTrafficData.com
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PASSENGER CARS & HEAVY VEHICLES COMBINED

	Hudson Street Northbound				Hudson Street Southbound				Tai Tung Street Eastbound				Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	0	0	0	0	16	1	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	15	0	0	0	0	1	0	0	0	0
7:30 AM	0	0	0	0	0	0	22	2	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	21	3	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	25	1	0	0	0	1	0	0	0	0
8:15 AM	0	0	0	0	0	0	26	3	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	22	3	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	23	5	0	0	0	0	0	0	0	0

	Hudson Street Northbound				Hudson Street Southbound				Tai Tung Street 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	0	0	0	0	27	2	0	0	0	1	0	0	0	0
4:15 PM	0	0	0	0	0	0	28	1	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	24	8	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	23	2	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	27	1	0	0	0	1	0	0	0	0
5:15 PM	0	0	0	0	0	0	30	2	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	26	3	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	25	3	0	0	0	1	0	0	0	0

AM PEAK HOUR	Hudson Street Northbound				Hudson Street Southbound				Tai Tung Street Eastbound				Westbound			
8:00 AM to 9:00 AM	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**0**	**96**	**12**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**
PHF	**0.00**				**0.93**				**0.25**				**0.00**			
HV %	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**3.1%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

PM PEAK HOUR	Hudson Street Northbound				Hudson Street Southbound				Tai Tung Street Eastbound				Westbound			
5:00 PM to 6:00 PM	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**0**	**108**	**9**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**
PHF	**0.00**				**0.91**				**0.50**				**0.00**			
HV %	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**2.8%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

Client: Melissa Restrepo
Project #: 411_C23_HSH
BTD #: Location 2
Location: Boston, MA
Street 1: Hudson Street
Street 2: Tai Tung Street
Count Date: 6/25/2019
Day of Week: Tuesday
Weather: Mostly Cloudy, 65°F

BOSTON TRAFFIC DATA
PO BOX 1723, Framingham, MA 01701
Office: 978-746-1259
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HEAVY VEHICLES

	Hudson Street Northbound				Hudson Street Southbound				Tai Tung Street Eastbound				Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0

	Hudson Street Northbound				Hudson Street Southbound				Tai Tung Street 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	0	0	0	0	1	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0

AM PEAK HOUR 7:30 AM to 8:30 AM	Hudson Street Northbound				Hudson Street Southbound				Tai Tung Street Eastbound				Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**0**	**5**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PHF	**0.00**				**0.63**				**0.00**				**0.00**			

PM PEAK HOUR 5:00 PM to 6:00 PM	Hudson Street Northbound				Hudson Street Southbound				Tai Tung Street Eastbound				Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PHF	**0.00**				**0.75**				**0.00**				**0.00**			

Client:	Melissa Restrepo
Project #:	411_C23_HSH
BTD #:	Location 2
Location:	Boston, MA
Street 1:	Hudson Street
Street 2:	Tai Tung Street
Count Date:	6/25/2019
Day of Week:	Tuesday
Weather:	Mostly Cloudy, 65°F

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PEDESTRIANS & BICYCLES

	Hudson Street Northbound					Hudson Street Southbound					Tai Tung Street Eastbound					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	8		0	0	0	0		0	0	0	3		0	0	0	0	
7:15 AM	0	0	0	9		0	0	1	1		0	0	0	2		0	0	0	0	
7:30 AM	0	0	0	7		0	0	0	0		0	0	0	2		0	0	0	0	
7:45 AM	0	3	0	9		0	0	0	0		0	0	0	1		0	0	0	0	
8:00 AM	0	1	0	13		0	0	0	1		0	0	0	2		0	0	0	0	
8:15 AM	0	1	0	11		0	1	0	0		0	0	1	2		0	0	0	0	
8:30 AM	0	0	0	12		0	2	0	0		0	0	0	3		0	0	0	0	
8:45 AM	0	0	0	10		0	0	0	0		0	0	0	2		0	0	0	0	

	Hudson Street Northbound					Hudson Street Southbound					Tai Tung Street 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	11		0	1	0	1		0	0	0	3		0	0	0	0	
4:15 PM	0	0	0	14		0	0	0	2		0	0	0	3		0	0	0	0	
4:30 PM	0	1	0	18		0	0	0	1		0	0	0	4		0	0	0	0	
4:45 PM	0	1	0	22		0	3	0	0		0	0	0	4		0	0	0	0	
5:00 PM	0	0	0	25		0	4	0	1		0	0	0	7		0	0	0	0	
5:15 PM	0	1	0	24		0	3	0	1		0	0	0	6		0	0	0	0	
5:30 PM	0	0	0	26		0	4	0	0		0	0	0	7		0	0	0	0	
5:45 PM	0	0	0	23		0	9	0	0		0	0	0	6		0	0	0	0	

AM PEAK HOUR[1] 8:00 AM to 9:00 AM	Hudson Street Northbound					Hudson Street Southbound					Tai Tung Street Eastbound					Westbound				
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	2	0	46		0	3	0	1		0	0	1	9		0	0	0	0	

PM PEAK HOUR[1] 5:00 PM to 6:00 PM	Hudson Street Northbound					Hudson Street Southbound					Tai Tung Street Eastbound					Westbound				
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	1	0	98		0	20	0	2		0	0	0	26		0	0	0	0	

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

Client:	Melissa Restrepo
Project #:	411_C23_HSH
BTD #:	Location 3
Location:	Boston, MA
Street 1:	Hudson Street
Street 2:	Existing Parking Lot Driveway
Count Date:	6/25/2019
Day of Week:	Tuesday
Weather:	Mostly Cloudy, 65°F

BOSTON TRAFFIC DATA
PO BOX 1723, Framingham, MA 01701
Office: 978-746-1259
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PASSENGER CARS & HEAVY VEHICLES COMBINED

	Hudson Street Northbound				Hudson Street Southbound				Existing Parking Lot Driveway Eastbound				Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	0	0	0	0	14	2	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	15	1	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	22	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	20	1	0	0	0	1	0	0	0	0
8:00 AM	0	0	0	0	0	0	25	1	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	22	4	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	21	1	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	23	0	0	0	0	1	0	0	0	0

	Hudson Street Northbound				Hudson Street Southbound				Existing Parking Lot Driveway 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	0	0	0	0	28	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	26	2	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	23	1	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	22	1	0	0	0	1	0	0	0	0
5:00 PM	0	0	0	0	0	0	27	1	0	0	0	1	0	0	0	0
5:15 PM	0	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	25	1	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	24	2	0	0	0	0	0	0	0	0

AM PEAK HOUR 8:00 AM to 9:00 AM	Hudson Street Northbound				Hudson Street Southbound				Existing Parking Lot Driveway Eastbound				Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**0**	**91**	**6**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**
PHF	**0.00**				**0.93**				**0.25**				**0.00**			
HV %	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**3.3%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

PM PEAK HOUR 5:00 PM to 6:00 PM	Hudson Street Northbound				Hudson Street Southbound				Existing Parking Lot Driveway Eastbound				Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**0**	**106**	**4**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**
PHF	**0.00**				**0.92**				**0.25**				**0.00**			
HV %	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**2.8%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

Client:	Melissa Restrepo
Project #:	411_C23_HSH
BTD #:	Location 3
Location:	Boston, MA
Street 1:	Hudson Street
Street 2:	Existing Parking Lot Driveway
Count Date:	6/25/2019
Day of Week:	Tuesday
Weather:	Mostly Cloudy, 65°F

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HEAVY VEHICLES

	Hudson Street Northbound				Hudson Street Southbound				Existing Parking Lot Driveway Eastbound				Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0

	Hudson Street Northbound				Hudson Street Southbound				Existing Parking Lot Driveway 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	0	0	0	0	1	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0

AM PEAK HOUR 7:30 AM to 8:30 AM	Hudson Street Northbound				Hudson Street Southbound				Existing Parking Lot Driveway Eastbound				Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**0**	**5**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PHF	**0.00**				**0.63**				**0.00**				**0.00**			

PM PEAK HOUR 5:00 PM to 6:00 PM	Hudson Street Northbound				Hudson Street Southbound				Existing Parking Lot Driveway Eastbound				Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PHF	**0.00**				**0.75**				**0.00**				**0.00**			

Client:	Melissa Restrepo
Project #:	411_C23_HSH
BTD #:	Location 3
Location:	Boston, MA
Street 1:	Hudson Street
Street 2:	Existing Parking Lot Driveway
Count Date:	6/25/2019
Day of Week:	Tuesday
Weather:	Mostly Cloudy, 65°F

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PEDESTRIANS & BICYCLES

	Hudson Street Northbound					Hudson Street Southbound					Existing Parking Lot Driveway Eastbound					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	0		0	0	0	0		0	0	0	12		0	0	0	0	
7:15 AM	0	0	0	0		0	0	0	0		0	0	0	11		0	0	0	0	
7:30 AM	0	0	0	0		0	0	0	0		0	0	0	10		0	0	0	0	
7:45 AM	0	3	0	0		0	0	0	0		0	0	0	11		0	0	0	0	
8:00 AM	0	1	0	0		0	0	0	0		0	0	0	15		0	0	0	0	
8:15 AM	0	1	0	0		0	1	0	0		0	0	0	14		0	0	0	0	
8:30 AM	0	0	0	0		0	3	0	0		0	0	0	15		0	0	0	0	
8:45 AM	0	0	0	0		0	0	0	0		0	0	0	12		0	0	0	0	

	Hudson Street Northbound					Hudson Street Southbound					Existing Parking Lot Driveway 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	0		0	0	0	0		0	0	0	14		0	0	0	0	
4:15 PM	0	0	0	0		0	0	0	0		0	0	0	17		0	0	0	0	
4:30 PM	0	1	0	0		0	0	0	0		0	0	0	22		0	0	0	0	
4:45 PM	0	1	0	0		0	3	0	0		0	0	0	25		0	0	0	0	
5:00 PM	0	0	0	0		0	4	0	0		0	0	0	32		0	0	0	0	
5:15 PM	0	1	0	0		0	2	0	0		1	0	0	30		0	0	0	0	
5:30 PM	0	0	0	0		0	10	0	0		0	0	0	31		0	0	0	0	
5:45 PM	0	1	0	0		0	8	0	0		0	0	0	29		0	0	0	0	

AM PEAK HOUR[1] 8:00 AM to 9:00 AM	Hudson Street Northbound					Hudson Street Southbound					Existing Parking Lot Driveway Eastbound					Westbound				
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	2	0	0		0	4	0	0		0	0	0	56		0	0	0	0	

PM PEAK HOUR[1] 5:00 PM to 6:00 PM	Hudson Street Northbound					Hudson Street Southbound					Existing Parking Lot Driveway Eastbound					Westbound				
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	2	0	0		0	24	0	0		1	0	0	122		0	0	0	0	

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

Client:	Melissa Restrepo
Project #:	411_C23_HSH
BTD #:	Location 4
Location:	Boston, MA
Street 1:	Harrison Avenue
Street 2:	Marginal Road/Hudson Street
Count Date:	6/25/2019
Day of Week:	Tuesday
Weather:	Mostly Cloudy, 65°F

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PASSENGER CARS & HEAVY VEHICLES COMBINED

	Harrison Avenue Northbound				Harrison Avenue Southbound				Marginal Road Eastbound				Hudson Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	0	0	0	0	39	14	0	0	0	0	0	6	8	0
7:15 AM	0	0	0	0	0	0	35	20	0	0	0	0	0	8	7	0
7:30 AM	0	0	0	0	0	0	38	25	0	0	0	0	0	6	16	0
7:45 AM	0	0	0	0	0	0	42	28	0	0	0	0	0	7	14	0
8:00 AM	0	0	0	0	0	0	45	26	0	0	0	0	0	10	15	0
8:15 AM	0	0	0	0	0	0	43	18	0	0	0	0	0	9	13	0
8:30 AM	0	0	0	0	0	0	41	14	0	0	0	0	0	7	14	0
8:45 AM	0	0	0	0	0	0	45	17	0	0	0	0	0	8	16	0

	Harrison Avenue Northbound				Harrison Avenue Southbound				Marginal Road Eastbound				Hudson Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	0	0	0	0	92	27	0	0	0	0	0	12	16	0
4:15 PM	0	0	0	0	0	0	89	22	0	0	0	0	0	13	13	0
4:30 PM	0	0	0	0	0	0	103	25	0	0	0	0	0	11	12	0
4:45 PM	0	0	0	0	0	0	98	28	0	0	0	0	0	8	15	0
5:00 PM	0	0	0	0	0	0	87	32	0	0	0	0	0	10	18	0
5:15 PM	0	0	0	0	0	0	102	35	0	0	0	0	0	15	15	0
5:30 PM	0	0	0	0	0	0	106	37	0	0	0	0	0	12	13	0
5:45 PM	0	0	0	0	0	0	101	33	0	0	0	0	0	10	14	0

AM PEAK HOUR 7:30 AM to 8:30 AM	Harrison Avenue Northbound				Harrison Avenue Southbound				Marginal Road Eastbound				Hudson Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**0**	**168**	**97**	**0**	**0**	**0**	**0**	**0**	**32**	**58**	**0**
PHF	**0.00**				**0.93**				**0.00**				**0.90**			
HV %	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**3.6%**	**7.2%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**12.5%**	**1.7%**	**0.0%**

PM PEAK HOUR 5:00 PM to 6:00 PM	Harrison Avenue Northbound				Harrison Avenue Southbound				Marginal Road Eastbound				Hudson Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**0**	**396**	**137**	**0**	**0**	**0**	**0**	**0**	**47**	**60**	**0**
PHF	**0.00**				**0.93**				**0.00**				**0.89**			
HV %	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.8%**	**1.5%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**4.3%**	**1.7%**	**0.0%**

Client: Melissa Restrepo
Project #: 411_C23_HSH
BTD #: Location 4
Location: Boston, MA
Street 1: Harrison Avenue
Street 2: Marginal Road/Hudson Street
Count Date: 6/25/2019
Day of Week: Tuesday
Weather: Mostly Cloudy, 65°F

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HEAVY VEHICLES

	Harrison Avenue Northbound				Harrison Avenue Southbound				Marginal Road Eastbound				Hudson Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	3	1	0	0	0	0	0	1	0	0
7:45 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	2	0	0
8:00 AM	0	0	0	0	0	0	0	4	0	0	0	0	0	0	1	0
8:15 AM	0	0	0	0	0	0	2	2	0	0	0	0	0	1	0	0
8:30 AM	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0

	Harrison Avenue Northbound				Harrison Avenue Southbound				Marginal Road Eastbound				Hudson Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0
5:15 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0
5:30 PM	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0

AM PEAK HOUR 7:30 AM to 8:30 AM	Harrison Avenue Northbound				Harrison Avenue Southbound				Marginal Road Eastbound				Hudson Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**0**	**6**	**7**	**0**	**0**	**0**	**0**	**0**	**4**	**1**	**0**
PHF	**0.00**				**0.81**				**0.00**				**0.63**			

PM PEAK HOUR 5:00 PM to 6:00 PM	Harrison Avenue Northbound				Harrison Avenue Southbound				Marginal Road Eastbound				Hudson Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**0**	**3**	**2**	**0**	**0**	**0**	**0**	**0**	**2**	**1**	**0**
PHF	**0.00**				**0.63**				**0.00**				**0.75**			

Client: Melissa Restrepo
Project #: 411_C23_HSH
BTD #: Location 4
Location: Boston, MA
Street 1: Harrison Avenue
Street 2: Marginal Road/Hudson Street
Count Date: 6/25/2019
Day of Week: Tuesday
Weather: Mostly Cloudy, 65°F

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PEDESTRIANS & BICYCLES

	Harrison Avenue Northbound					Harrison Avenue Southbound					Marginal Road Eastbound					Hudson Street Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
7:00 AM	0	0	0	2		0	3	2	6		0	0	0	16		1	0	0	15	
7:15 AM	1	2	0	0		0	0	0	11		0	0	0	22		0	0	0	24	
7:30 AM	0	2	1	1		0	0	0	14		0	1	0	28		0	0	0	36	
7:45 AM	0	0	0	0		0	2	0	16		0	0	0	35		0	0	0	43	
8:00 AM	0	2	1	2		0	0	0	18		0	0	0	40		0	0	0	52	
8:15 AM	0	4	0	1		0	0	0	14		0	0	0	42		1	0	0	46	
8:30 AM	0	0	1	0		0	1	1	15		0	0	0	44		2	0	0	48	
8:45 AM	0	0	0	1		0	2	0	12		0	0	0	48		0	0	0	45	

	Harrison Avenue Northbound					Harrison Avenue Southbound					Marginal Road Eastbound					Hudson Street Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
4:00 PM	1	2	1	1		0	3	0	15		0	0	0	45		1	0	0	40	
4:15 PM	0	1	0	0		0	5	0	14		0	0	0	50		0	0	0	48	
4:30 PM	1	1	0	0		0	4	2	16		0	0	0	56		0	0	0	56	
4:45 PM	0	4	0	1		0	7	0	17		0	0	0	62		3	0	0	62	
5:00 PM	0	0	0	0		0	13	2	16		0	0	0	68		3	0	0	75	
5:15 PM	0	0	1	1		0	7	0	15		0	0	0	66		0	0	0	70	
5:30 PM	0	1	0	0		1	6	2	14		0	0	0	68		6	0	0	74	
5:45 PM	1	1	1	0		0	3	0	12		0	0	0	65		3	0	0	72	

AM PEAK HOUR[1]	Harrison Avenue Northbound					Harrison Avenue Southbound					Marginal Road Eastbound					Hudson Street Westbound				
7:30 AM to	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
8:30 AM	0	8	2	4		0	2	0	62		0	1	0	145		1	0	0	177	

PM PEAK HOUR[1]	Harrison Avenue Northbound					Harrison Avenue Southbound					Marginal Road Eastbound					Hudson Street Westbound				
5:00 PM to	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
6:00 PM	1	2	2	1		1	29	4	57		0	0	0	267		12	0	0	291	

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

Client:	Melissa Restrepo
Project #:	411_C23_HSH
BTD #:	Location 5
Location:	Boston, MA
Street 1:	Harrison Avenue
Street 2:	Existing Parking Lot Driveway
Count Date:	6/25/2019
Day of Week:	Tuesday
Weather:	Mostly Cloudy, 65°F

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PASSENGER CARS & HEAVY VEHICLES COMBINED

	Harrison Avenue Northbound				Harrison Avenue Southbound				Eastbound				Existing Parking Lot Driveway Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	0	0	0	0	52	0	0	0	0	0	0	1	0	0
7:15 AM	0	0	0	0	0	1	51	0	0	0	0	0	0	4	0	0
7:30 AM	0	0	0	0	0	2	61	0	0	0	0	0	0	2	0	0
7:45 AM	0	0	0	0	0	1	70	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	1	71	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	60	0	0	0	0	0	0	1	0	0
8:30 AM	0	0	0	0	0	0	53	0	0	0	0	0	0	2	0	0
8:45 AM	0	0	0	0	0	2	62	0	0	0	0	0	0	0	0	0

	Harrison Avenue Northbound				Harrison Avenue Southbound				Eastbound				Existing Parking Lot Driveway Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	0	0	0	0	119	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	1	110	0	0	0	0	0	0	1	0	0
4:30 PM	0	0	0	0	0	1	128	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	124	0	0	0	0	0	0	2	0	0
5:00 PM	0	0	0	0	0	2	117	0	0	0	0	0	0	2	0	0
5:15 PM	0	0	0	0	0	1	134	0	0	0	0	0	0	3	0	0
5:30 PM	0	0	0	0	0	0	139	0	0	0	0	0	0	4	0	0
5:45 PM	0	0	0	0	0	2	132	0	0	0	0	0	0	2	0	0

AM PEAK HOUR 7:30 AM to 8:30 AM	Harrison Avenue Northbound				Harrison Avenue Southbound				Eastbound				Existing Parking Lot Driveway Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**4**	**262**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**
PHF	**0.00**				**0.92**				**0.00**				**0.38**			
HV %	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**33.3%**	**0.0%**	**0.0%**

PM PEAK HOUR 5:00 PM to 6:00 PM	Harrison Avenue Northbound				Harrison Avenue Southbound				Eastbound				Existing Parking Lot Driveway Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**5**	**522**	**0**	**0**	**0**	**0**	**0**	**0**	**11**	**0**	**0**
PHF	**0.00**				**0.95**				**0.00**				**0.69**			
HV %	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

Client: Melissa Restrepo
Project #: 411_C23_HSH
BTD #: Location 5
Location: Boston, MA
Street 1: Harrison Avenue
Street 2: Existing Parking Lot Driveway
Count Date: 6/25/2019
Day of Week: Tuesday
Weather: Mostly Cloudy, 65°F

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HEAVY VEHICLES

	Harrison Avenue Northbound				Harrison Avenue Southbound				Eastbound				Existing Parking Lot Driveway Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	1		0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0		0	0	0	0	0	0	1	0	0
7:45 AM	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Harrison Avenue Northbound				Harrison Avenue Southbound				Eastbound				Existing Parking Lot Driveway Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AM PEAK HOUR 7:00 AM to 8:00 AM	Harrison Avenue Northbound				Harrison Avenue Southbound				Eastbound				Existing Parking Lot Driveway Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**
PHF	**0.00**				**0.25**				**0.00**				**0.25**			

PM PEAK HOUR 4:00 PM to 5:00 PM	Harrison Avenue Northbound				Harrison Avenue Southbound				Eastbound				Existing Parking Lot Driveway Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PHF	**0.00**				**0.00**				**0.00**				**0.00**			

Client:	Melissa Restrepo
Project #:	411_C23_HSH
BTD #:	Location 5
Location:	Boston, MA
Street 1:	Harrison Avenue
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Count Date:	6/25/2019
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PEDESTRIANS & BICYCLES

	Harrison Avenue Northbound					Harrison Avenue Southbound					Eastbound					Existing Parking Lot Driveway 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	1		0	1	0	0		0	0	0	0		0	0	0	16	
7:15 AM	0	2	0	2		0	0	0	1		0	0	0	0		0	0	0	25	
7:30 AM	0	0	0	1		0	0	0	0		0	0	0	0		0	0	0	34	
7:45 AM	0	0	0	10		0	2	0	0		0	0	0	0		0	0	0	42	
8:00 AM	0	0	0	2		0	0	0	0		0	0	0	0		0	0	0	50	
8:15 AM	0	1	0	3		0	1	0	1		0	0	0	0		0	0	0	48	
8:30 AM	0	3	0	2		0	1	0	0		0	0	0	0		0	0	0	46	
8:45 AM	0	0	0	2		0	1	0	0		0	0	0	0		0	0	0	44	

	Harrison Avenue Northbound					Harrison Avenue Southbound					Eastbound					Existing Parking Lot Driveway Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
4:00 PM	0	2	0	2		0	0	0	0		0	0	0	0		0	0	0	42	
4:15 PM	0	1	0	1		0	2	0	1		0	0	0	0		0	0	0	50	
4:30 PM	0	0	0	2		0	4	0	0		0	0	0	0		0	0	0	54	
4:45 PM	0	0	0	1		0	7	0	1		0	0	0	0		0	0	0	60	
5:00 PM	0	0	0	4		0	13	0	1		0	0	0	0		0	0	0	74	
5:15 PM	0	0	0	2		0	7	0	0		0	0	0	0		1	0	0	72	
5:30 PM	0	0	0	1		0	8	0	1		0	0	0	0		0	0	0	70	
5:45 PM	0	1	0	1		0	3	0	0		0	0	0	0		0	0	0	72	

AM PEAK HOUR[1]	Harrison Avenue Northbound					Harrison Avenue Southbound					Eastbound					Existing Parking Lot Driveway Westbound				
7:30 AM to	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
8:30 AM	0	1	0	16		0	3	0	1		0	0	0	0		0	0	0	174	

PM PEAK HOUR[1]	Harrison Avenue Northbound					Harrison Avenue Southbound					Eastbound					Existing Parking Lot Driveway Westbound				
5:00 PM to	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
6:00 PM	0	1	0	8		0	31	0	2		0	0	0	0		1	0	0	288	

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

Seasonal Adjustment Factors

Massachusetts Highway Department
Statewide Traffic Data Collection
2017 Weekday Seasonal Factors

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

Round off:
0-999 = 10
>1000 = 100

U = Urban
R = Rural

1 - Interstate
2 - Freeway and Expressway
3 - Other Principal Arterial
4 - Minor Arterial
5 - Major Collector
6 - Minor Collector
7 - Local Road and Street

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

Recreational - West Group - Continuous Stations 2 and 189 including stations 1066,1067,1083,1084,1085,1086,1087,1088,1089,1090,1091,1092,1093,1094,1095,1096,1097,1098,1099,1100,1101,1102,1103,1104,1105,1106,1107,1108,1113,1114,1116,2196,2197 and 2198.

4/10/2019

Trip Generation - Proposed Program

2019128.00 - 288 Harrison Residences

Trip Generation Assessment

HOWARD STEIN HUDSON

22-Aug-2019

Land Use	Size	Category	Directional Split	Average Trip Rate	Unadjusted Vehicle Trips	Assumed National Vehicle Occupancy Rate[1]	Unadjusted Person-Trips	Transit Share[2]	Transit Person-Trips	Walk/Bike/ Other Share[2]	Walk/ Bike/ Other Trips	Auto Share[2]	Auto Person-Trips	% Taxi[3]	Private Auto Person-Trips	Taxi Person-Trips	Assumed Local Auto Occupancy Rate[4]	Assumed Local Auto Occupancy Rate for Taxis[5]	Total Adjusted Private Auto Trips	Total Adjusted Taxi Trips	Total Adjusted Auto (Private + Taxi) Trips
Daily Peak Hour																					
Multifamily Housing (Low Rise)[6]	85	Total		7.320	622	1.18	**734**	12%	**88**	67%	**492**	21%	**154**	5%	146	8	1.18	1.18	**124**	**6**	**130**
	units	In	50%	3.660	311	1.18	**367**	12%	**44**	67%	**246**	21%	**77**	5%	73	4	1.18	1.18	**62**	**3**	**65**
		Out	50%	3.660	311	1.18	**367**	12%	**44**	67%	**246**	21%	**77**	5%	73	4	1.18	1.18	**62**	**3**	**65**
Shopping Center[7]	4.1	Total		37.750	154	1.82	**280**	17%	**48**	43%	**120**	40%	**112**	5%	106	6	1.82	1.82	**58**	**4**	**62**
	KSF	In	50%	18.875	77	1.82	**140**	17%	**24**	43%	**60**	40%	**56**	5%	53	3	1.82	1.82	**29**	**2**	**31**
		Out	50%	18.875	77	1.82	**140**	17%	**24**	43%	**60**	40%	**56**	5%	53	3	1.82	1.82	**29**	**2**	**31**
Total		Total			**776**		**1,014**		**136**		**612**		**266**		**252**	**14**			**182**	**10**	**192**
		In			**388**		**507**		**68**		**306**		**133**		**126**	**7**			**91**	**5**	**96**
		Out			**388**		**507**		**68**		**306**		**133**		**126**	**7**			**91**	**5**	**96**
AM Peak Hour																					
Multifamily Housing (Low Rise)[6]	85	Total		0.460	39	1.18	**46**		**5**		**32**		**9**	5%	9	0	1.18	1.18	**8**	**0**	**8**
	units	In	23%	0.106	9	1.18	**11**	12%	**1**	67%	**8**	21%	**2**	5%	2	0	1.18	1.18	**2**	**0**	**2**
		Out	77%	0.354	30	1.18	**35**	12%	**4**	67%	**24**	21%	**7**	5%	7	0	1.18	1.18	**6**	**0**	**6**
Shopping Center[7]	4.1	Total		0.94	3	1.82	**6**		**1**		**3**		**2**	5%	2	0	1.82	1.82	**1**	**0**	**1**
	KSF	In	62%	0.583	2	1.82	**4**	16%	**1**	33%	**1**	51%	**2**	5%	2	0	1.82	1.82	**1**	**0**	**1**
		Out	38%	0.357	1	1.82	**2**	8%	**0**	79%	**2**	13%	**0**	5%	0	0	1.82	1.82	**0**	**0**	**0**
Total		Total			**42**		**52**		**6**		**35**		**11**		**11**	**0**			**9**	**0**	**9**
		In			**11**		**15**		**2**		**9**		**4**		**4**	**0**			**3**	**0**	**3**
		Out			**31**		**37**		**4**		**26**		**7**		**7**	**0**			**6**	**0**	**6**
PM Peak Hour																					
Multifamily Housing (Low Rise)[6]	85	Total		0.560	48	1.18	**56**		**7**		**38**		**11**	5%	11	0	1.18	1.18	**9**	**0**	**9**
	units	In	63%	0.353	30	1.18	**35**	12%	**4**	67%	**24**	21%	**7**	5%	7	0	1.18	1.18	**6**	**0**	**6**
		Out	37%	0.207	18	1.18	**21**	12%	**3**	67%	**14**	21%	**4**	5%	4	0	1.18	1.18	**3**	**0**	**3**
Shopping Center[7]	4.1	Total		3.81	15	1.82	**28**		**3**		**15**		**10**	5%	10	0	1.82	1.82	**5**	**0**	**5**
	KSF	In	48%	1.829	7	1.82	**13**	7%	**1**	80%	**10**	13%	**2**	5%	2	0	1.82	1.82	**1**	**0**	**1**
		Out	52%	1.981	8	1.82	**15**	16%	**2**	33%	**5**	51%	**8**	5%	8	0	1.82	1.82	**4**	**0**	**4**
Total		Total			**63**		**84**		**10**		**53**		**21**		**21**	**0**			**14**	**0**	**14**
		In			**37**		**48**		**5**		**34**		**9**		**9**	**0**			**7**	**0**	**7**
		Out			**26**		**36**		**5**		**19**		**12**		**12**	**0**			**7**	**0**	**7**

1. 2017 National vehicle occupancy rates - 1.18:home to work; 1.82: family/personal business; 1.82: shopping; 2.1 social/recreational
2. Mode shares based on peak-hour BTD Data for Area 3
3. Assumed Taxi/TNC percentage
4. Local vehicle occupancy rates based on 2009 National vehicle occupancy rates
5. For taxi cabs, 1.2 passengers per cab. (2.2 minus 1 driver equals 1.2)
6. ITE Trip Generation Manual, 10th Edition, LUC 220 (Multifamily Housing Low-Rise (1-2 floors), average rate
7. ITE Trip Generation Manual, 10th Edition, LUC 820 (Shopping Center), average rate

Synchro Intersection Level of Service Reports

- Existing (2019) Condition

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø2
Lane Configurations													
Traffic Volume (vph)	0	0	0	32	56	0	0	0	0	0	168	97	
Future Volume (vph)	0	0	0	32	56	0	0	0	0	0	168	97	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	
Ped Bike Factor					1.00								
Frt												0.850	
Flt Protected					0.982								
Satd. Flow (prot)	0	0	0	0	1584	0	0	0	0	0	3471	1509	
Flt Permitted					0.982								
Satd. Flow (perm)	0	0	0	0	1579	0	0	0	0	0	3471	1509	
Right Turn on Red			Yes	Yes		Yes			Yes			Yes	
Satd. Flow (RTOR)					60							104	
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		179			277			219			124		
Travel Time (s)		4.1			6.3			5.0			2.8		
Confl. Peds. (#/hr)				4								145	
Confl. Bikes (#/hr)												2	
Peak Hour Factor	0.25	0.25	0.25	0.90	0.90	0.90	0.25	0.25	0.25	0.93	0.93	0.93	
Heavy Vehicles (%)	0%	0%	0%	13%	2%	0%	0%	0%	0%	0%	4%	7%	
Parking (#/hr)					0								
Adj. Flow (vph)	0	0	0	36	62	0	0	0	0	0	181	104	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	0	0	0	98	0	0	0	0	0	181	104	
Turn Type				Split	NA						NA	Prot	
Protected Phases				5	5						1	1	2
Permitted Phases													
Detector Phase				5	5						1	1	
Switch Phase													
Minimum Initial (s)				10.0	10.0						10.0	10.0	1.0
Minimum Split (s)				20.0	20.0						16.5	16.5	21.0
Total Split (s)				36.0	36.0						43.0	43.0	21.0
Total Split (%)				36.0%	36.0%						43.0%	43.0%	21%
Maximum Green (s)				32.0	32.0						38.5	38.5	17.0
Yellow Time (s)				3.0	3.0						3.5	3.5	2.0
All-Red Time (s)				1.0	1.0						1.0	1.0	2.0
Lost Time Adjust (s)					0.0						0.0	0.0	
Total Lost Time (s)					4.0						4.5	4.5	
Lead/Lag											Lead	Lead	Lag
Lead-Lag Optimize?											Yes	Yes	Yes
Vehicle Extension (s)				3.0	3.0						3.0	3.0	3.0
Recall Mode				Max	Max						C-Max	C-Max	None
Walk Time (s)				7.0	7.0						7.0	7.0	7.0
Flash Dont Walk (s)				9.0	9.0						5.0	5.0	10.0
Pedestrian Calls (#/hr)				0	0						0	0	387
Act Effct Green (s)					32.0						38.5	38.5	
Actuated g/C Ratio					0.32						0.38	0.38	
v/c Ratio					0.18						0.14	0.16	
Control Delay					12.1						20.3	4.7	
Queue Delay					0.0						0.0	0.0	
Total Delay					12.1						20.3	4.7	
LOS					B						C	A	
Approach Delay					12.1						14.6		
Approach LOS					B						B		
90th %ile Green (s)				32.0	32.0						38.5	38.5	17.0
90th %ile Term Code				MaxR	MaxR						Coord	Coord	Ped
70th %ile Green (s)				32.0	32.0						38.5	38.5	17.0
70th %ile Term Code				MaxR	MaxR						Coord	Coord	Ped
50th %ile Green (s)				32.0	32.0						38.5	38.5	17.0
50th %ile Term Code				MaxR	MaxR						Coord	Coord	Ped
30th %ile Green (s)				32.0	32.0						38.5	38.5	17.0
30th %ile Term Code				MaxR	MaxR						Coord	Coord	Ped
10th %ile Green (s)				32.0	32.0						38.5	38.5	17.0
10th %ile Term Code				MaxR	MaxR						Coord	Coord	Ped
Queue Length 50th (ft)					17						38	0	
Queue Length 95th (ft)					54						62	33	
Internal Link Dist (ft)		99			197			139			44		
Turn Bay Length (ft)													
Base Capacity (vph)					547						1336	644	
Starvation Cap Reductn					0						0	0	
Spillback Cap Reductn					0						0	0	
Storage Cap Reductn					0						0	0	
Reduced v/c Ratio					0.18						0.14	0.16	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 1:SBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.18
Intersection Signal Delay: 14.0 Intersection LOS: B
Intersection Capacity Utilization 28.4% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 4: Harrison Avenue & Marginal Road/Hudson Street

Ø1 (R)	Ø2	Ø5
43 s	21 s	36 s

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑↱			↑↱							
Traffic Volume (veh/h)	11	409	23	82	831	90	0	0	0	0	0	0
Future Volume (Veh/h)	11	409	23	82	831	90	0	0	0	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.96	0.96	0.96	0.25	0.25	0.25	0.25	0.25	0.25
Hourly flow rate (vph)	12	454	26	85	866	94	0	0	0	0	0	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	960			480			1094	1621	240	1334	1587	480
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	960			480			1094	1621	240	1334	1587	480
tC, single (s)	4.1			4.2			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			92			100	100	100	100	100	100
cM capacity (veh/h)	725			1065			159	94	767	106	99	537

Direction, Lane #	EB 1	EB 2	WB 1	WB 2
Volume Total	239	253	518	527
Volume Left	12	0	85	0
Volume Right	0	26	0	94
cSH	725	1700	1065	1700
Volume to Capacity	0.02	0.15	0.08	0.31
Queue Length 95th (ft)	1	0	6	0
Control Delay (s)	0.7	0.0	2.2	0.0
Lane LOS	A		A	
Approach Delay (s)	0.3		1.1	
Approach LOS				

Intersection Summary				
Average Delay	0.8			
Intersection Capacity Utilization	47.2%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	93	12
Future Volume (Veh/h)	0	0	0	0	93	12
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.25	0.25	0.25	0.25	0.93	0.93
Hourly flow rate (vph)	0	0	0	0	100	13
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				699		
pX, platoon unblocked						
vC, conflicting volume	106	106	113			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	106	106	113			
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	100			
cM capacity (veh/h)	896	953	1489			

Direction, Lane #	SB 1
Volume Total	113
Volume Left	0
Volume Right	13
cSH	1700
Volume to Capacity	0.07
Queue Length 95th (ft)	0
Control Delay (s)	0.0
Lane LOS	
Approach Delay (s)	0.0
Approach LOS	

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	9.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	1	0	0	87	6
Future Volume (Veh/h)	0	1	0	0	87	6
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.25	0.25	0.25	0.25	0.63	0.63
Hourly flow rate (vph)	0	4	0	0	138	10
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				277		
pX, platoon unblocked						
vC, conflicting volume	143	143	148			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	143	143	148			
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	100			
cM capacity (veh/h)	854	910	1446			

Direction, Lane #	EB 1	SB 1
Volume Total	4	148
Volume Left	0	0
Volume Right	4	10
cSH	910	1700
Volume to Capacity	0.00	0.09
Queue Length 95th (ft)	0	0
Control Delay (s)	9.0	0.0
Lane LOS	A	
Approach Delay (s)	9.0	0.0
Approach LOS	A	

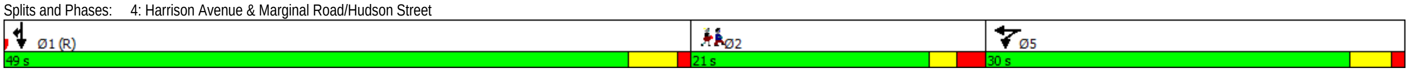
Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	14.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø2
Lane Configurations													
Traffic Volume (vph)	0	0	0	46	59	0	0	0	0	0	396	137	
Future Volume (vph)	0	0	0	46	59	0	0	0	0	0	396	137	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	
Ped Bike Factor					1.00							0.62	
Frt												0.850	
Flt Protected					0.978								
Satd. Flow (prot)	0	0	0	0	1626	0	0	0	0	0	3574	1583	
Flt Permitted					0.978								
Satd. Flow (perm)	0	0	0	0	1624	0	0	0	0	0	3574	976	
Right Turn on Red			Yes	Yes		Yes			Yes			Yes	
Satd. Flow (RTOR)					60							147	
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		179			277			219			124		
Travel Time (s)		4.1			6.3			5.0			2.8		
Confl. Peds. (#/hr)				1								267	
Confl. Bikes (#/hr)												29	
Peak Hour Factor	0.25	0.25	0.25	0.89	0.89	0.89	0.25	0.25	0.25	0.93	0.93	0.93	
Heavy Vehicles (%)	0%	0%	0%	4%	2%	0%	0%	0%	0%	0%	1%	2%	
Parking (#/hr)					0								
Adj. Flow (vph)	0	0	0	52	66	0	0	0	0	0	426	147	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	0	0	0	118	0	0	0	0	0	426	147	
Turn Type				Split	NA						NA	custom	
Protected Phases				5	5						1	1	2
Permitted Phases												1	
Detector Phase				5	5						1	1	
Switch Phase													
Minimum Initial (s)				10.0	10.0						10.0	10.0	1.0
Minimum Split (s)				20.0	20.0						16.5	16.5	21.0
Total Split (s)				30.0	30.0						49.0	49.0	21.0
Total Split (%)				30.0%	30.0%						49.0%	49.0%	21%
Maximum Green (s)				26.0	26.0						44.5	44.5	17.0
Yellow Time (s)				3.0	3.0						3.5	3.5	2.0
All-Red Time (s)				1.0	1.0						1.0	1.0	2.0
Lost Time Adjust (s)					0.0						0.0	0.0	
Total Lost Time (s)					4.0						4.5	4.5	
Lead/Lag											Lead	Lead	Lag
Lead-Lag Optimize?											Yes	Yes	Yes
Vehicle Extension (s)				3.0	3.0						3.0	3.0	3.0
Recall Mode				Max	Max						C-Max	C-Max	None
Walk Time (s)				7.0	7.0						7.0	7.0	7.0
Flash Dont Walk (s)				9.0	9.0						5.0	5.0	10.0
Pedestrian Calls (#/hr)				0	0						0	0	500
Act Effct Green (s)					26.0						44.5	44.5	
Actuated g/C Ratio					0.26						0.44	0.44	
v/c Ratio					0.25						0.27	0.19	
Control Delay					17.0						18.1	3.4	
Queue Delay					0.0						0.0	0.0	
Total Delay					17.0						18.1	3.4	
LOS					B						B	A	
Approach Delay					17.0						14.3		
Approach LOS					B						B		
90th %ile Green (s)				26.0	26.0						44.5	44.5	17.0
90th %ile Term Code				MaxR	MaxR						Coord	Coord	Ped
70th %ile Green (s)				26.0	26.0						44.5	44.5	17.0
70th %ile Term Code				MaxR	MaxR						Coord	Coord	Ped
50th %ile Green (s)				26.0	26.0						44.5	44.5	17.0
50th %ile Term Code				MaxR	MaxR						Coord	Coord	Ped
30th %ile Green (s)				26.0	26.0						44.5	44.5	17.0
30th %ile Term Code				MaxR	MaxR						Coord	Coord	Ped
10th %ile Green (s)				26.0	26.0						44.5	44.5	17.0
10th %ile Term Code				MaxR	MaxR						Coord	Coord	Ped
Queue Length 50th (ft)					28						87	0	
Queue Length 95th (ft)					73						122	34	
Internal Link Dist (ft)		99			197			139			44		
Turn Bay Length (ft)													
Base Capacity (vph)					467						1590	786	
Starvation Cap Reductn					0						0	0	
Spillback Cap Reductn					0						0	0	
Storage Cap Reductn					0						0	0	
Reduced v/c Ratio					0.25						0.27	0.19	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 1:SBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.27
Intersection Signal Delay: 14.8 Intersection LOS: B
Intersection Capacity Utilization 32.3% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 4: Harrison Avenue & Marginal Road/Hudson Street



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	3	0	0	0	4	262
Future Volume (Veh/h)	3	0	0	0	4	262
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.38	0.38	0.25	0.25	0.92	0.92
Hourly flow rate (vph)	8	0	0	0	4	285
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			124			
pX, platoon unblocked						
vC, conflicting volume	293	0			0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	293	0			0	
tC, single (s)	6.7	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.8	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	636	1091			1636	

Direction, Lane #	WB 1	SB 1
Volume Total	8	289
Volume Left	8	4
Volume Right	0	0
cSH	636	1636
Volume to Capacity	0.01	0.00
Queue Length 95th (ft)	1	0
Control Delay (s)	10.7	0.1
Lane LOS	B	A
Approach Delay (s)	10.7	0.1
Approach LOS	B	

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	24.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations														
Traffic Volume (veh/h)	1	24	709	28	3	89	612	60	0	0	0	0	0	0
Future Volume (Veh/h)	1	24	709	28	3	89	612	60	0	0	0	0	0	0
Sign Control			Free				Free			Stop			Stop	
Grade			0%				0%			0%			0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.96	0.96	0.96	0.96	0.25	0.25	0.25	0.25	0.25	0.25
Hourly flow rate (vph)	0	24	723	29	0	93	638	63	0	0	0	0	0	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	0.00				0.00									
vC, conflicting volume	0	701			0	752			1290	1672	376	1265	1656	350
vC1, stage 1 conf vol														
vC2, stage 2 conf vol														
vCu, unblocked vol	0	701			0	752			1290	1672	376	1265	1656	350
tC, single (s)	0.0	4.1			0.0	4.2			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)														
tF (s)	0.0	2.2			0.0	2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	0	97			0	89			100	100	100	100	100	100
cM capacity (veh/h)	0	905			0	840			108	82	622	113	84	646

Direction, Lane #	EB 1	EB 2	WB 1	WB 2
Volume Total	386	390	412	382
Volume Left	24	0	93	0
Volume Right	0	29	0	63
cSH	905	1700	840	1700
Volume to Capacity	0.03	0.23	0.11	0.22
Queue Length 95th (ft)	2	0	9	0
Control Delay (s)	0.9	0.0	3.3	0.0
Lane LOS	A		A	
Approach Delay (s)	0.4		1.7	
Approach LOS				

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	49.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	108	9
Future Volume (Veh/h)	0	0	0	0	108	9
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.50	0.50	0.25	0.25	0.91	0.91
Hourly flow rate (vph)	0	0	0	0	119	10
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				699		
pX, platoon unblocked						
vC, conflicting volume	124	124	129			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	124	124	129			
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	100			
cM capacity (veh/h)	876	932	1469			

Direction, Lane #	SB 1
Volume Total	129
Volume Left	0
Volume Right	10
cSH	1700
Volume to Capacity	0.08
Queue Length 95th (ft)	0
Control Delay (s)	0.0
Lane LOS	
Approach Delay (s)	0.0
Approach LOS	

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	9.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	1	0	0	104	4
Future Volume (Veh/h)	0	1	0	0	104	4
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.25	0.25	0.25	0.25	0.92	0.92
Hourly flow rate (vph)	0	4	0	0	113	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				277		
pX, platoon unblocked						
vC, conflicting volume	113	113	117			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	113	113	117			
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	100			
cM capacity (veh/h)	888	945	1484			

Direction, Lane #	EB 1	SB 1
Volume Total	4	117
Volume Left	0	0
Volume Right	4	4
cSH	945	1700
Volume to Capacity	0.00	0.07
Queue Length 95th (ft)	0	0
Control Delay (s)	8.8	0.0
Lane LOS	A	
Approach Delay (s)	8.8	0.0
Approach LOS	A	

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	Err%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	0	0	0	5	522
Future Volume (Veh/h)	11	0	0	0	5	522
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.69	0.69	0.25	0.25	0.95	0.95
Hourly flow rate (vph)	16	0	0	0	5	549
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			124			
pX, platoon unblocked						
vC, conflicting volume	559	0			0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	559	0			0	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	100			100	
cM capacity (veh/h)	492	1091			1636	

Direction, Lane #	WB 1	SB 1
Volume Total	16	554
Volume Left	16	5
Volume Right	0	0
cSH	492	1636
Volume to Capacity	0.03	0.00
Queue Length 95th (ft)	3	0
Control Delay (s)	12.6	0.1
Lane LOS	B	A
Approach Delay (s)	12.6	0.1
Approach LOS	B	

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	37.8%	ICU Level of Service	A
Analysis Period (min)	15		

- No-Build (2026) Condition

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø2
Lane Configurations													
Traffic Volume (vph)	0	0	0	33	58	0	0	0	0	0	177	100	
Future Volume (vph)	0	0	0	33	58	0	0	0	0	0	177	100	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor					1.00						0.88		
Frt											0.951		
Flt Protected					0.982								
Satd. Flow (prot)	0	0	0	0	1584	0	0	0	0	0	1521	0	
Flt Permitted					0.982								
Satd. Flow (perm)	0	0	0	0	1579	0	0	0	0	0	1521	0	
Right Turn on Red			Yes	Yes		Yes			Yes			Yes	
Satd. Flow (RTOR)					60						33		
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		179			277			219			124		
Travel Time (s)		4.1			6.3			5.0			2.8		
Confl. Peds. (#/hr)				4								145	
Confl. Bikes (#/hr)												2	
Peak Hour Factor	0.25	0.25	0.25	0.90	0.90	0.90	0.25	0.25	0.25	0.93	0.93	0.93	
Heavy Vehicles (%)	0%	0%	0%	13%	2%	0%	0%	0%	0%	0%	4%	7%	
Parking (#/hr)					0								
Adj. Flow (vph)	0	0	0	37	64	0	0	0	0	0	190	108	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	0	0	0	101	0	0	0	0	0	298	0	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(ft)		0			0			0			0		
Link Offset(ft)		0			0			0			0		
Crosswalk Width(ft)		16			16			16			16		
Two way Left Turn Lane													
Headway Factor	1.00	1.00	1.00	1.00	1.14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (mph)	15		9	15		9	15		9	15		9	
Number of Detectors				1	2						2		
Detector Template				Left	Thru						Thru		
Leading Detector (ft)				20	100						100		
Trailing Detector (ft)				0	0						0		
Detector 1 Position(ft)				0	0						0		
Detector 1 Size(ft)				20	6						6		
Detector 1 Type				Cl+Ex	Cl+Ex						Cl+Ex		
Detector 1 Channel													
Detector 1 Extend (s)				0.0	0.0						0.0		
Detector 1 Queue (s)				0.0	0.0						0.0		
Detector 1 Delay (s)				0.0	0.0						0.0		
Detector 2 Position(ft)					94						94		
Detector 2 Size(ft)					6						6		
Detector 2 Type					Cl+Ex						Cl+Ex		
Detector 2 Channel													
Detector 2 Extend (s)					0.0						0.0		
Turn Type				Split	NA						NA		
Protected Phases				5	5						1		2
Permitted Phases													
Detector Phase				5	5						1		
Switch Phase													
Minimum Initial (s)				10.0	10.0						10.0		1.0
Minimum Split (s)				20.0	20.0						16.5		21.0
Total Split (s)				36.0	36.0						43.0		21.0
Total Split (%)				36.0%	36.0%						43.0%		21%
Maximum Green (s)				32.0	32.0						38.5		17.0
Yellow Time (s)				3.0	3.0						3.5		2.0
All-Red Time (s)				1.0	1.0						1.0		2.0
Lost Time Adjust (s)					0.0						0.0		
Total Lost Time (s)					4.0						4.5		
Lead/Lag											Lead		Lag
Lead-Lag Optimize?											Yes		Yes
Vehicle Extension (s)				3.0	3.0						3.0		3.0
Recall Mode				Max	Max						C-Max		None
Walk Time (s)				7.0	7.0						7.0		7.0
Flash Dont Walk (s)				9.0	9.0						5.0		10.0
Pedestrian Calls (#/hr)				0	0						0		387
Act Effct Green (s)					32.0						38.5		
Actuated g/C Ratio					0.32						0.38		
v/c Ratio					0.18						0.49		
Control Delay					12.5						23.9		
Queue Delay					0.0						0.0		
Total Delay					12.5						23.9		
LOS					B						C		
Approach Delay					12.5						23.9		
Approach LOS					B						C		

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 1:SBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.49
Intersection Signal Delay: 21.0 Intersection LOS: C
Intersection Capacity Utilization 33.4% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 4: Harrison Avenue & Marginal Road/Hudson Street

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Volume (veh/h)	11	440	24	3	85	867	93	0	0	0	0	0	0
Future Volume (Veh/h)	11	440	24	3	85	867	93	0	0	0	0	0	0
Sign Control		Free				Free			Stop			Stop	
Grade		0%				0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.92	0.96	0.96	0.96	0.25	0.25	0.25	0.25	0.25	0.25
Hourly flow rate (vph)	12	489	27	0	89	903	97	0	0	0	0	0	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				0.00									
vC, conflicting volume	1000			0	516			1156	1704	258	1398	1670	500
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol	1000			0	516			1156	1704	258	1398	1670	500
tC, single (s)	4.1			0.0	4.2			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)													
tF (s)	2.2			0.0	2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			0	91			100	100	100	100	100	100
cM capacity (veh/h)	700			0	1032			142	83	747	94	87	522

Direction, Lane #	EB 1	EB 2	WB 1	WB 2
Volume Total	256	272	540	548
Volume Left	12	0	89	0
Volume Right	0	27	0	97
cSH	700	1700	1032	1700
Volume to Capacity	0.02	0.16	0.09	0.32
Queue Length 95th (ft)	1	0	7	0
Control Delay (s)	0.7	0.0	2.3	0.0
Lane LOS	A		A	
Approach Delay (s)	0.3		1.1	
Approach LOS				

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	49.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	96	12
Future Volume (Veh/h)	0	0	0	0	96	12
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.25	0.25	0.25	0.25	0.93	0.93
Hourly flow rate (vph)	0	0	0	0	103	13
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				699		
pX, platoon unblocked						
vC, conflicting volume	110	110	116			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	110	110	116			
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	100			
cM capacity (veh/h)	892	950	1485			

Direction, Lane #	SB 1
Volume Total	116
Volume Left	0
Volume Right	13
cSH	1700
Volume to Capacity	0.07
Queue Length 95th (ft)	0
Control Delay (s)	0.0
Lane LOS	
Approach Delay (s)	0.0
Approach LOS	

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	9.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	1	0	0	90	6
Future Volume (Veh/h)	0	1	0	0	90	6
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.25	0.25	0.25	0.25	0.63	0.63
Hourly flow rate (vph)	0	4	0	0	143	10
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				277		
pX, platoon unblocked						
vC, conflicting volume	148	148	153			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	148	148	153			
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	100			
cM capacity (veh/h)	849	904	1440			

Direction, Lane #	EB 1	SB 1
Volume Total	4	153
Volume Left	0	0
Volume Right	4	10
cSH	904	1700
Volume to Capacity	0.00	0.09
Queue Length 95th (ft)	0	0
Control Delay (s)	9.0	0.0
Lane LOS	A	
Approach Delay (s)	9.0	0.0
Approach LOS	A	

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	15.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	3	0	0	0	4	274
Future Volume (Veh/h)	3	0	0	0	4	274
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.38	0.38	0.25	0.25	0.92	0.92
Hourly flow rate (vph)	8	0	0	0	4	298
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			124			
pX, platoon unblocked						
vC, conflicting volume	306	0			0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	306	0			0	
tC, single (s)	6.7	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.8	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	625	1091			1636	

Direction, Lane #	WB 1	SB 1
Volume Total	8	302
Volume Left	8	4
Volume Right	0	0
cSH	625	1636
Volume to Capacity	0.01	0.00
Queue Length 95th (ft)	1	0
Control Delay (s)	10.8	0.1
Lane LOS	B	A
Approach Delay (s)	10.8	0.1
Approach LOS	B	

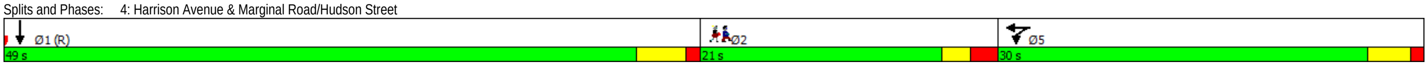
Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	24.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø2
Lane Configurations													
Traffic Volume (vph)	0	0	0	48	61	0	0	0	0	0	417	142	
Future Volume (vph)	0	0	0	48	61	0	0	0	0	0	417	142	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor					1.00						0.90		
Frt											0.966		
Flt Protected					0.979								
Satd. Flow (prot)	0	0	0	0	1627	0	0	0	0	0	1636	0	
Flt Permitted					0.979								
Satd. Flow (perm)	0	0	0	0	1626	0	0	0	0	0	1636	0	
Right Turn on Red			Yes	Yes		Yes			Yes			Yes	
Satd. Flow (RTOR)					60						22		
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		179			277			219			124		
Travel Time (s)		4.1			6.3			5.0			2.8		
Confl. Peds. (#/hr)				1								267	
Confl. Bikes (#/hr)												29	
Peak Hour Factor	0.25	0.25	0.25	0.89	0.89	0.89	0.25	0.25	0.25	0.93	0.93	0.93	
Heavy Vehicles (%)	0%	0%	0%	4%	2%	0%	0%	0%	0%	0%	1%	2%	
Parking (#/hr)					0								
Adj. Flow (vph)	0	0	0	54	69	0	0	0	0	0	448	153	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	0	0	0	123	0	0	0	0	0	601	0	
Turn Type				Split	NA						NA		
Protected Phases				5	5						1		2
Permitted Phases													
Detector Phase				5	5						1		
Switch Phase													
Minimum Initial (s)				10.0	10.0						10.0		1.0
Minimum Split (s)				20.0	20.0						16.5		21.0
Total Split (s)				30.0	30.0						49.0		21.0
Total Split (%)				30.0%	30.0%						49.0%		21%
Maximum Green (s)				26.0	26.0						44.5		17.0
Yellow Time (s)				3.0	3.0						3.5		2.0
All-Red Time (s)				1.0	1.0						1.0		2.0
Lost Time Adjust (s)					0.0						0.0		
Total Lost Time (s)					4.0						4.5		
Lead/Lag											Lead		Lag
Lead-Lag Optimize?											Yes		Yes
Vehicle Extension (s)				3.0	3.0						3.0		3.0
Recall Mode				Max	Max						C-Max		None
Walk Time (s)				7.0	7.0						7.0		7.0
Flash Dont Walk (s)				9.0	9.0						5.0		10.0
Pedestrian Calls (#/hr)				0	0						0		500
Act Effct Green (s)					26.0						44.5		
Actuated g/C Ratio					0.26						0.44		
v/c Ratio					0.26						0.81		
Control Delay					17.5						33.7		
Queue Delay					0.0						0.0		
Total Delay					17.5						33.7		
LOS					B						C		
Approach Delay					17.5						33.7		
Approach LOS					B						C		
90th %ile Green (s)				26.0	26.0						44.5		17.0
90th %ile Term Code				MaxR	MaxR						Coord		Ped
70th %ile Green (s)				26.0	26.0						44.5		17.0
70th %ile Term Code				MaxR	MaxR						Coord		Ped
50th %ile Green (s)				26.0	26.0						44.5		17.0
50th %ile Term Code				MaxR	MaxR						Coord		Ped
30th %ile Green (s)				26.0	26.0						44.5		17.0
30th %ile Term Code				MaxR	MaxR						Coord		Ped
10th %ile Green (s)				26.0	26.0						44.5		17.0
10th %ile Term Code				MaxR	MaxR						Coord		Ped
Queue Length 50th (ft)					31						313		
Queue Length 95th (ft)					76						#511		
Internal Link Dist (ft)		99			197			139			44		
Turn Bay Length (ft)													
Base Capacity (vph)					467						740		
Starvation Cap Reductn					0						0		
Spillback Cap Reductn					0						0		
Storage Cap Reductn					0						0		
Reduced v/c Ratio					0.26						0.81		

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 1:SBT, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 31.0 Intersection LOS: C
Intersection Capacity Utilization 48.1% 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: 4: Harrison Avenue & Marginal Road/Hudson Street



Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations														
Traffic Volume (veh/h)	1	25	750	29	3	92	659	62	0	0	0	0	0	0
Future Volume (Veh/h)	1	25	750	29	3	92	659	62	0	0	0	0	0	0
Sign Control			Free				Free			Stop			Stop	
Grade			0%				0%			0%			0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.96	0.96	0.96	0.96	0.25	0.25	0.25	0.25	0.25	0.25
Hourly flow rate (vph)	0	26	765	30	0	96	686	65	0	0	0	0	0	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	0.00				0.00									
vC, conflicting volume	0	751			0	795			1367	1775	398	1345	1758	376
vC1, stage 1 conf vol														
vC2, stage 2 conf vol														
vCu, unblocked vol	0	751			0	795			1367	1775	398	1345	1758	376
tC, single (s)	0.0	4.1			0.0	4.2			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)														
tF (s)	0.0	2.2			0.0	2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	0	97			0	88			100	100	100	100	100	100
cM capacity (veh/h)	0	868			0	809			94	70	602	98	72	622

Direction, Lane #	EB 1	EB 2	WB 1	WB 2
Volume Total	408	412	439	408
Volume Left	26	0	96	0
Volume Right	0	30	0	65
cSH	868	1700	809	1700
Volume to Capacity	0.03	0.24	0.12	0.24
Queue Length 95th (ft)	2	0	10	0
Control Delay (s)	0.9	0.0	3.4	0.0
Lane LOS	A		A	
Approach Delay (s)	0.5		1.7	
Approach LOS				

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	52.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	112	9
Future Volume (Veh/h)	0	0	0	0	112	9
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.50	0.50	0.25	0.25	0.91	0.91
Hourly flow rate (vph)	0	0	0	0	123	10
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				699		
pX, platoon unblocked						
vC, conflicting volume	128	128	133			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	128	128	133			
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	100			
cM capacity (veh/h)	871	927	1464			

Direction, Lane #	SB 1
Volume Total	133
Volume Left	0
Volume Right	10
cSH	1700
Volume to Capacity	0.08
Queue Length 95th (ft)	0
Control Delay (s)	0.0
Lane LOS	
Approach Delay (s)	0.0
Approach LOS	

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	9.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	1	0	0	109	5
Future Volume (Veh/h)	0	1	0	0	109	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.25	0.25	0.25	0.25	0.92	0.92
Hourly flow rate (vph)	0	4	0	0	118	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				277		
pX, platoon unblocked						
vC, conflicting volume	120	120	123			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	120	120	123			
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	100			
cM capacity (veh/h)	880	936	1477			

Direction, Lane #	EB 1	SB 1
Volume Total	4	123
Volume Left	0	0
Volume Right	4	5
cSH	936	1700
Volume to Capacity	0.00	0.07
Queue Length 95th (ft)	0	0
Control Delay (s)	8.9	0.0
Lane LOS	A	
Approach Delay (s)	8.9	0.0
Approach LOS	A	

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	16.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	0	0	0	5	548
Future Volume (Veh/h)	11	0	0	0	5	548
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.69	0.69	0.25	0.25	0.95	0.95
Hourly flow rate (vph)	16	0	0	0	5	577
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			124			
pX, platoon unblocked						
vC, conflicting volume	587	0			0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	587	0			0	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	100			100	
cM capacity (veh/h)	474	1091			1636	

Direction, Lane #	WB 1	SB 1
Volume Total	16	582
Volume Left	16	5
Volume Right	0	0
cSH	474	1636
Volume to Capacity	0.03	0.00
Queue Length 95th (ft)	3	0
Control Delay (s)	12.9	0.1
Lane LOS	B	A
Approach Delay (s)	12.9	0.1
Approach LOS	B	

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	39.1%	ICU Level of Service	A
Analysis Period (min)	15		

- Build (2026) Condition

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø2
Lane Configurations													
Traffic Volume (vph)	0	0	0	39	61	0	0	0	0	0	175	99	
Future Volume (vph)	0	0	0	39	61	0	0	0	0	0	175	99	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor					1.00						0.89		
Frt											0.951		
Flt Protected					0.981								
Satd. Flow (prot)	0	0	0	0	1579	0	0	0	0	0	1522	0	
Flt Permitted					0.981								
Satd. Flow (perm)	0	0	0	0	1574	0	0	0	0	0	1522	0	
Right Turn on Red			Yes	Yes		Yes			Yes			Yes	
Satd. Flow (RTOR)					60						33		
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		179			277			219			124		
Travel Time (s)		4.1			6.3			5.0			2.8		
Confl. Peds. (#/hr)				4								145	
Confl. Bikes (#/hr)												2	
Peak Hour Factor	0.25	0.25	0.25	0.90	0.90	0.90	0.25	0.25	0.25	0.93	0.93	0.93	
Heavy Vehicles (%)	0%	0%	0%	13%	2%	0%	0%	0%	0%	0%	4%	7%	
Parking (#/hr)					0								
Adj. Flow (vph)	0	0	0	43	68	0	0	0	0	0	188	106	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	0	0	0	111	0	0	0	0	0	294	0	
Turn Type				Split	NA						NA		
Protected Phases				5	5						1		2
Permitted Phases													
Detector Phase				5	5						1		
Switch Phase													
Minimum Initial (s)				10.0	10.0						10.0		1.0
Minimum Split (s)				20.0	20.0						16.5		21.0
Total Split (s)				36.0	36.0						43.0		21.0
Total Split (%)				36.0%	36.0%						43.0%		21%
Maximum Green (s)				32.0	32.0						38.5		17.0
Yellow Time (s)				3.0	3.0						3.5		2.0
All-Red Time (s)				1.0	1.0						1.0		2.0
Lost Time Adjust (s)					0.0						0.0		
Total Lost Time (s)					4.0						4.5		
Lead/Lag											Lead		Lag
Lead-Lag Optimize?											Yes		Yes
Vehicle Extension (s)				3.0	3.0						3.0		3.0
Recall Mode				Max	Max						C-Max		None
Walk Time (s)				7.0	7.0						7.0		7.0
Flash Dont Walk (s)				9.0	9.0						5.0		10.0
Pedestrian Calls (#/hr)				0	0						0		387
Act Effct Green (s)					32.0						38.5		
Actuated g/C Ratio					0.32						0.38		
v/c Ratio					0.20						0.49		
Control Delay					13.5						23.7		
Queue Delay					0.0						0.0		
Total Delay					13.5						23.7		
LOS					B						C		
Approach Delay					13.5						23.7		
Approach LOS					B						C		
90th %ile Green (s)				32.0	32.0						38.5		17.0
90th %ile Term Code				MaxR	MaxR						Coord		Ped
70th %ile Green (s)				32.0	32.0						38.5		17.0
70th %ile Term Code				MaxR	MaxR						Coord		Ped
50th %ile Green (s)				32.0	32.0						38.5		17.0
50th %ile Term Code				MaxR	MaxR						Coord		Ped
30th %ile Green (s)				32.0	32.0						38.5		17.0
30th %ile Term Code				MaxR	MaxR						Coord		Ped
10th %ile Green (s)				32.0	32.0						38.5		17.0
10th %ile Term Code				MaxR	MaxR						Coord		Ped
Queue Length 50th (ft)					23						123		
Queue Length 95th (ft)					63						202		
Internal Link Dist (ft)		99			197			139			44		
Turn Bay Length (ft)													
Base Capacity (vph)					546						606		
Starvation Cap Reductn					0						0		
Spillback Cap Reductn					0						0		
Storage Cap Reductn					0						0		
Reduced v/c Ratio					0.20						0.49		

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 1:SBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.49
Intersection Signal Delay: 20.9 Intersection LOS: C
Intersection Capacity Utilization 33.2% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 4: Harrison Avenue & Marginal Road/Hudson Street

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Volume (veh/h)	11	440	27	3	89	867	93	0	0	0	0	0	0
Future Volume (Veh/h)	11	440	27	3	89	867	93	0	0	0	0	0	0
Sign Control		Free				Free			Stop			Stop	
Grade		0%				0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.92	0.96	0.96	0.96	0.25	0.25	0.25	0.25	0.25	0.25
Hourly flow rate (vph)	12	489	30	0	93	903	97	0	0	0	0	0	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				0.00									
vC, conflicting volume	1000			0	519			1166	1714	260	1406	1680	500
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol	1000			0	519			1166	1714	260	1406	1680	500
tC, single (s)	4.1			0.0	4.2			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)													
tF (s)	2.2			0.0	2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			0	91			100	100	100	100	100	100
cM capacity (veh/h)	700			0	1029			139	82	745	93	86	522

Direction, Lane #	EB 1	EB 2	WB 1	WB 2
Volume Total	256	274	544	548
Volume Left	12	0	93	0
Volume Right	0	30	0	97
cSH	700	1700	1029	1700
Volume to Capacity	0.02	0.16	0.09	0.32
Queue Length 95th (ft)	1	0	7	0
Control Delay (s)	0.7	0.0	2.4	0.0
Lane LOS	A		A	
Approach Delay (s)	0.3		1.2	
Approach LOS				

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	49.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	103	12
Future Volume (Veh/h)	0	0	0	0	103	12
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.25	0.25	0.25	0.25	0.93	0.93
Hourly flow rate (vph)	0	0	0	0	111	13
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				699		
pX, platoon unblocked						
vC, conflicting volume	118	118	124			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	118	118	124			
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	100			
cM capacity (veh/h)	883	940	1475			

Direction, Lane #	SB 1
Volume Total	124
Volume Left	0
Volume Right	13
cSH	1700
Volume to Capacity	0.07
Queue Length 95th (ft)	0
Control Delay (s)	0.0
Lane LOS	
Approach Delay (s)	0.0
Approach LOS	

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	9.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	10	0	0	90	13
Future Volume (Veh/h)	0	10	0	0	90	13
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.25	0.25	0.25	0.25	0.63	0.63
Hourly flow rate (vph)	0	40	0	0	143	21
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				277		
pX, platoon unblocked						
vC, conflicting volume	154	154	164			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	154	154	164			
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	96	100			
cM capacity (veh/h)	843	898	1427			

Direction, Lane #	EB 1	SB 1
Volume Total	40	164
Volume Left	0	0
Volume Right	40	21
cSH	898	1700
Volume to Capacity	0.04	0.10
Queue Length 95th (ft)	3	0
Control Delay (s)	9.2	0.0
Lane LOS	A	
Approach Delay (s)	9.2	0.0
Approach LOS	A	

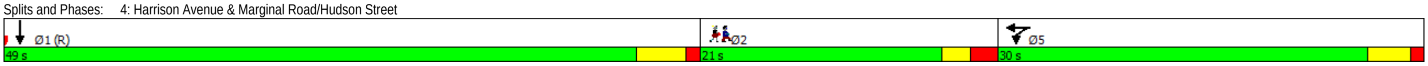
Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	15.5%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø2
Lane Configurations													
Traffic Volume (vph)	0	0	0	61	66	0	0	0	0	0	409	139	
Future Volume (vph)	0	0	0	61	66	0	0	0	0	0	409	139	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor					1.00						0.90		
Frt											0.966		
Flt Protected					0.976								
Satd. Flow (prot)	0	0	0	0	1621	0	0	0	0	0	1637	0	
Flt Permitted					0.976								
Satd. Flow (perm)	0	0	0	0	1619	0	0	0	0	0	1637	0	
Right Turn on Red			Yes	Yes		Yes			Yes			Yes	
Satd. Flow (RTOR)					60						22		
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		179			277			219			124		
Travel Time (s)		4.1			6.3			5.0			2.8		
Confl. Peds. (#/hr)				1								267	
Confl. Bikes (#/hr)												29	
Peak Hour Factor	0.25	0.25	0.25	0.89	0.89	0.89	0.25	0.25	0.25	0.93	0.93	0.93	
Heavy Vehicles (%)	0%	0%	0%	4%	2%	0%	0%	0%	0%	0%	1%	2%	
Parking (#/hr)					0								
Adj. Flow (vph)	0	0	0	69	74	0	0	0	0	0	440	149	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	0	0	0	143	0	0	0	0	0	589	0	
Turn Type				Split	NA						NA		
Protected Phases				5	5						1		2
Permitted Phases													
Detector Phase				5	5						1		
Switch Phase													
Minimum Initial (s)				10.0	10.0						10.0		1.0
Minimum Split (s)				20.0	20.0						16.5		21.0
Total Split (s)				30.0	30.0						49.0		21.0
Total Split (%)				30.0%	30.0%						49.0%		21%
Maximum Green (s)				26.0	26.0						44.5		17.0
Yellow Time (s)				3.0	3.0						3.5		2.0
All-Red Time (s)				1.0	1.0						1.0		2.0
Lost Time Adjust (s)					0.0						0.0		
Total Lost Time (s)					4.0						4.5		
Lead/Lag											Lead		Lag
Lead-Lag Optimize?											Yes		Yes
Vehicle Extension (s)				3.0	3.0						3.0		3.0
Recall Mode				Max	Max						C-Max		None
Walk Time (s)				7.0	7.0						7.0		7.0
Flash Dont Walk (s)				9.0	9.0						5.0		10.0
Pedestrian Calls (#/hr)				0	0						0		500
Act Effct Green (s)					26.0						44.5		
Actuated g/C Ratio					0.26						0.44		
v/c Ratio					0.31						0.80		
Control Delay					19.4						32.6		
Queue Delay					0.0						0.0		
Total Delay					19.4						32.6		
LOS					B						C		
Approach Delay					19.4						32.6		
Approach LOS					B						C		
90th %ile Green (s)				26.0	26.0						44.5		17.0
90th %ile Term Code				MaxR	MaxR						Coord		Ped
70th %ile Green (s)				26.0	26.0						44.5		17.0
70th %ile Term Code				MaxR	MaxR						Coord		Ped
50th %ile Green (s)				26.0	26.0						44.5		17.0
50th %ile Term Code				MaxR	MaxR						Coord		Ped
30th %ile Green (s)				26.0	26.0						44.5		17.0
30th %ile Term Code				MaxR	MaxR						Coord		Ped
10th %ile Green (s)				26.0	26.0						44.5		17.0
10th %ile Term Code				MaxR	MaxR						Coord		Ped
Queue Length 50th (ft)					41						303		
Queue Length 95th (ft)					92						#463		
Internal Link Dist (ft)		99			197			139			44		
Turn Bay Length (ft)													
Base Capacity (vph)					465						740		
Starvation Cap Reductn					0						0		
Spillback Cap Reductn					0						0		
Storage Cap Reductn					0						0		
Reduced v/c Ratio					0.31						0.80		

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 1:SBT, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 30.0 — Intersection LOS: C
Intersection Capacity Utilization 47.5% — 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: 4: Harrison Avenue & Marginal Road/Hudson Street



Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations														
Traffic Volume (veh/h)	1	25	750	34	3	99	659	62	0	0	0	0	0	0
Future Volume (Veh/h)	1	25	750	34	3	99	659	62	0	0	0	0	0	0
Sign Control			Free				Free			Stop			Stop	
Grade			0%				0%			0%			0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.96	0.96	0.96	0.96	0.25	0.25	0.25	0.25	0.25	0.25
Hourly flow rate (vph)	0	26	765	35	0	103	686	65	0	0	0	0	0	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	0.00				0.00									
vC, conflicting volume	0	751			0	800			1384	1792	400	1359	1776	376
vC1, stage 1 conf vol														
vC2, stage 2 conf vol														
vCu, unblocked vol	0	751			0	800			1384	1792	400	1359	1776	376
tC, single (s)	0.0	4.1			0.0	4.2			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)														
tF (s)	0.0	2.2			0.0	2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	0	97			0	87			100	100	100	100	100	100
cM capacity (veh/h)	0	868			0	806			91	68	600	95	69	622

Direction, Lane #	EB 1	EB 2	WB 1	WB 2
Volume Total	408	418	446	408
Volume Left	26	0	103	0
Volume Right	0	35	0	65
cSH	868	1700	806	1700
Volume to Capacity	0.03	0.25	0.13	0.24
Queue Length 95th (ft)	2	0	11	0
Control Delay (s)	0.9	0.0	3.6	0.0
Lane LOS	A		A	
Approach Delay (s)	0.5		1.9	
Approach LOS				

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	124	9
Future Volume (Veh/h)	0	0	0	0	124	9
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.50	0.50	0.25	0.25	0.91	0.91
Hourly flow rate (vph)	0	0	0	0	136	10
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				699		
pX, platoon unblocked						
vC, conflicting volume	141	141	146			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	141	141	146			
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	100			
cM capacity (veh/h)	857	912	1448			

Direction, Lane #	SB 1
Volume Total	146
Volume Left	0
Volume Right	10
cSH	1700
Volume to Capacity	0.09
Queue Length 95th (ft)	0
Control Delay (s)	0.0
Lane LOS	
Approach Delay (s)	0.0
Approach LOS	

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	10.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	19	0	0	109	17
Future Volume (Veh/h)	0	19	0	0	109	17
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.25	0.25	0.25	0.25	0.92	0.92
Hourly flow rate (vph)	0	76	0	0	118	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)				277		
pX, platoon unblocked						
vC, conflicting volume	127	127	136			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	127	127	136			
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	92	100			
cM capacity (veh/h)	872	929	1461			

Direction, Lane #	EB 1	SB 1
Volume Total	76	136
Volume Left	0	0
Volume Right	76	18
cSH	929	1700
Volume to Capacity	0.08	0.08
Queue Length 95th (ft)	7	0
Control Delay (s)	9.2	0.0
Lane LOS	A	
Approach Delay (s)	9.2	0.0
Approach LOS	A	

Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	16.8%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix D

Preliminary Energy Model Results

Preliminary Modeling Parameters

Model Input Parameter	2015 IECC Prescriptive minimum (where applicable)	Proposed Design Model
Conditioned Area in REMRate	Varies by unit, all values shown are average for type 1 bed = 600 s.f. 2 bed = 900 s.f. 3 bed = 1100 s.f.	Varies by unit, all values shown are average for type 1 bed = 600 s.f. 2 bed = 900 s.f. 3 bed = 1100 s.f.
Building Envelope		
Wall	R-20 or R-13+R-5 (continuous)	R-20 + R-5 (continuous)
Slab	N/A, all units on floors 2-6	N/A, all units on floors 2-6
Roof	R-30 continuous	R-30 (continuous)
Window to Wall Ratio	8%	8%
Window U-factor	U-0.30	U-0.30
Infiltration	3.0 ACH50	5.0 ACH50
Lighting & Appliances		
Residential lighting	100% “high efficiency” lighting (CFL/LED)	100% “high efficiency” lighting (CFL/LED)
Exterior lighting (Total)	100% “high efficiency” lighting (CFL/LED)	100% “high efficiency” lighting (CFL/LED)
HVAC System Air-Side		
Primary HVAC system	Vertical fan coil units with hot water heating coils and DX cooling coils	Vertical fan coil units with hot water heating coils and DX cooling coils
Ventilation System	Continuous local exhaust at bathroom	Central ERV- 75% exchange
Bathroom Local Exhaust Ventilation	Continuous	Continuous via Central ERV
Duct Leakage (Total)	CFM25 total leakage less than 8% of floor area	CFM25 total leakage less than 8% of floor area

Model Input Parameter	2015 IECC Prescriptive minimum (where applicable)	Proposed Design Model
Duct Leakage (Outside)	CFM25 leakage less than 6% of floor area	CFM25 leakage less than 6% of floor area
HVAC System Water-Side		
Heating Equip Type	Gas-fired high-efficiency boilers	VRF System, COP = 3.0
Cooling Equip Type	Condensing units	VRF System, SEER = 18
Domestic Hot Water System		
Equipment Type	Dedicated boiler with indirect storage	Dedicated boiler with indirect storage - 93% AFUE
Utility Cost		
Electricity ($/KWH)	n/a	0.155
Gas ($/THERM)	n/a	1.15

Home Energy Rating Certificate

Projected Report

Rating Date:
Registry ID: Unregistered
Ekotrope ID: x25wYxyd

HERS® Index Score:

44 Your home's HERS score is a relative performance score. The lower the number, the more energy efficient the home. To learn more, visit www.hersindex.com

Annual Savings

$581

*Relative to an average U.S. home

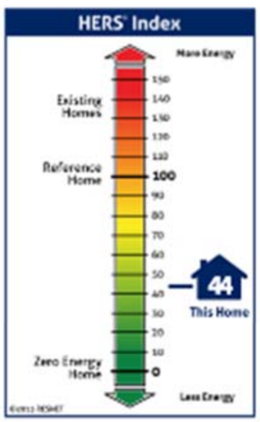
Home:
288 Harrison Ave 1 bed mid
Boston, MA 02111

Builder:

Your Home's Estimated Energy Use:

	Use [MBtu]	Annual Cost
Heating	1.4	$53
Cooling	0.3	$10
Hot Water	5.5	$54
Lights/Appliances	9.5	$314
Service Charges		$0
Generation (e.g. Solar)	0.0	$0
Total:	**16.7**	**$430**

This home meets or exceeds the criteria of the following:



Home Feature Summary:

Home Type:	Apartment, inside unit
Model:	1 Bed mid
Community:	Tai Tung Village
Conditioned Floor Area:	600 ft²
Number of Bedrooms:	1
Primary Heating System:	Air Source Heat Pump • Electric • 3 COP
Primary Cooling System:	Air Source Heat Pump • Electric • 18 SEER
Primary Water Heating:	Water Heater • Natural Gas • 0.93 Energy Factor
House Tightness:	5 ACH50
Ventilation:	32.0 CFM • 20.0 Watts
Duct Leakage to Outside:	40 CFM25 (6.67 / 100 s.f.)
Above Grade Walls:	R-25
Ceiling:	Adiabatic, R-0
Window Type:	U-Value: 0.3, SHGC: 0.35
Foundation Walls:	N/A

Rating Completed by:

Energy Rater: Cody Wero
RESNET ID: 7031806

Rating Company: New Ecology
15 Court Sq. Boston, MA 02108
617 557 1700

Rating Provider: Building Efficiency Resources
PO Box 1769 Brevard, NC 28712
800-399-9620

Cody Wero, Certified Energy Rater
Date: 8/14/19 at 11:39 AM

ekotrope™

Ekotrope RATER - Version: 3.2.1.2233
The Energy Rating Disclosure for this home is available from the Approved Rating Provider.
This report does not constitute any warranty or guarantee.

Home Energy Rating Certificate

Projected Report

Rating Date:
Registry ID: Unregistered
Ekotrope ID: KvpQOE42

HERS® Index Score:

42

Your home's HERS score is a relative performance score. The lower the number, the more energy efficient the home. To learn more, visit www.hersindex.com

Annual Savings

$759

*Relative to an average U.S. home

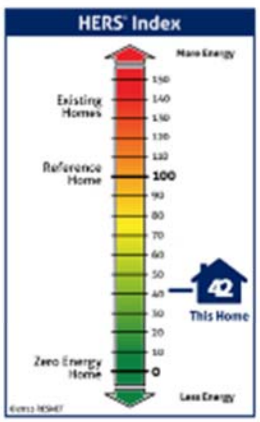
Home:
288 Harrison Ave 2 bed mid
Boston, MA 02111

Builder:

Your Home's Estimated Energy Use:

	Use [MBtu]	Annual Cost
Heating	2.3	$86
Cooling	0.4	$14
Hot Water	7.4	$72
Lights/Appliances	11.4	$377
Service Charges		$0
Generation (e.g. Solar)	0.0	$0
Total:	**21.6**	**$549**

This home meets or exceeds the criteria of the following:



Home Feature Summary:

Home Type:	Apartment, inside unit
Model:	2 Bed mid
Community:	Tai Tung Village
Conditioned Floor Area:	900 ft²
Number of Bedrooms:	2
Primary Heating System:	Air Source Heat Pump • Electric • 3 COP
Primary Cooling System:	Air Source Heat Pump • Electric • 18 SEER
Primary Water Heating:	Water Heater • Natural Gas • 0.93 Energy Factor
House Tightness:	5 ACH50
Ventilation:	50.0 CFM • 20.0 Watts
Duct Leakage to Outside:	40 CFM25 (6.67 / 100 s.f.)
Above Grade Walls:	R-25
Ceiling:	Adiabatic, R-0
Window Type:	U-Value: 0.3, SHGC: 0.35
Foundation Walls:	N/A

Rating Completed by:

Energy Rater: Cody Wero
RESNET ID:7031806

Rating Company: New Ecology
15 Court Sq. Boston, MA 02108
617 557 1700

Rating Provider: Building Efficiency Resources
PO Box 1769 Brevard, NC 28712
800-399-9620

Cody Wero, Certified Energy Rater
Date: 8/14/19 at 11:39 AM

ekotrope™

Ekotrope RATER - Version:3.2.1.2233
The Energy Rating Disclosure for this home is available from the Approved Rating Provider.
This report does not constitute any warranty or guarantee.

Home Energy Rating Certificate

Projected Report

Rating Date:
Registry ID: Unregistered
Ekotrope ID: BdNkBX8v

HERS® Index Score:

40

Your home's HERS score is a relative performance score. The lower the number, the more energy efficient the home. To learn more, visit www.hersindex.com

Annual Savings

$972

*Relative to an average U.S. home

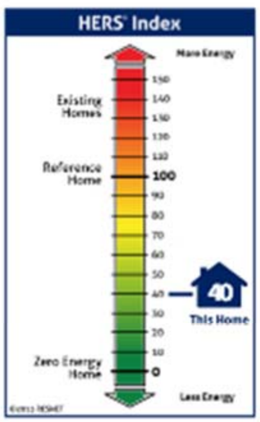
Home:
288 Harrison Ave 3 bed mid
Boston, MA 02111

Builder:

Your Home's Estimated Energy Use:

	Use [MBtu]	Annual Cost
Heating	3.4	$126
Cooling	0.5	$17
Hot Water	9.3	$90
Lights/Appliances	13.0	$426
Service Charges		$0
Generation (e.g. Solar)	0.0	$0
Total:	**26.1**	**$659**

This home meets or exceeds the criteria of the following:



Home Feature Summary:

Home Type:	Apartment, inside unit
Model:	3 Bed mid
Community:	Tai Tung Village
Conditioned Floor Area:	1,100 ft²
Number of Bedrooms:	3
Primary Heating System:	Air Source Heat Pump • Electric • 3 COP
Primary Cooling System:	Air Source Heat Pump • Electric • 18 SEER
Primary Water Heating:	Water Heater • Natural Gas • 0.93 Energy Factor
House Tightness:	5 ACH50
Ventilation:	63.0 CFM • 20.0 Watts
Duct Leakage to Outside:	44 CFM25 (7.33 / 100 s.f.)
Above Grade Walls:	R-25
Ceiling:	Adiabatic, R-0
Window Type:	U-Value: 0.3, SHGC: 0.35
Foundation Walls:	N/A

Rating Completed by:

Energy Rater: Cody Wero
RESNET ID:7031806

Rating Company: New Ecology
15 Court Sq. Boston, MA 02108
617 557 1700

Rating Provider: Building Efficiency Resources
PO Box 1769 Brevard, NC 28712
800-399-9620

Cody Wero, Certified Energy Rater
Date: 8/14/19 at 11:39 AM

ekotrope™

Ekotrope RATER - Version:3.2.1.2233
The Energy Rating Disclosure for this home is available from the Approved Rating Provider.
This report does not constitute any warranty or guarantee.

Appendix E

Climate Resiliency Checklist

Boston Planning & Development Agency
Climate Resiliency Report Summary

Submitted: 08/23/2019 09:55:45

A.1 - Project Information

Project Name:	288 Harrison Residences			
Project Address:	288 Harrison Avenue			
Filing Type:	Initial (PNF, EPNF, NPC or other substantial filing)			
Filing Contact:	Talya Moked	Epsilon Associates, Inc.	tmoked@epsilonassociates.com	9784616223
Is MEPA approval required?	No	MEPA date:		

A.2 - Project Team

Owner / Developer:	Chinese Consolidated Benevolent Association of New England (“CCBA”) / Beacon Communities LLC
Architect:	Bruner/Cott Architects
Engineer:	Nitsch Engineering (Civil), Petersen Engineering, Inc. (MEP)
Sustainability / LEED:	New Ecology, Inc.
Permitting:	Epsilon Associates, Inc.
Construction Management:	

A.3 - Project Description and Design Conditions

List the principal Building Uses:	Residential
List the First Floor Uses:	Residential, non-residential space
List any Critical Site Infrastructure and or Building Uses:	

Site and Building:

Site Area (SF):	23224	Building Area (SF):	86100
Building Height (Ft):	71	Building Height (Stories):	6
Existing Site Elevation – Low (Ft BCB):	16.77	Existing Site Elevation – High (Ft BCB):	20.76
Proposed Site Elevation – Low (Ft BCB):	17.2	Proposed Site Elevation – High (Ft BCB):	20.7
Proposed First Floor Elevation (Ft BCB):	20	Below grade spaces/levels (#):	0

Article 37 Green Building:

LEED Version - Rating System:	v4 BD+C Multifamily Midrise	LEED Certification:	No
Proposed LEED rating:	Silver	Proposed LEED point score (Pts.):	55

Building Envelope:

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

Roof:	30	Exposed Floor :	30
Foundation Wall:	10	Slab Edge (at or below grade):	10

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

Area of Opaque Curtain Wall & Spandrel Assembly:	0	Wall & Spandrel Assembly Value:	
Area of Framed & Insulated / Standard Wall:	76	Wall Value:	20
Area of Vision Window:	23	Window Glazing Assembly Value:	0.30
		Window Glazing SHGC:	0.35
Area of Doors:	1	Door Assembly Value :	0.20

Energy Loads and Performance

For this filing – describe how energy loads & performance were determined	The Project will be designed to achieve the Massachusetts energy code for residential buildings (HERS 55) as well as LEED Multifamily Midrise v4. The team has produced early-stage models in Ekotrope to confirm compliance, showing a range of HERS 40-44. The values shown below are for unit spaces only (common areas are not modeled in the HERS process).		
Annual Electric (kWh):	291471	Peak Electric (kW):	
Annual Heating (MMbtu/hr):	201	Peak Heating (MMbtu):	
Annual Cooling (Tons/hr):	34	Peak Cooling (Tons):	
Energy Use - Below ASHRAE 90.1 - 2013 (%):		Have the local utilities reviewed the building energy performance?:	No
Energy Use - Below Mass. Code (%):	23	Energy Use Intensity (kBtu/SF):	35.5

Back-up / Emergency Power System

Electrical Generation Output (kW):	200	Number of Power Units:	1
System Type (kW):	Combustion Engine Generator	Fuel Source:	Diesel

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

Electric (kW):

Heating (MMbtu/hr):

Cooling (Tons/hr):

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

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

B.1 – GHG Emissions - Design Conditions

For this filing - Annual Building GHG Emissions (Tons): 247

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

The building models will serve as a reference point throughout the design process to ensure that efficient design practices are included. High performance building envelope, high-efficiency mechanical and lighting systems, and Energy Star labeled appliances will be incorporated into the project to reduce the overall building energy usage. High performance envelope details and systems are anticipated.

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

A high-performance building envelope will be provided for the project to reduce the heating and cooling loads of the building. Air leakage will be minimized.

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

High efficiency mechanical systems, light fixtures with high efficacy e.g. LED / CFL bulbs, and EnergyStar labeled appliances will be provided for the project to reduce its building energy usage.

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

None

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

None

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

The building will be modeled by experienced energy modelers and design guidance will be provide by experts well-versed in high-performance building design. The team has applied for incentives through the MassSave Multifamily High-Rise program.

B.2 - GHG Reduction - Adaptation Strategies

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

High performance building envelope and high efficiency mechanical systems.

C - Extreme Heat Events

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

C.1 – Extreme Heat - Design Conditions

Temperature Range - Low (Deg.):	7	Temperature Range - High (Deg.):	91
Annual Heating Degree Days:	5512	Annual Cooling Degree Days	776

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

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

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

Design intent aims to include a combination of white roof area with a high SRI, and green space with planting in the triangular area at the north end of the project.

C.2 - Extreme Heat – Adaptation Strategies

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

Design intent aims to meet/exceed current Boston building energy efficiency code requirements, investigate various passive strategies, and improve the buildings' passive survivability performance.

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

Mechanicals will be set at 20 Ft BCB, which is 1 Ft above base flood elevation for the site (19 Ft BCB). The emergency generator will also be located on the roof.

D - Extreme Precipitation Events

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

D.1 – Extreme Precipitation - Design Conditions

What is the project design precipitation level? (In. / 24 Hours)	5.25

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

Design intent will be the 10 year, 24-Hour design storm (5.25” – 6”) through infiltration and retention strategies.

D.2 - Extreme Precipitation - Adaptation Strategies

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

Design intent includes further investigation of increased storm water infiltration strategies across the site.

E – Sea Level Rise and Storms

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

Is any portion of the site in a FEMA Special Flood Hazard Area?	No	What Zone:	
What is the current FEMA SFHA Zone Base Flood Elevation for the site (Ft BCB)?			
Is any portion of the site in the BPDA Sea Level Rise Flood Hazard Area (see SLR-FHA online map)?	Yes		

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

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

Proposed projects should identify immediate and future adaptation strategies for managing the flooding scenario represented by the Sea Level Rise Flood Hazard Area (SLR-FHA), which includes 3.2' of sea level rise above 2013 tide levels, an additional 2.5" to account for subsidence, and the 1% Annual Chance Flood. After using the SLR-FHA to identify a project's Sea Level Rise Base Flood Elevation, proponents should calculate the Sea Level Rise Design Flood Elevation by adding 12" of freeboard for buildings, and 24" of freeboard for critical facilities and infrastructure and any ground floor residential units.

What is the Sea Level Rise - Base Flood Elevation for the site (Ft BCB)?	19		
What is the Sea Level Rise - Design Flood Elevation for the site (Ft BCB)?	20	First Floor Elevation (Ft BCB):	20
What are the Site Elevations at Building (Ft BCB)?	20	What is the Accessible Route Elevation (Ft BCB)?	TBD

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

Design aims to investigate various building level mitigation strategies as described by the requirements, as well as work with the civil engineer to explore site level mitigation strategies. For example, the team is examining the potential to elevate the site-level transformer above typical elevation.

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

Design intent aims to explore several potential methods for flood protection, including a possible flood proof door to mechanical spaces, and possible flood gate strategies. Also under consideration are elevated pads for electrical and domestic hot water equipment on the 1st floor.

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

Design intent includes investigating first aid and emergency supplies stored on-site in public common areas, a tenant education program, preparedness coordination by property management, emergency generator for common areas, and limited emergency power. The team is examining the feasibility of designing the 1st floor common room as a shelter-in-place zone, with dedicated heating and cooling equipment on backup generation, a shower, and cooking equipment.

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

The team will examine the protection of building mechanical and electrical equipment from flood damage by raising the equipment.

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

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

The project is investigating stormwater infiltration system strategies to promote groundwater infiltration now and in the future.

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

Future adaptive measures could include retrofit of the residential common areas and amenity spaces on the 1st floor.

Thank you for completing the Boston Climate Change Checklist!

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

Appendix F

Accessibility Checklist

Article 80 – Accessibility Checklist

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

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

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

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

Accessibility Analysis Information Sources:

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

Glossary of Terms:

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

1. Project Information:

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

Project Name:	288 Harrison Residences
Primary Project Address:	288 Harrison Avenue, Boston, MA 02111
Total Number of Phases/Buildings:	1
Primary Contact (Name / Title / Company / Email / Phone):	Susan Chu / Executive Director / Chinese Consolidated Benevolent Association of New England ("CCBA") / ccbane.exec.dir@gmail.com / 617-542-2574
Owner / Developer:	Chinese Consolidated Benevolent Association of New England ("CCBA") / Beacon Communities LLC
Architect:	Bruner/Cott Architects
Civil Engineer:	Nitsch Engineering
Landscape Architect:	TBD
Permitting:	Epsilon Associates, Inc.
Construction Management:	TBD

At what stage is the project at time of this questionnaire? Select below:

☑PNF / Expanded PNF Submitted	Draft / Final Project Impact Report Submitted	BPDA Board Approved
BPDA Design Approved	Under Construction	Construction Completed:

Do you anticipate filing for any variances with the Massachusetts Architectural Access Board (MAAB)? ***If yes,*** identify and explain.	No

2. Building Classification and Description:

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

What are the dimensions of the project?

Site Area:	*~ 23,520 SF*	Building Area:	*~86,100 GFA*
Building Height:	*~ 71 FT.*	Number of Stories:	*6 Flrs.*

First Floor Elevation:	~19.5 Ft BCB	Is there below grade space:		*No*
What is the Construction Type? (Select most appropriate type)				
	☑Wood Frame	Masonry	Steel Frame	Concrete
What are the principal building uses? (IBC definitions are below – select all appropriate that apply)				
	Residential – One - Three Unit	☑Residential - Multi-unit, Four +	Institutional	Educational
	Business	Mercantile	Factory	Hospitality
	Laboratory / Medical	☑Storage, Utility and Other		
List street-level uses of the building:	*Residential lobby, non-residential space, mechanical, storage*			

3. Assessment of Existing Infrastructure for Accessibility:

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

Provide a description of the neighborhood where this development is located and its identifying topographical characteristics:	The Site is at the edge of Boston's Chinatown, within a section with a mix of residential, commercial and institutional uses, but dominated by highways to the south and east. It is currently a surface parking lot for the Tai Tung Village, a complex of affordable housing built in early 1970's. Harrison Avenue connects the site to the business core of Chinatown to the north and to the South End across the Turnpike.
List the surrounding accessible MBTA transit lines and their proximity to development site: commuter rail / subway stations, bus stops:	Within half mile radius from the Site are three major subway stations - Tufts Medical Center, Boylston Street, and South Station. The Silver Line is one block away on Washington Street.
List the surrounding institutions: hospitals, public housing, elderly and disabled housing developments, educational facilities, others:	Josiah Quincy School, The Chinatown Community Education Center, Quincy Tower Senior Housing, Tufts Medical Center, Tufts University School of Medicine, Floating Hospital for Children, Tufts University Dental School
List the surrounding government buildings: libraries, community centers, recreational facilities, and other related facilities:	Eliot Norton Park, Reggie Wong Park, Chin Park, Mary Soo Hoo Park, Jean Mayer USDA Human Nutrition Research Center for Aging, YMCA

4. Surrounding Site Conditions – Existing:

This section identifies current condition of the sidewalks and pedestrian ramps at the development site.

Is the development site within a historic district? ***If yes,*** identify which district:	No

Are there sidewalks and pedestrian ramps existing at the development site? ***If yes***, list the existing sidewalk and pedestrian ramp dimensions, slopes, materials, and physical condition at the development site:	No
Are the sidewalks and pedestrian ramps existing-to-remain? ***If yes,*** have they been verified as ADA / MAAB compliant (with yellow composite detectable warning surfaces, cast in concrete)? ***If yes,*** provide description and photos:	No

5. Surrounding Site Conditions – Proposed

This section identifies the proposed condition of the walkways and pedestrian ramps around the development site. Sidewalk width contributes to the degree of comfort walking along a street. Narrow sidewalks do not support lively pedestrian activity, and may create dangerous conditions that force people to walk in the street. Wider sidewalks allow people to walk side by side and pass each other comfortably walking alone, walking in pairs, or using a wheelchair.

Are the proposed sidewalks consistent with the Boston Complete Street Guidelines? ***If yes***, choose which Street Type was applied: Downtown Commercial, Downtown Mixed-use, Neighborhood Main, Connector, Residential, Industrial, Shared Street, Parkway, or Boulevard.	The Project falls into the Neighborhood Residential category of the Complete Streets Guidelines and are consistent with those guidelines.
What are the total dimensions and slopes of the proposed sidewalks? List the widths of the proposed zones: Frontage, Pedestrian and Furnishing Zone:	They will have a 1.5% cross slope generally, with a maximum of 2%. Sidewalk width is around 10 feet.
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?	Precast concrete pavers at accent areas within the furniture/landscape zone, broom finish concrete in all other sidewalk areas and to allow for accessibility per Boston standards.
Will sidewalk cafes or other furnishings be programmed for the pedestrian right-of-way? ***If yes,*** what are the proposed dimensions of the sidewalk café or furnishings and what will the remaining right-of-way	No

clearance be?	
If the pedestrian right-of-way is on private property, will the proponent seek a pedestrian easement with the Public Improvement Commission (PIC)?	Yes
Will any portion of the Project be going through the PIC? ***If yes,*** identify PIC actions and provide details.	Yes the Project will go through the PIC for streetscape improvements.

6. Accessible Parking:

See Massachusetts Architectural Access Board Rules and Regulations 521 CMR Section 23.00 regarding accessible parking requirement counts and the Massachusetts Office of Disability – Disabled Parking Regulations.

What is the total number of parking spaces provided at the development site? Will these be in a parking lot or garage?	40 surface parking spaces
What is the total number of accessible spaces provided at the development site? How many of these are "Van Accessible" spaces with an 8 foot access aisle?	2, 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 regarding this need?	Requirement will be determined after review with the Commission for Persons with Disabilities.
Where is the accessible visitor parking located?	Requirement will be determined after review with the Commission for Persons with Disabilities.
Has a drop-off area been identified? ***If yes,*** will it be accessible?	Drop-off locations have not been identified, and they will be accessible.

7. Circulation and Accessible Routes:

The primary objective in designing smooth and continuous paths of travel is to create universal access to entryways and common spaces, which accommodates persons of all abilities and allows for visitability with neighbors.

Describe accessibility at each entryway: Example: Flush Condition, Stairs, Ramp, Lift or Elevator:	Flush condition at each entryway.
Are the accessible entrances and standard entrance integrated? ***If yes,***	Yes

*describe. **If no**,* what is the reason?	
If project is subject to Large Project Review/Institutional Master Plan, describe the accessible routes way-finding / signage package.	Accessible routes across the project will be provided from the primary entrance to the accessible elevator access points. Signage compliant with 521 CMR will be provided for residents and visitors for clear wayfinding.
8. Accessible Units (Group 2) and Guestrooms: (If applicable) *In order to facilitate access to housing and hospitality, this section addresses the number of accessible units that are proposed for the development site that remove barriers to housing and hotel rooms.*	
What is the total number of proposed housing units or hotel rooms for the development?	Approximately 85 units.
If a residential development, how many units are for sale? How many are for rent? What is the breakdown of market value units vs. IDP (Inclusionary Development Policy) units?	All rental units. All units will be affordable.
If a residential development, how many accessible Group 2 units are being proposed?	Project will meet MAAB requirement for Group 2 units.
If a residential development, how many accessible Group 2 units will also be IDP units? ***If none***, describe reason.	All units will be affordable.
If a hospitality development, how many accessible units will feature a wheel-in shower? Will accessible equipment be provided as well? ***If yes,*** provide amount and location of equipment.	Not applicable.
Do standard units have architectural barriers that would prevent entry or use of common space for persons with mobility impairments? Example: stairs / thresholds at entry, step to balcony, others. ***If yes***, provide reason.	No
Are there interior elevators, ramps or lifts located in the development for access around architectural barriers	Yes, there will be two elevators serving the upper floors.

and/or to separate floors? ***If yes***, describe:	
9. Community Impact: *Accessibility and inclusion extend past required compliance with building codes. Providing an overall scheme that allows full and equal participation of persons with disabilities makes the development an asset to the surrounding community.*	
Is this project providing any funding or improvements to the surrounding neighborhood? Examples: adding extra street trees, building or refurbishing a local park, or supporting other community-based initiatives?	The Project is proposing additional street trees along Harrison Avenue and Hudson Street.
What inclusion elements does this development provide for persons with disabilities in common social and open spaces? Example: Indoor seating and TVs in common rooms; outdoor seating and barbeque grills in yard. Will all of these spaces and features provide accessibility?	All common and social spaces will be accessible.
Are any restrooms planned in common public spaces? ***If yes,*** will any be single-stall, ADA compliant and designated as "Family"/ "Companion" restrooms? ***If no***, explain why not.	Yes, there will be a single unisex accessible restroom.
Has the proponent reviewed the proposed plan with the City of Boston Disability Commissioner or with their Architectural Access staff? ***If yes,*** did they approve? ***If no,*** what were their comments?	The Project has not yet been reviewed with the Disability Director or the Architectural Access staff.
Has the proponent presented the proposed plan to the Disability Advisory Board at one of their monthly meetings? Did the Advisory Board vote to support this project? ***If no,*** what recommendations did the Advisory Board give to make this project more accessible?	The Project has not been presented to the Disability Advisory Board.

10. Attachments *Include a list of all documents you are submitting with this Checklist. This may include drawings, diagrams, photos, or any other material that describes the accessible and inclusive elements of this project.*
Provide a diagram of the accessible routes to and from the accessible parking lot/garage and drop-off areas to the development entry locations, including route distances.
Provide a diagram of the accessible route connections through the site, including distances.
Provide a diagram the accessible route to any roof decks or outdoor courtyard space? (if applicable)
Provide a plan and diagram of the accessible Group 2 units, including locations and route from accessible entry.
Provide any additional drawings, diagrams, photos, or any other material that describes the inclusive and accessible elements of this project. • • • •

This completes the Article 80 Accessibility Checklist required for your project. Prior to and during the review process, Commission staff are able to provide technical assistance and design review, in order to help achieve ideal accessibility and to ensure that all buildings, sidewalks, parks, and open spaces are usable and welcoming to Boston's diverse residents and visitors, including those with physical, sensory, and other disabilities.

For questions or comments about this checklist, or for more information on best practices for improving accessibility and inclusion, visit www.boston.gov/disability, or our office:

The Mayor’s Commission for Persons with Disabilities
1 City Hall Square, Room 967,
Boston MA 02201.

Architectural Access staff can be reached at:

accessibility@boston.gov | patricia.mendez@boston.gov | sarah.leung@boston.gov | 617-635-3682

Appendix G

Smart Utilities Checklist

Boston Smart Utilities Checklist

Date Submitted:	08/22/2019 14:03:20
Submitted by:	tmoked@epsilonassociates.com

Background

The Smart Utilities Checklist will facilitate the Boston Smart Utilities Steering Committee's review of:

a) compliance with the Smart Utilities Policy for Article 80 Development Review, which calls for the integration of five (5) Smart Utility Technologies (SUTs) into Article 80 developments

b) integration of the Smart Utility Standards

More information about the Boston Smart Utilities Vision project, including the Smart Utilities Policy and Smart Utility Standards, is available at: www.http://bostonplans.org/smart-utilities

Note: Any documents submitted via email to manuel.esquivel@boston.gov will not be attached to the pdf form generated after submission, but are available upon request.

Part 1 - General Project Information

1.1 Project Name	288 Harrison Residences
1.2 Project Address	288 Harrison Avenue
1.3 Building Size (square feet) **For a multi-building development, enter total development size (square feet)*	86100
1.4 Filing Stage	Initial Filing (i.e., PNF)
1.5 Filing Contact Information	
1.5a Name	Talya Moked

Boston Smart Utilities Checklist

1.5b Company	Epsilon Associates
1.5c E-mail	tmoked@epsilonassociates.com
1.5d Phone Number	9784616223

1.6 Project Team

1.6a Project Owner/Developer	CCBA Tai Tung Management, Inc. and Beacon Communities Development, LLC
1.6b Architect	Bruner/Cott Associates
1.6c Permitting	Epsilon Associates, Inc.
1.6d Construction Management	

Part 2 - District Energy Microgrids

Fill out this section if the proposed project's total development size is equal to or greater than 1.5 million square feet.

Note on submission requirements timeline:

Feasibility Assessment Part A should be submitted with PNF or any other initial filing.

Feasibility Assessment Part B should be submitted with any major filing during the Development Review stage (i.e., DPIR)

District Energy Microgrid Master Plan Part A should be submitted before submission of the Draft Board Memorandum by the BPDA Project Manager (Note: Draft Board Memorandums are due one month ahead of the BPDA Board meetings)

District Energy Microgrid Master Plan Part B should be submitted before applying for a Building Permit

Please email submission to manuel.esquivel@boston.gov

2.1 Consultant Assessing/Designing District Energy Microgrid (if applicable)	Not applicable

Boston Smart Utilities Checklist

2.2 Latest document submitted	
2.3 Date of latest submission	
2.4 Which of the following have you had engagement/review meetings with regarding District Energy Microgrids? (select all that apply)	
2.5 What engagement meetings have you had with utilities and/or other agencies (i.e., MA DOER, MassCEC) regarding District Energy Microgrids? (Optional: include dates)	
2.6 Additional Information	

Part 3 - Telecommunications Utilidor

Fill out this section if the proposed project's total development size is equal to or greater than 1.5 million square feet OR if the project will include the construction of roadways equal to or greater than 0.5 miles in length.

Please submit a map/diagram highlighting the sections of the roads on the development area where a Telecom Utilidor will be installed, including access points to the Telcom Utilidor (i.e., manholes)

Please email submission to manuel.esquivel@boston.gov

3.1 Consultant Assessing/Designing Telecom Utilidor (if applicable)	Not applicable
3.2 Date Telecom Utilidor Map/Diagram was submitted	

Boston Smart Utilities Checklist

3.3 Dimensions of Telecom Utilidor (include units)	
3.3a Cross-section (i.e., diameter, width X height)	
3.3b Length	
3.4 Capacity of Telecom Utilidor (i.e., number of interducts, 2 inch (ID) pipes, etc.)	
3.5 Which of the following have you had engagement/review meetings with regarding the Telecom Utilidor? (select all that apply)	
3.6 What engagement meetings have you had with utilities and/or other agencies (i.e., State agencies) regarding the Telecom Utilidor? (Optional: include dates)	
3.7 Additional Information	

Part 4 - Green Infrastructure

Fill out this section if the proposed project's total development size is equal to or greater than 100,000 square feet.

Please submit a map/diagram highlighting where on the development Green Infrastructure will be installed.

Please email submission to manuel.esquivel@boston.gov

4.1 Consultant Assessing/Designing Green Infrastructure (if applicable)	Not applicable, project is under 100,000 sf

Boston Smart Utilities Checklist

4.2 Date Green Infrastructure Map/Diagram was submitted	
4.3 Types of Green Infrastructure included in the project (select all that apply)	
4.4 Total impervious area of the development (in square inches)	
4.5 Volume of stormwater that will be retained (in cubic inches)* **Note: Should equal to at least "Total impervious area (entered in section 4.4)" times "1.25 inches"*	
4.6 Which of the following have you had engagement/review meetings with regarding Green Infrastructure? (select all that apply)	
4.7 What engagement meetings have you had with utilities and/or other agencies (i.e., State agencies) regarding Green Infrastructure? (Optional: include dates)	
4.8 Additional Information	

Part 5 - Adaptive Signal Technology (AST)

Fill out this section if as part of your project BTD will require you to install new traffic signals or make significant improvements to the existing signal system.

Please submit a map/diagram highlighting the context of AST around the proposed development area, as well as any areas within the development where new traffic signals will be installed or where significant improvements to traffic signals will be made.

Please email submission to manuel.esquivel@boston.gov

Boston Smart Utilities Checklist

5.1 Consultant Assessing/Designing Adaptive Signal Technology (if applicable)	Not applicable
5.2 Date AST Map/Diagram was submitted	
5.3 Describe how the AST system will benefit/impact the following transportation modes	
5.3a Pedestrians	
5.3b Bicycles	
5.3c Buses and other Public Transportation	
5.3d Other Motorized Vehicles	
5.4 Describe the components of the AST system (including system design and components)	
5.5 Which of the following have you had engagement/review meetings with regarding AST? (select all that apply)	
5.6 What engagement meetings have you had with utilities and/or other agencies (i.e., State agencies) regarding AST? (Optional: include dates)	
5.7 Additional Information	

Part 6 - Smart Street Lights

Fill out this section if as part of your project PWD and PIC will require you to install new street lights or make significant improvements to the existing street light system.

Boston Smart Utilities Checklist

Please submit a map/diagram highlighting where new street lights will be installed or where improvements to street lights will be made.

Please email submission to manuel.esquivel@boston.gov

6.1 Consultant Assessing/Designing Smart Street Lights (if applicable)	Potential street light improvements will be determined as the design progresses.
6.2 Date Smart Street Lights Map/Diagram was submitted	
6.3 Which of the following have you had engagement/review meetings with regarding Smart Street Lights? (select all that apply)	
6.4 What engagement meetings have you had with utilities and/or other agencies (i.e., State agencies) regarding Smart Street Lights? (Optional: include dates)	
6.5 Additional Information	

Part 7 - Smart Utility Standards

The Smart Utility Standards set forth guidelines for planning and integration of SUTs with existing utility infrastructure in existing or new streets, including cross-section, lateral, and intersection diagrams. The Smart Utility Standards are intended to serve as guidelines for developers, architects, engineers, and utility providers for planning, designing, and locating utilities. The Smart Utility Standards will serve as the baseline for discussions on any deviations from the standards needed/proposed for any given utility infrastructure.

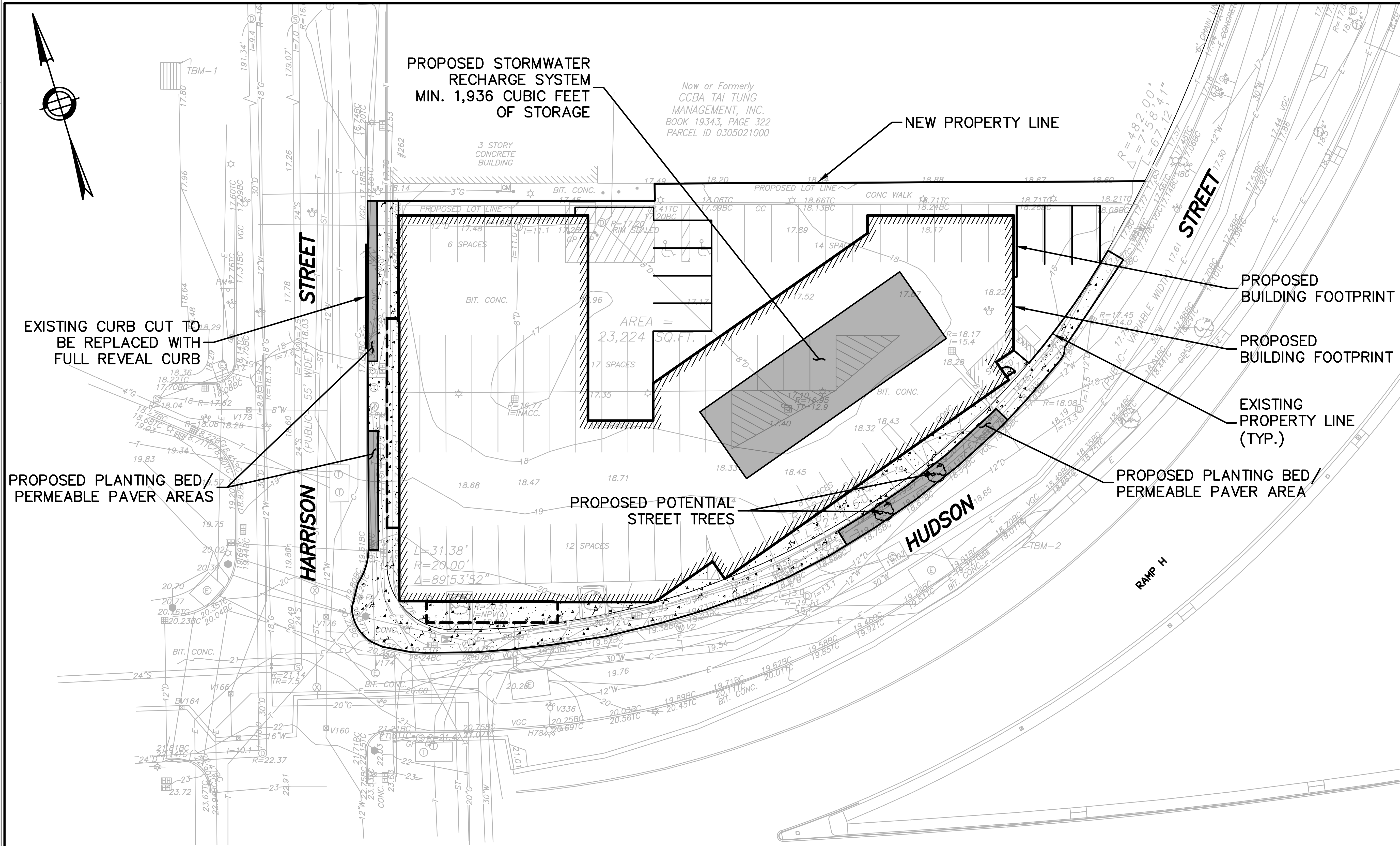
Please submit typical below and above grade cross section diagrams of all utility infrastructure in the proposed development area (including infrastructure related to the applicable SUTs).

Please submit typical below and above grade lateral diagrams of all utility infrastructure in the proposed development area (including infrastructure related to the applicable SUTs).

Boston Smart Utilities Checklist

Please email submission to manuel.esquivel@boston.gov

7.1 Date Cross Section Diagram(s) was submitted	08/22/2019
7.2 Date Lateral Diagram(s) was submitted	
7.3 Additional Information	



VOLUME OF STORMWATER TO BE RETAINED ON SITE

1.0" X TOTAL SITE IMPERVIOUS AREA = REQUIRED RECHARGE VOLUME
1.0" X 23,224 SF = 1,936 CUBIC FEET
= 14,483 GALLONS

SCALE:
1" = 30'
30 15 0 30 60

Nitsch Engineering
www.nitscheng.com
2 Center Plaza, Suite 430
Boston, MA 02108
T: (617) 338-0063
F: (617) 338-6472

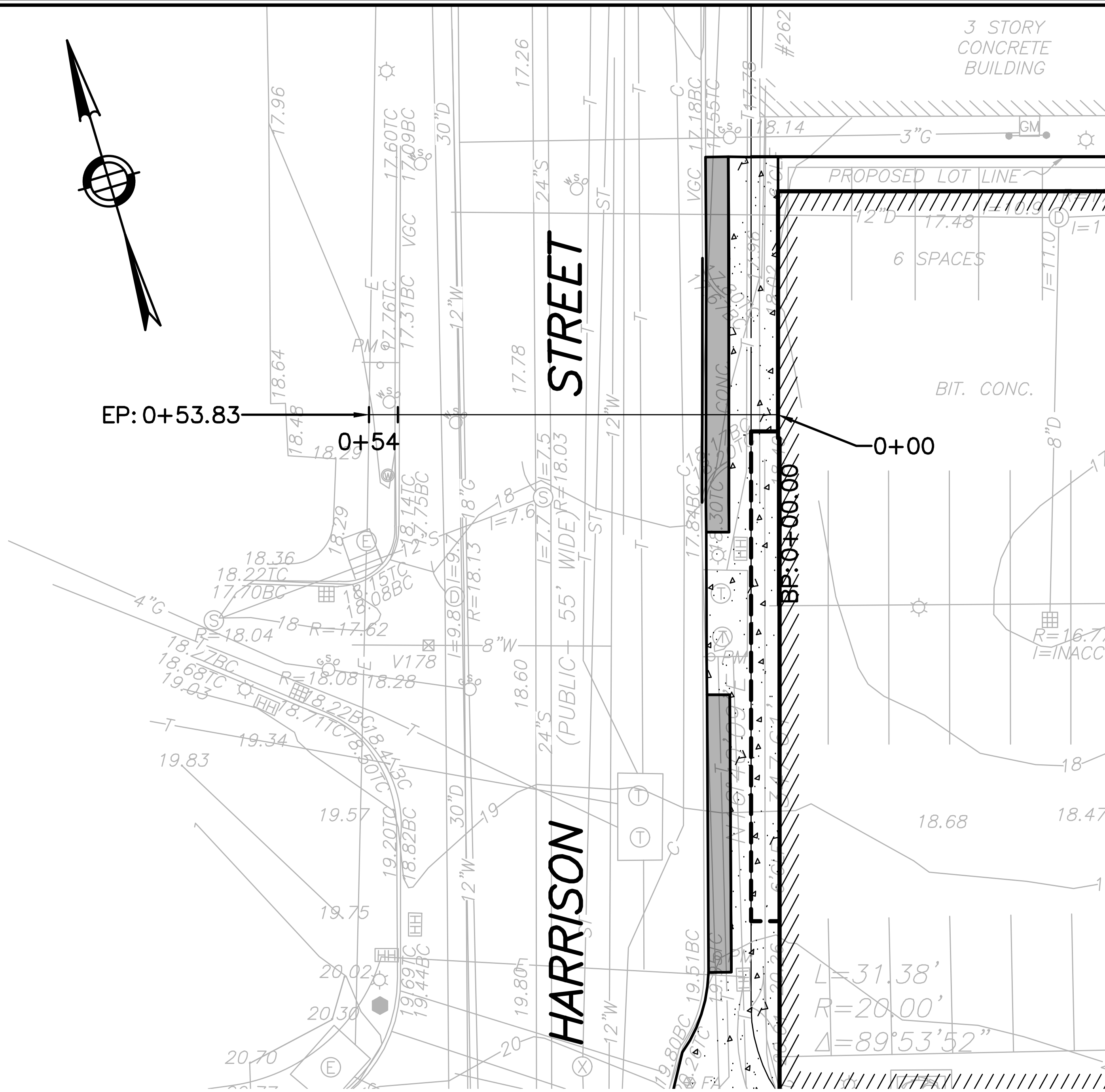
- Civil Engineering
- Land Surveying
- Transportation Engineering
- Structural Engineering
- Green Infrastructure
- Planning
- GIS

TAI TUNG VILLAGE HOUSING
HARRISON AVENUE AND HUDSON STREET
BOSTON, MA

PREPARED FOR:
BEACON COMMUNITIES
TWO CENTER PLAZA, SUITE 700, BOSTON, MA 02108

PROJECT #: 13621
FILE: 13621CLO-PNF.DWG
SCALE: 1" = 30'
DATE: 7/24/19
PROJECT MGR: JMS
SURVEYOR: NITSCH
DRAFTED BY: KAQ
CHECKED BY: JH

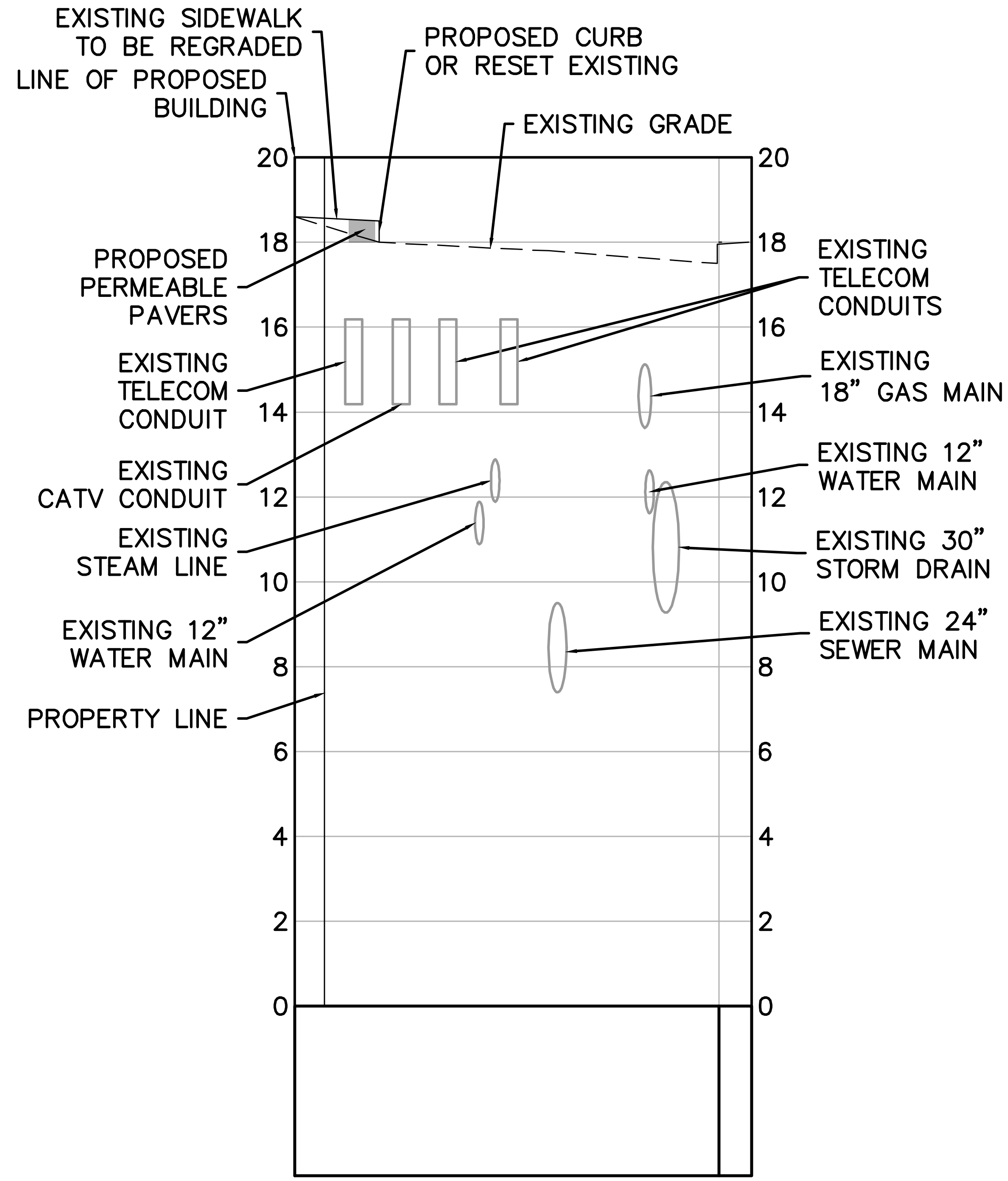
SHEET:
C-1



HARRISON AVENUE
PROFILE PLAN VIEW

SCALE:
1" = 20'

20 10 0 20 40



PROFILE VIEW

SCALE:
HORIZONTAL: 1"=20'

10 5 0 10 20

4 2 0 4 8

VERTICAL: 1"=4'

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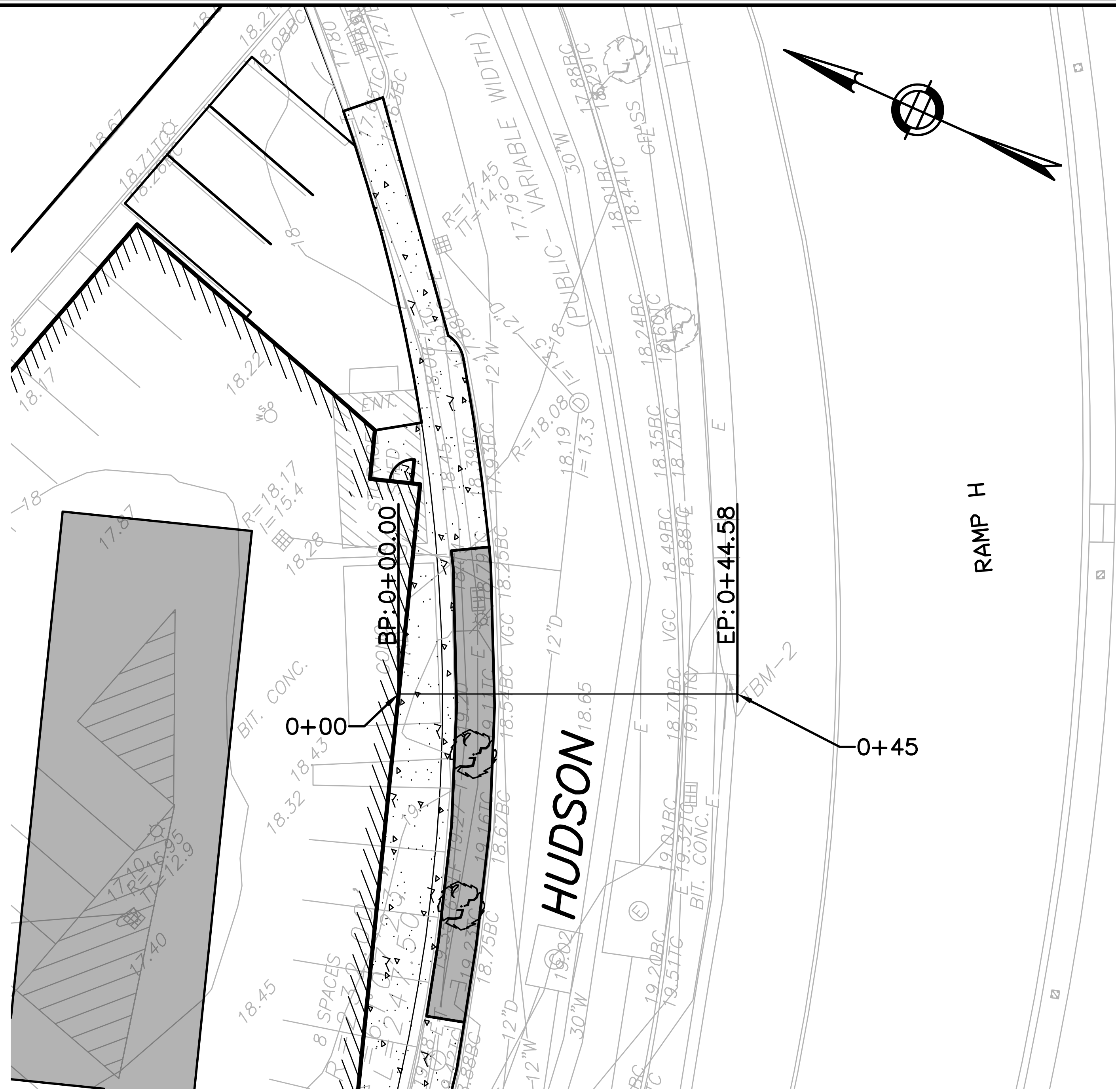
BOSTON, MA

PREPARED FOR:
BEACON COMMUNITIES
TWO CENTER PLAZA, SUITE 700, BOSTON, MA 02108

PROJECT #	13621
FILE:	13621CLO-PNF.DWG
SCALE:	SEE PLAN
DATE:	7/24/19
PROJECT MGR:	JMS
SURVEYOR:	NITSCH
DRAFTED BY:	KAQ
CHECKED BY:	JH

SHEET:

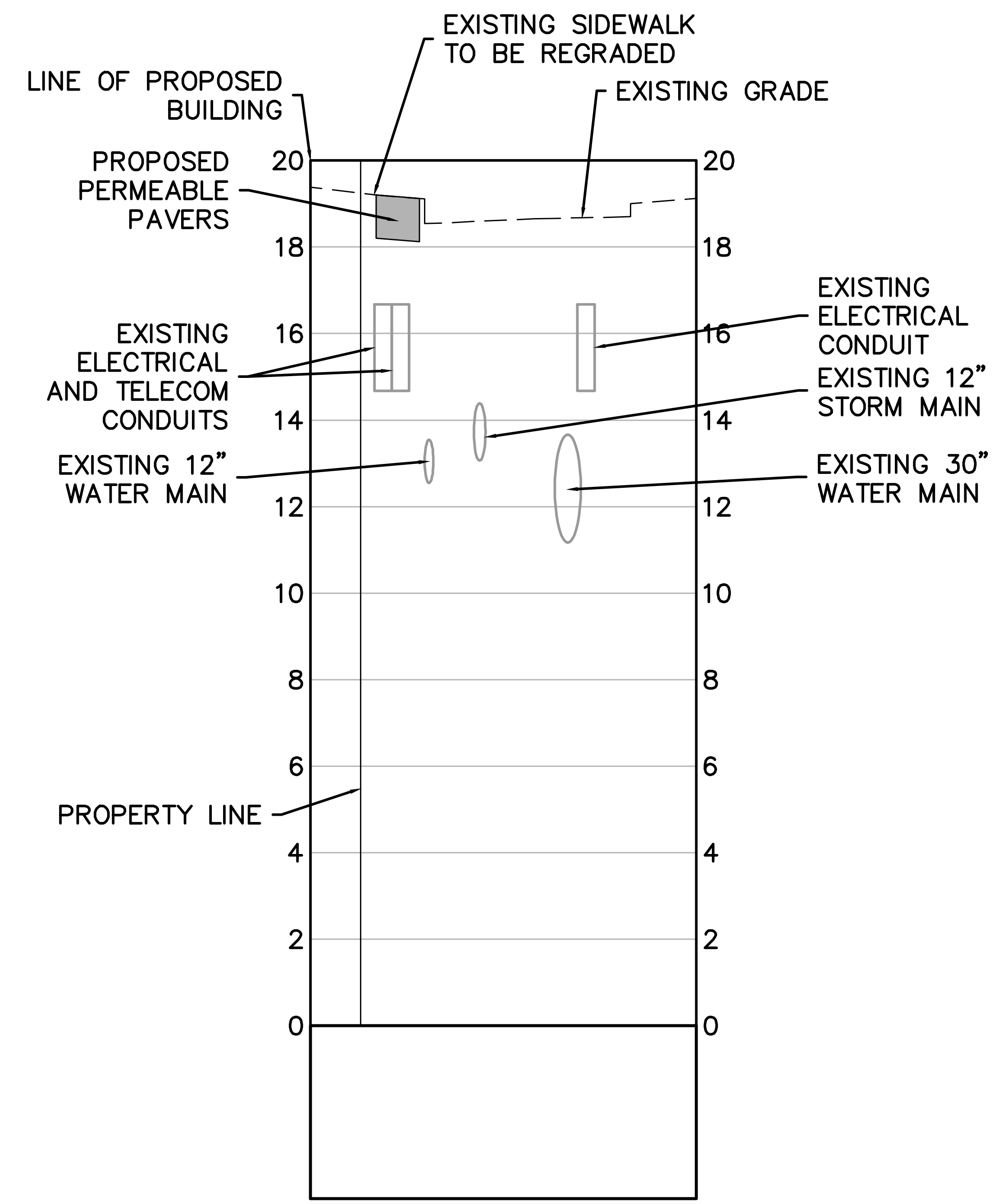
C-2



HUDSON STREET PROFILE PLAN VIEW

SCALE:
1" = 20'

20 10 0 20 40



PROFILE VIEW

SCALE:
HORIZONTAL: 1"=20'

10 5 0 10 20

4 2 0 4 8

VERTICAL: 1"=4'

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TWO CENTER PLAZA, SUITE 700, BOSTON, MA 02108

PROJECT #	13621
FILE:	13621CLO-PNF.DWG
SCALE:	SEE PLAN
DATE:	7/24/19
PROJECT MGR:	JMS
SURVEYOR:	NITSCH
DRAFTED BY:	KAQ
CHECKED BY:	JH

SHEET:

C-3

Appendix H

Broadband Ready Checklist

15				*08/22/2019 10:17:05*
		Form Publisher Template		
08/22/2019				

This is a simple template document automatically generated by Form Publisher.
Feel free to personalize it like any other Google Spreadsheet.

FormPublisher

Questions list:				
Project Name::				
Project Address Primary: :				
Project Address Additional: :				
Project Contact (name / Title / Company / email / phone): :				
Expected completion date:				
Owner / Developer:	CCBA Tai Tung Management, Inc. and Beacon Communities Development, LLC			
Architect:	Bruner/Cott Associates			
Engineer (building systems)::	Petersen Engineering, Inc.			
Permitting::	Epsilon Associates, Inc.			
Construction Management:				
Number of Points of Entry:	One			
Locations of Points of Entry:	Harrison Avenue			
Quantity and size of conduits:	(4) 4” conduits			
Location where conduits connect (e.g. building-owned manhole, carrier-specific manhole or stubbed at property line) :	Stubbed at property line			
Other information/comments:				
Do you plan to conduct a utility site assessment to identify where cabling is located within the street? This information can be helpful in determining the locations of POEs and telco rooms. Please enter ‘unknown’ if these decisions have not yet been made or you are presently unsure.:	Unknown			
Number of risers:	One			
Distance between risers (if more than one):				
Dimensions of riser closets:	Unknown			
Riser or conduit will reach to top floor :	Yes			
Number and size of conduits or sleeves within each riser:	(4) 4” conduit sleeves between floors			
Proximity to other utilities (e.g. electrical, heating):	Unknown			
Other information/comments:				
What is the size of the telecom room?:	minimum of 8’x8’			
Describe the electrical capacity of the telecom room (i.e. # and size of electrical circuits):	(4) 20amp, 120 volt dedicated circuits			
Will the telecom room be located in an area of the building containing one or more load bearing walls?:	Unknown			

Will the telecom room be climate controlled? :	Yes			
If the building is within a flood-prone geographic area, will the telecom equipment will be located above the floodplain?:	Unknown			
Will the telecom room be located on a floor where water or other liquid storage is present?:	Unknown			
Will the telecom room contain a flood drain?:	No			
Will the telecom room be single use (telecom only) or shared with other utilities?:	No			
Other information/comments:				
Will building/developer supply common inside wiring to all floors of the building? :	Unknown			
If yes, what transmission medium (e.g. coax, fiber)? Please enter ‘unknown’ if these decisions have not yet been made or you are presently unsure.:	Unknown			
Is the building/developer providing wiring within each unit? :	Yes			
If yes, what transmission medium (e.g. coax, fiber)? Please enter ‘unknown’ if these decisions have not yet been made or you are presently unsure.:	Unknown			
Will the building conduct any RF benchmark testing to assess cellular coverage?:				
Will the building allocate any floor space for future in-building wireless solutions (DAS/small cell/booster equipment)?:				
Will the building be providing an in-building solution (DAS/ Small cell/ booster)? :				
If so, are you partnering with a carrier, neutral host provider, or self-installing?:				
Will you allow cellular providers to place equipment on the roof?:				
Will you allow broadband providers (fixed wireless) to install equipment on the roof? :				
Will you allow broadband providers (fixed wireless) to install equipment on the roof? :				
Date contacted:				
Does Comcast intend to serve the building?:				
Transmission Medium:				
If no or unknown, why?:				
Date contacted:				
Does RCN intend to serve the building?:				
Transmission Medium:				
If no or unknown, why?:				
Date contacted:				

Does Verizon intend to serve the building?:				
Transmission Medium:				
If no or unknown, why?:				
Date contacted:				
Does netBlazr intend to serve the building?:				
Transmission Medium:				
If no or unknown, why?:				
Date contacted:				
Does WebPass intend to serve the building?:				
Transmission Medium:				
If no or unknown, why?:				
Date contacted:				
Does Starry intend to serve the building?:				
Transmission Medium:				
If no or unknown, why?:				
Do you plan to abstain from exclusivity agreements with broadband and cable providers? :				
Do you plan to make public to tenants and prospective tenants the list of broadband/cable providers who serve the building?:				