PUBLIC NOTICE

The Boston Redevelopment Authority ("BRA"), pursuant to Article 80 of the Boston Zoning Code, hereby gives notice that an Expanded Project Notification Form for Large Project Review ("PNF") was filed by Brighton Marine Health Center (the "Proponent") on July 11, 2014 for the Brighton Marine Health Center Veterans Mixed Income Housing project (the "Proposed Project"), to be constructed on an approximately 1.5-acre site with frontage on the Commonwealth Avenue Carriage Road on the east side of the Brighton Marine Health Center campus in the Brighton neighborhood of Boston.

The Proposed Project includes a new, approximately 101-unit residential building with below-grade parking, the rehabilitation of an existing building on the site likely into a residential unit and ground floor amenity space, and new landscaping and surface parking. Four of the existing buildings on the site will be demolished.

The Proponent is seeking the issuance of a Scoping Determination by the BRA pursuant to Section 80B-5. The BRA in the Scoping Determination for such PNF may waive further review pursuant to Section 80B-5.3(d), if, after reviewing public comments, the BRA finds that such PNF adequately describes the Proposed Project's impacts.

The PNF may be reviewed in the office of the Secretary of the BRA, Room 910, Boston City Hall, 9th Floor, Boston MA 02201 between 9:00 AM and 5:00 PM, Monday through Friday, except legal holidays. The PNF may also be viewed in the reference section of the Honan-Allston Branch of the Boston Public Library, 300 North Harvard Street, Allston, MA 02134 on Mondays and Wednesdays between noon and 8:00 PM, on Tuesdays and Thursdays between 10:00 AM and 6:00 PM and Fridays and Saturdays between 9:00 AM and 5 PM.

Public comments on the PNF, including the comments of public agencies, should be submitted in writing to Lauren Middleton-Pratt, BRA, at the address stated above within 30 days of this notice.

BOSTON REDEVELOPMENT AUTHORITY
Brian P. Golden, Acting Director

EXPANDED PROJECT NOTIFICATION FORM

Brighton Marine Health Center Veterans Mixed Income Housing Project

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

Submitted by:
Brighton Marine Health Center, Inc.
77 Warren Street
Boston, MA 02135

and

WinnCompanies
6 Faneuil Hall MarketPlace
Boston, MA 02109

Prepared by:
Epsilon Associates, Inc.
3 Clock Tower Place, Suite 250
Maynard, Massachusetts 01754

In Association with:
The Architectural Team
Nutter McClennen & Fish LLP
Howard/Stein-Hudson Associates
Nitsch Engineering
Haley & Aldrich
A.T. Leonard & Associates
Petersen Engineering
Conservation Services Group
Polaris Public Relations

July 11, 2014

Epsilon
ASSOCIATES INC.

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Veterans Mixed Income Housing Project

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July 11, 2014

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Chapter 1.0

Introduction / Project Description

1.0 INTRODUCTION / PROJECT DESCRIPTION

1.1 Introduction

Brighton Marine Health Center, Inc. (the Proponent or Brighton Marine) proposes to redevelop an approximately 1.5-acre site (the Project site) on the east side of the approximately 8.3-acre Brighton Marine Health Center campus (Brighton Marine campus) in the Brighton neighborhood of Boston. The development includes a new, approximately 101-unit residential building with below-grade parking, the rehabilitation of an existing building on the site into a residential unit and ground floor amenity space, and new landscaping and surface parking (the Project). Of the approximately 101 units to be built, approximately 80 will be mixed income units with various levels of affordability. All units will be leased with a preference for veterans, keeping with Brighton Marine's mission.

Brighton Marine is a non-profit, privately owned corporation, established in 1982 to support the continuing need for selective primary care, diagnostic, and behavioral health services to uniformed services, retirees and their dependents through a Department of Defense sponsored health plan known as the U.S. Family Health Plan which services Massachusetts, Rhode Island and Eastern Connecticut.

The organization is dedicated to two principle missions. The first is ensuring the foundation of comprehensive, quality health care services to U.S. Family Health Plan uniformed services beneficiaries who live in a defined market area. The second is to promote all-embracing, community-based health care by providing an integrated, attractive and well-maintained campus for a multitude of health-related programs serving, among others, the Allston-Brighton community and the U.S. Family Health Plan Beneficiaries.

This Expanded Project Notification Form (PNF) is being submitted to the Boston Redevelopment Authority (BRA) to initiate review of the Project under Article 80B, Large Project Review, of the Boston Zoning Code.

1.2 Brighton Marine Health Center

Brighton Marine is located at 77 Warren Street in Brighton, MA. The campus was originally constructed by the federal government beginning in 1938 in order to relocate the U.S. Marine Hospital in Boston from its then location in Chelsea, MA. The U.S. Marine Hospital's history dates back to 1798 when the Seaman's and Sailor's Act was signed by President John Adams. The original location of the hospital was on Castle Island in Boston.

Ground was broken for the 336-bed capacity hospital on October 4, 1938. The campus houses nine buildings; the largest building served as the hospital. A central heating plant facility was constructed at the west side of campus and is still used for that purpose today. Two three-story buildings were constructed to house the nursing staff and administrative staff of the hospital. Four two-story buildings were constructed to house the medical officers serving the hospital, and one single residence was constructed as the Chief Medical Officer's residence.

Over the years, the Act was expanded significantly and governance eventually fell under the Office of the Surgeon General. During this time, the U.S. Marine Hospital was renamed to the U.S. Public Hospital. The transition included expanding the services of the hospital from solely serving the military to also serving immigrants and meeting the social needs of the community.

In 1981, the federal government made the decision to close a number of U.S. Public Hospitals across the country, Boston included. At that time, a group of patients who were receiving their health care through this campus joined forces to purchase the hospital and form Brighton Marine Health Center, Inc. (formerly known as A.B.A.H.G, Inc.) to continue to provide health care to beneficiaries. The federal government agreed to sell the property to the newly formed non-profit organization.

The organization's original mission in 1981 was to continue to provide the military beneficiaries the health care they were promised, and to operate the campus as a community health care center. Two of the original tenants are still on campus and continue to provide social services needed in the community. Those two organizations are the Addiction Treatment Center of New England and Family Community Solutions, a division of The Italian Home.

Brighton Marine has continued to serve its mission since its formation in 1981. Today, Brighton Marine administers a contract with the Department of Defense for medical services for beneficiaries under the U.S. Family Health Plan. Retired military personnel and active duty family members are eligible for this medical coverage in a prescribed catchment area. The provision of the medical services is subcontracted to Brighton Marine's largest tenant, Steward Health Care. In addition to the aforementioned tenants, Brighton Marine also provides space for The Home for Little Wanderers' Children's Collaborative. This program is housed in one building on campus and provides a residence for up to twenty children who have been separated from their families. These children range in age from 13 to 19, and are being mentored to adjust to aging out of the child care system. Brighton Marine also has a number of other social service providers and clinical services on campus.

In 2011, the Board of Directors of Brighton Marine, most of whom are retired military officers or veterans, made the decision to re-examine the mission of the organization. The strategic planning process resulted in the Board re-committing the original mission of the organization and expanding the mission by including the expansion of services to all veterans, not just those eligible for the U.S. Family Health Plan. Over the last three years, the Board and Management of Brighton Marine have explored initiatives and investigated how best it can serve veterans, and how best it can re-commit to the Allston-Brighton community to address the most needed social services in the community on its campus and through its real estate. After significant research and due diligence, Brighton Marine has concluded that providing mixed income housing to veterans is the best reuse of underutilized assets on campus.

1.3 Project Identification and Project Team

Address/Location:	Brighton Marine Health Center 1485 Commonwealth Avenue, Brighton
Owner:	Brighton Marine Health Center, Inc. R.E. Hawes Medical Building 77 Warren Street Brighton, MA 02135 (617) 562-5225 Michael Dwyer Marlene Calisi
Developer:	WinnCompanies 6 Faneuil Hall MarketPlace Boston, MA 02109 (617) 742-4500 Gilbert Winn Christopher Fleming LeAnn Hanfield
Architect:	The Architectural Team 50 Commandant's Way at Admiral's Hill Chelsea, MA 02150 (617) 889-4402 Michael Binette Edward Bradford Philip Renzi
Legal Counsel:	Nutter McClennen & Fish LLP Seaport West 155 Seaport Boulevard Boston, MA 02210 (617) 439-2000 Mary Marshall Beth Mitchell

Permitting Consultant:	Epsilon Associates, Inc. 3 Clock Tower Place, Suite 250 Maynard, MA 01754 (978) 897-7100 Cindy Schlessinger Geoff Starsiak
Transportation Consultant:	Howard/Stein-Hudson Associates 38 Chauncy Street Boston, MA 02111 (617) 482-7080 Guy Busa Michael Santos
Civil Engineer:	Nitsch Engineering 2 Center Plaza, Suite 430 Boston, MA 02108 (617) 338-0063 William Maher
Geotechnical Consultant:	Haley & Aldrich, Inc. 465 Medford Street, Suite 2200 Boston, MA 02129 (617) 886-7400 Steven Kraemer
MEP/FP Engineer:	Petersen Engineering P.O. Box 4774 Portsmouth, NH 03802 (603) 436-4233 James Petersen James Parkington
Landscape Architect:	A. T. Leonard & Associates 675 Jones Hill Road Ashby, MA 01431 (978) 386-1212 Andrew T. Leonard

Sustainability Consultant:	Conservations Services Group 50 Washington Street, Suite 3000 Westborough, MA 01581 (508) 836-9500 Michael Schofield
Community and Media Relations:	Polaris Public Relations 1180 Washington Street, #303 Boston, MA 02118 (617) 437-9990 Karen Schwartzman

1.4 Project Description

1.4.1 Area Context

The Brighton Marine campus is located in the Brighton neighborhood of Boston, and is surrounded by a variety of uses (see Figure 1-1). Hospital uses are located to the north and west (St. Elizabeth's Medical Center and Franciscan Hospital for Children). Brighton High School is also located to the west. To the north is the Regency Building apartments and commercial uses beyond, and to the south are the Charing Cross residential building, currently under construction, Fidelis Way Park, commercial uses and the Commonwealth housing development beyond. The nearby sites are similarly designed with low- to mid-rise buildings surrounded by surface parking lots and landscaped area. To the east of the site is a residential neighborhood with four to five-story multi-family residential buildings. The Project site is ideally situated to take advantage of several public transportation opportunities, and is located less than a quarter-mile from the Warren Street Station that serves the MBTA Green Line B Branch, and less than a half-mile from several MBTA bus routes.

1.4.2 Project Site

The Project site is located on the eastern side of the Brighton Marine campus, adjacent to the Commonwealth Avenue Carriage Road. The site includes five two-story buildings, a roadway with restricted access, surface parking lots and landscaped areas. Four of the five buildings are currently vacant. Figures 1-2 to 1-5 include photographs of the existing site. A site survey is included in Appendix A.

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Figure 1-1

Site Context

Figure 1-2

Project Site Location

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Figure 1-3

Existing Conditions – Looking Northwest at the Site

BMHC – Veterans Mixed Income Housing Project   Boston, MA

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Figure 1-4

Existing Conditions – Looking Southwest at the Site

BMHC – Veterans Mixed Income Housing Project   Boston, MA

Figure 1-5

Existing Conditions – Looking North at the Site

1.4.3 *Proposed Development*

The Project includes the construction of a new, L-shaped six-story multi-family residential apartment building and the rehabilitation of an existing, approximately 2,560 sf building (Building 3) on an approximately 1.5 acre portion of the Brighton Marine campus. The new building will include approximately 111,650 sf, of which approximately 7,500 sf will be for common amenity space and the remainder will be residential space. A portion of the approximately 7,500 sf amenity space will be a "safe room" that will include bathrooms and have heating, air conditioning and electricity provided by the emergency generator in the event of an electrical blackout. A below-grade parking garage will include approximately 49 parking spaces. The rehabilitation of Building 3 will likely include conversion of the ground floor into common amenity space and conversion of the top floor into a two bedroom residential unit. Overall, the Project includes approximately 101 residential units. Four of the existing buildings on the site will be demolished, and the tenants of Building 5 will be relocated to another location on campus. Table 1-1 includes the Project program.

Table 1-1 Project Program

Project Element	Approximate Dimension
New Apartment Building	
Residential	100 units / 104,150 sf
One Bedroom	48 units
Two Bedroom	52 units
Common Amenity	7,500 sf
Total Square Footage	**111,650 sf**
Building 3	
Residential	1 two bedroom unit / 1,450 sf
Common Amenity	1,110 sf
Total Square Footage	**2,560 sf**
New Apartment Building Height	77 feet
Parking	101 Spaces
Garage Parking	49 spaces
Surface Parking	52 spaces
Covered Bicycle Storage	101 spaces

The Project's parking garage will be accessible from the Commonwealth Avenue Carriage Road. Further south of the entrance will be a second entrance (which currently exists but is restricted with a gate) leading to a drop-off and turnaround area. To the west of the turnaround area will be a surface parking lot including approximately 52 parking spaces that will continue around to the western side of the building.

Along the Commonwealth Avenue Carriage Road will be a landscaped open space that connects to a new courtyard, whose centerpiece is the restored officer's residence, Building 3, with a lawn and specimen shade trees between the new building and Building 3. Highly visible from Commonwealth Avenue, the restored and renovated Building 3 will provide a reminder for residents and passers-by of the site's important past. The northwest side of the courtyard will potentially have seating and tables, as well as an area on the northeast side of the courtyard with access from the proposed fitness space. A third outdoor space on the east side of Building 3 will potentially have seating and a small fountain under a cluster of trees. The vehicular drop-off is intended to have the appearance of a pedestrian court while serving a potential dual purpose as a hardscape plaza for community gatherings. Plantings around the site, including the north and east edges, are planned to be low maintenance, drought tolerant and provide rotating seasonal interest. Along the western edge of the parking lot, a landscape buffer with potentially trees, understory plantings, and ornamental fencing is intended to improve the aesthetic of the lot while providing a visual and physical break between the parking lots. Overall, the landscape design gives priority to the creation of outdoor open space, maintaining more than one-third of the parcel as green open space.

Figures 1-6 to 1-15 include a site plan, floor plans and elevations.

1.5 Public Benefits

The Project includes the redevelopment of an underused site with a sustainably designed building and new housing in the Brighton neighborhood. The Project will include numerous benefits to the neighborhood and the City of Boston, including but not limited to:

- The Project will create approximately 101 new residential units proximate to public transportation.
- Approximately 80 units will be mixed income units, complying with the city's Inclusionary Housing Development requirement.
- Approximately 80-100 construction jobs and three permanent full and part-time jobs will be created.
- The Project will increase annual property taxes, a substantial increase from the tax levied on the underdeveloped Project site.
- The Project will provide a creative variety of unit designs for individuals, couples, and families.

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Figure 1-6

Site Plan

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Figure 1-7

First Floor Plan

BMHC – Veterans Mixed Income Housing Project Boston, MA

Figure 1-8

Second Floor Plan

BMHC – Veterans Mixed Income Housing Project   Boston, MA

Figure 1-9

Typical Floor Plan (Levels 3-6)

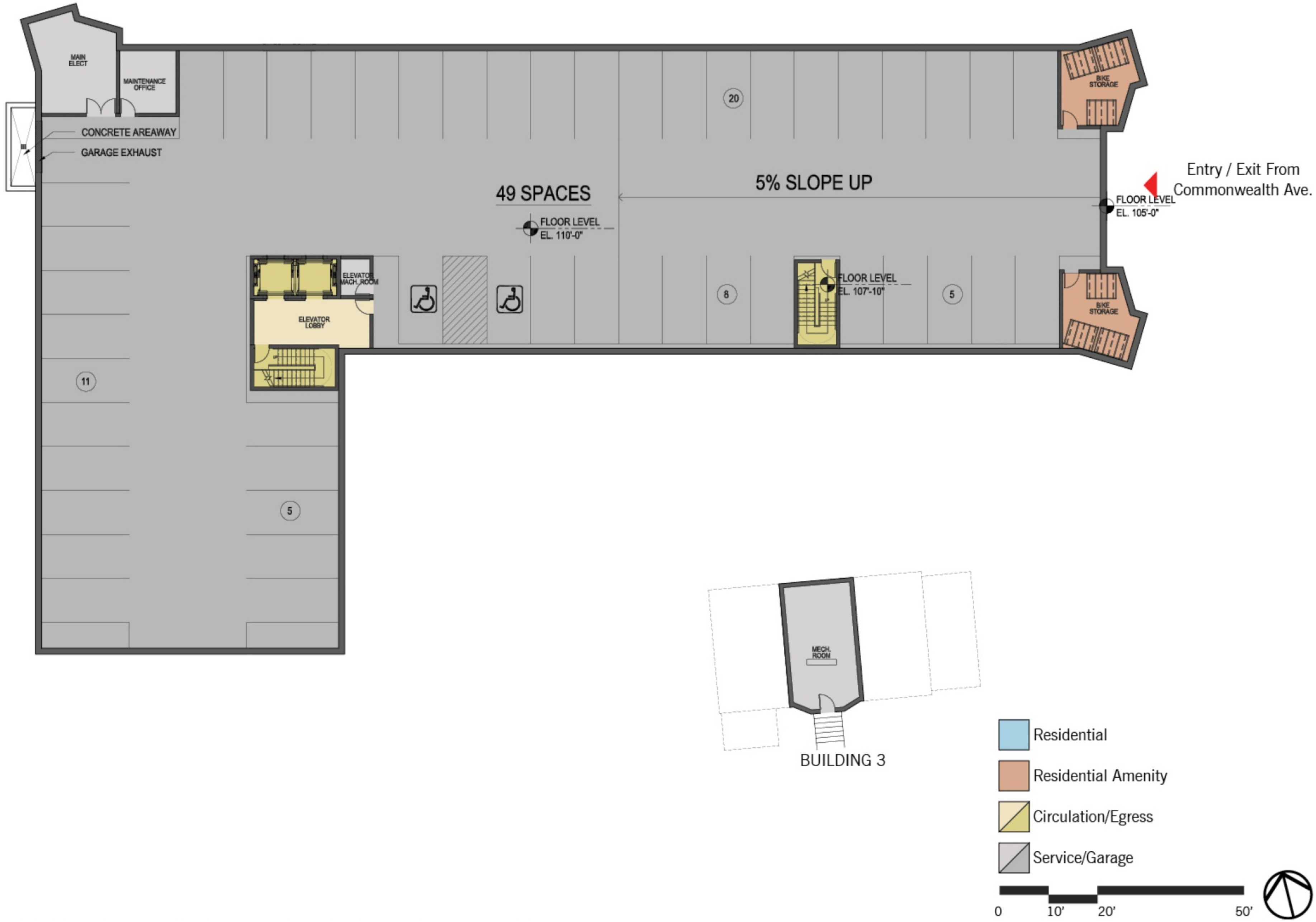

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Figure 1-10

Basement Floor Plan)

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Figure 1-11

North Elevation)

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Figure 1-12

South Elevation)

BMHC – Veterans Mixed Income Housing Project Boston, MA

Figure 1-13

West Elevation

BMHC – Veterans Mixed Income Housing Project   Boston, MA

Figure 1-14

North Elevation)

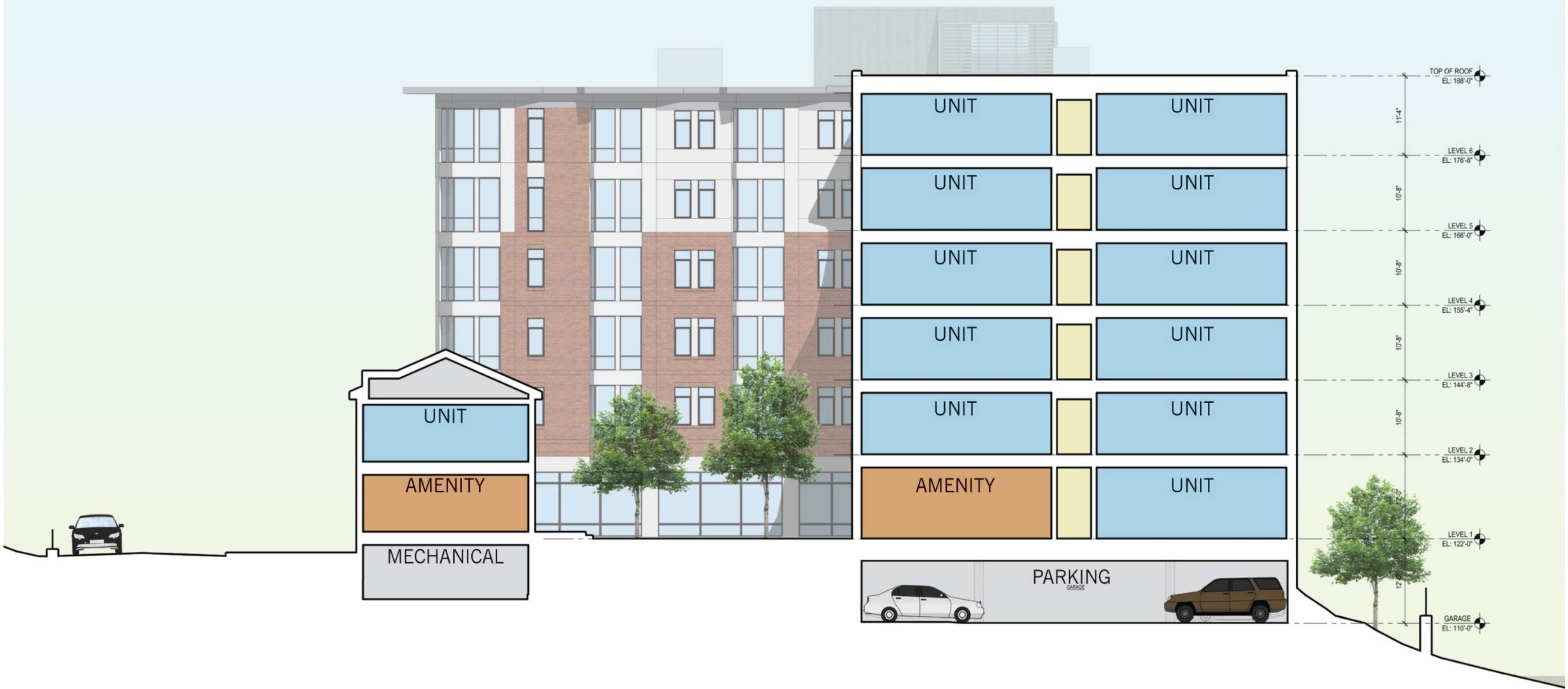


Figure 1-15

Site Section)

The proposed Project will provide a variety of urban design benefits to the surrounding neighborhood, including:

- The restored officer's residence, Building 3, will serve as a centerpiece in the new courtyard and provide a reminder for residents and passers-by of the site's importance. The existing stepped brick retaining wall and wrought iron fence that surrounds the site along the north, south and Commonwealth Avenue frontage will also be retained, further reinforcing the connection to the site's history.

- The design integrates both old and new: the brick facades, with traditional details and spacing of windows, recall the existing buildings on the Brighton Marine campus and other buildings nearby, while the angular bays in metal and glass, capped with the strong angular cornice, express the present.

- The building cornice gives the building a dynamic appearance and a contemporary interpretation of traditional building cornices that are prevalent in the neighborhood.

- The landscape design gives priority to the creation of outdoor open space, maintaining more than one-third of the parcel as green open space;

- The Project will meet the requirements of Article 37, Green Building, of the Boston Zoning Code.

- The Project's massing will be similar in scale to the surrounding residential buildings.

- Improved streetscape will be created along Commonwealth Avenue.

1.6 City of Boston Zoning

The Project site is located within the Community Facilities Subdistrict of the Allston-Brighton Neighborhood Zoning District, subject to the requirements set forth in Article 51 of the Boston Zoning Code ("Article 51".) A portion of the Project site closest to the "carriage" road section of Commonwealth Avenue is located within the Greenbelt Protection Overlay District (GPOD). It is adjacent to the Fidelis Way Park and Commonwealth Avenue, which is designated a parkway, so the development of the Project site will likely be subject to the jurisdiction of the Parks Commission in accordance with Section 7-4.11 of the City's non-zoning General Ordinances which regulate construction within 100 feet of a park or parkway. The Project is not subject to the height and use restriction provisions pertaining to Parkways—as this specific section of Commonwealth Avenue is not subject to the development restrictions which apply to other segments of Commonwealth Avenue.

The current zoning of the Project site, while appropriate for the balance of the Brighton Marine campus, is incompatible with the use and dimensional elements of the Project. The proposed use of the Project as a "multi-family dwelling" is not allowed within the CF Subdistrict. The relevant dimensional controls applicable within the CF Subdistrict as set forth in Table L of Article 51 have height limitations of 35 feet and floor area ratio limitations of 1.0, which would effectively preclude reasonable multifamily development on the Project site. Adjacent properties are within the Multi-family Residential ("MFR") Subdistrict where multi-family use is allowed as of right. Other properties with frontage on Commonwealth Avenue would allow for a building height of 55 feet and an FAR of up to 2.0 in certain locations. Given the use and dimensional restrictions within the CF Subdistrict, the Project will require use and dimensional variances from the Board of Appeal, which relief is however appropriate in this instance given the unique topography of the Project site and the use and dimensional requirements of the Project.

1.7 Legal Information

1.7.1 Legal Judgments Adverse to the Proposed Project

The Proponent is not aware of any legal judgments which are adverse to the proposed Project.

1.7.2 History of Tax Arrears on Property

The Project site is a portion of the Brighton Marine campus, all of which is owned by Brighton Marine, a non-profit, privately owned corporation. As noted above, while Brighton Marine's operations and use are tax-exempt, it leases a portion of the Brighton Marine campus to other users who are responsible for the payment of real estate tax. As with the other for-profit users, the Project will be subject to real estate taxation.

1.7.3 Site Control / Public Easements

The Brighton Marine campus, which includes the Project site, is owned in fee by Brighton Marine.

1.8 Anticipated Permits and Approvals

Table 1-2 presents a preliminary list of permits and approvals from governmental agencies that are expected to be required for the Project. It is possible that only some of these permits or actions will be required, or that additional permits or actions will be required. The Proponent will be seeking state and federal funding for the Project. Although the amount and sources of funding have not been determined at this time, funding requests are anticipated to be made to Low Income Housing Tax Credit (LIHTC), Affordable Housing Trust Fund (AHTF), Department of Housing and Community Development (DHCD) HOME Investment Partnerships Program (HOME), Housing Stabilization Fund (HSF) and possibly other DHCD affordable housing sources.

Table 1-2 List of Anticipated Permits and Approvals

AGENCY	APPROVAL
Local	
Boston Redevelopment Authority	Article 80 Large Project Review
Boston Civic Design Commission	Design Review and Approval in accordance with Article 28, if required
Boston Committee on Licenses	Parking Garage License; Flammable Storage License
Boston Water and Sewer Commission	Water and Sewer Connection Permits; General Service Application; Site Plan Review
Boston Transportation Department	Construction Management Plan; Transportation Access Plan Agreement
Boston Public Improvement Commission/Boston Department of Public Works	Curb Cut Permit; Street/Sidewalk Specific Repair Plan; Permits for street occupancy and opening permit
Boston Fire Department	Approval of Fire Safety Equipment; Fuel Oil Storage Permit
Boston Inspectional Services Department	Building Permit; Flammable Storage Permit; Certificate of Occupancy
Boston Board of Appeal	Zoning Relief
Boston Landmarks Commission	Article 85 Demolition Delay Review
Boston Parks Department	Construction within 100 feet of a public park or parkway, if required
State	
Department of Environmental Protection, Division of Water Pollution Control	Self-certification for sewer discharges
Department of Environmental Protection	Notification of Demolition and Construction
Massachusetts Historical Commission	State Register Review
Federal	
U.S. Department of Housing and Urban Development	Section 106 of the National Historic Preservation Act

1.9 Public Participation

A Letter of Intent was filed with the BRA on June 19, 2014 beginning the Project's formal public review process. The Proponent has met with residents, abutters, local elected officials and area community groups, and will continue to discuss the Project with interested parties as the permitting process and design progress.

1.10 Schedule

Construction is anticipated to commence in the third quarter of 2015, with a construction period of approximately 21 months.

Chapter 2.0

Transportation

2.0 TRANSPORTATION

2.1 Introduction

Howard/Stein-Hudson Associates, Inc. (HSH) has conducted an evaluation of the transportation impacts of the proposed Project. The transportation study adheres to the Boston Transportation Department (BTD) *Transportation Access Plan Guidelines* and the BRA's Article 80 development review process. The study includes an evaluation of existing conditions, future conditions with and without the Project, projected parking demand, transit services, and pedestrian activity. Based on the operations analysis, the Project is expected to have minimal impact to the surrounding roadways and the study area intersection.

2.1.1 Project Description

The Brighton Marine campus is located at 77 Warren Street in Boston's Brighton neighborhood and is bounded by Warren Street to the north, Brighton High School to the west, Fidelis Way Park to the south, and the Commonwealth Avenue Carriage Road to the east. The Project site, as shown in Figure 2-1, is located in the southeast corner of the campus, with direct access from the Commonwealth Avenue Carriage Road and is in proximity to the Warren Street Station, which serves the B Branch of the MBTA Green Line, providing convenient access to the mass transit system.

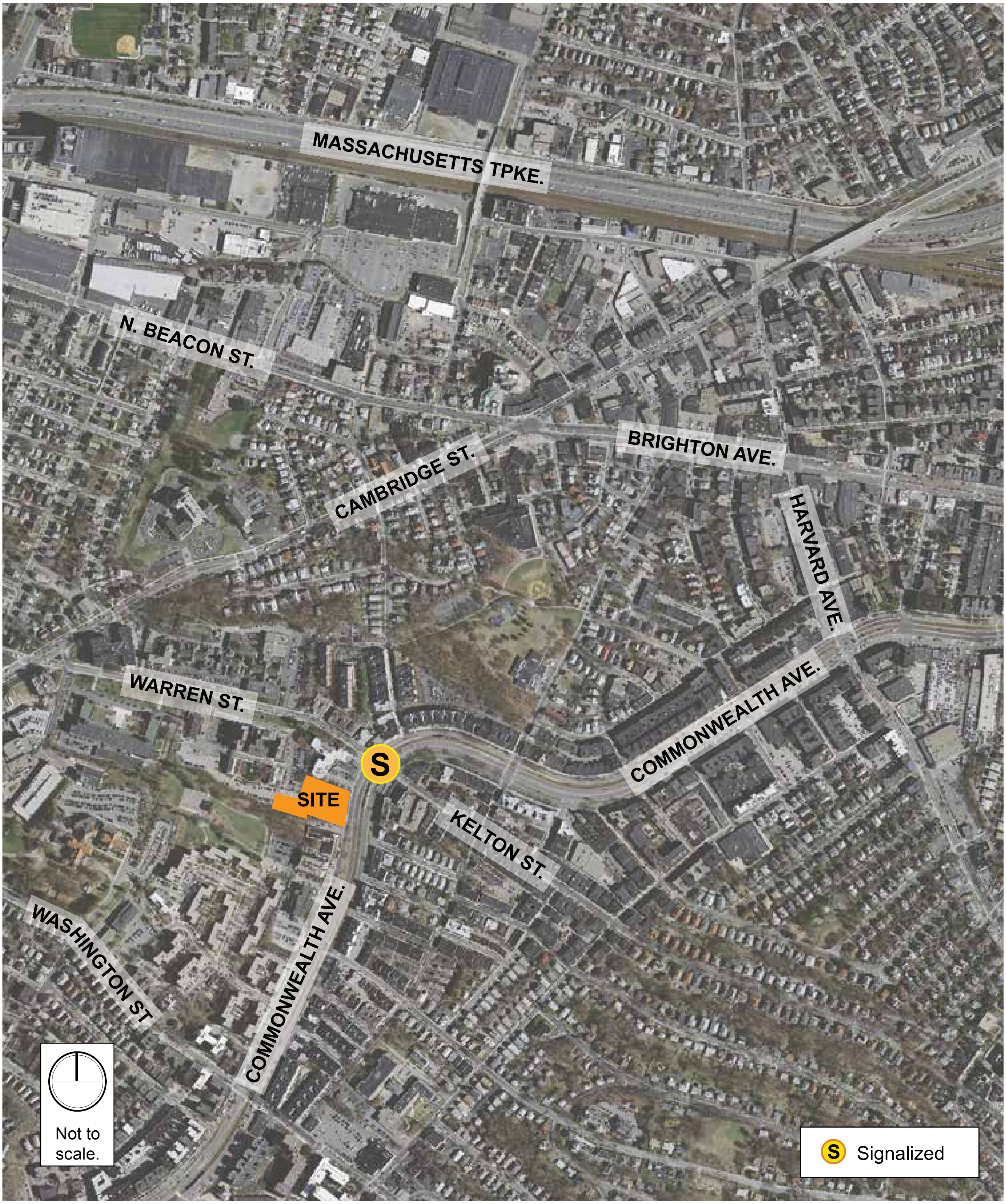
The site currently contains five existing buildings, only one of which is currently occupied and four of which are vacant, with related parking. The Project will replace the one existing use and will include approximately 101 mixed-income residential units and approximately 101 parking spaces to be split between surface spaces and a parking garage.

Vehicular access to the garage will be provided by a single driveway along the Commonwealth Avenue Carriage Road, approximately 275 feet south of Warren Street. Vehicular access to the surface parking spaces will be provided by way of an existing curb cut located approximately 150 feet south of the proposed garage driveway. The existing curb cut is currently gated and is not in use. Primary pedestrian access will be provided off of the Commonwealth Avenue Carriage Road to a central courtyard on the site. Loading, deliveries, and trash pick-up will take place on the Project site.

2.1.2 Study Area

The study area consists of the following major intersection in the vicinity of the Project site, also shown on Figure 2-1:

- Commonwealth Avenue/Warren Street/Kelton Street.



BMHC – Veterans Mixed Income Housing Project Brighton, Massachusetts

Howard/Stein-Hudson Associates, Inc.
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Figure 2-1
Study Area Intersections

2.1.3 Study Methodology

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

The existing conditions analysis includes an inventory of the existing (2014) transportation conditions such as traffic characteristics, parking and curb usage, transit, pedestrian circulation, bicycle facilities, loading, and site conditions. Existing counts for vehicles, bicycles, and pedestrians were collected in February 2014 at the study area intersection. The traffic counts form the basis for the transportation analysis conducted as part of this evaluation.

The future transportation conditions analysis evaluates potential transportation impacts associated with the Project. Long-term impacts are evaluated for the year 2019, based on a five-year horizon from the year of the filing of this traffic study. Expected roadway, parking, transit, pedestrian, bicycle accommodation, and loading capabilities are identified. This section includes the following scenarios:

- ♦ The 2019 No Build conditions scenario includes both general background traffic growth and traffic growth associated with specific developments and transportation improvements that are planned in the vicinity of the Project site.
- ♦ The 2019 Build conditions scenario includes Project-generated traffic volume estimates added to the traffic volumes developed as part of the 2019 No Build conditions scenario.

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

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

2.2 Existing Conditions

2.2.1 Existing Roadway Conditions

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

Commonwealth Avenue

- ♦ Located east of the Project site.
- ♦ Classified as an urban principal arterial roadway under BTD jurisdiction.

- Carriage Roads are provided along both sides of Commonwealth Avenue, providing access to local connections. The Carriage Road along Commonwealth Avenue eastbound will be herein referred to as the "Eastbound Commonwealth Avenue Carriage Road" and the Carriage Road along Commonwealth Avenue westbound will be herein referred to as the "Westbound Commonwealth Avenue Carriage Road".
- The east side of the Project site is adjacent to the Westbound Commonwealth Avenue Carriage Road, which provides a single lane in both directions of travel.
- Runs in a predominately east-west direction between Route 95 in Weston to the west and Arlington Street in Boston to the east. Adjacent to the site, Commonwealth Avenue runs in a north-south direction.
- Two-way roadway with multiple medians and two to four travel lanes in each direction and intermittent parking provided along the Carriage Roads in the vicinity of the Project site.
- Sidewalks are provided along both sides of Commonwealth Avenue.

Warren Street

- Adjacent to the north side of the Project site.
- Classified as an urban collector roadway under BTD jurisdiction.
- Runs in an east-west direction between Cambridge Street to the west and Commonwealth Avenue to the east.
- Two-way roadway with a single travel lane in each direction divided by a double-yellow centerline with parking along either side of the roadway in the vicinity of the Project site.
- Sidewalks are provided along both sides of Warren Street.

Kelton Street

- East of the Project site.
- Classified as an urban collector roadway under BTD jurisdiction.
- Runs in a northwest-southeast direction between Commonwealth Avenue to the northwest and Brainerd Road to the southeast.
- Two-way roadway with a single travel lane in each direction and parking along either side of the roadway in the vicinity of the Project site.
- Sidewalks are provided along both sides of Kelton Street.

2.2.2 *Existing Intersection Conditions*

Existing conditions at the study area intersection are described below.

Commonwealth Ave./Warren Street/Kelton Street/Commonwealth Ave. Carriage Roads

This signalized intersection has four primary approaches with additional approaches for the Commonwealth Avenue Carriage Roads in both directions. Additionally, the MBTA Green Line B Branch travels along Commonwealth Avenue through the intersection. The Commonwealth Avenue northbound and southbound approaches consist of a shared left-turn/through lane and a shared through/right-turn lane. The directions of travel along Commonwealth Avenue are separated by a raised median. The Warren Street eastbound and Kelton Street westbound approaches consist of a single travel lane that accommodates left-turns, through movements, and right-turns. The Eastbound Commonwealth Avenue Carriage Road is one-way in the northbound direction at the intersection and consists of a single travel lane that accommodates through movements and right-turns. The Westbound Commonwealth Avenue Carriage Road southbound approach to the intersection is one-way and consists of a single travel lane that accommodates through movements and right-turns. The Westbound Commonwealth Avenue Carriage Road northbound approach consists of a single travel lane that accommodates left-turning movements. The Westbound Commonwealth Avenue Carriage Road is a two-way roadway south of Warren Street. Both Commonwealth Avenue Carriage Roads are separated from the main line of Commonwealth Avenue by raised medians. South of the intersection, the MBTA Green Line B Branch travels within the median that separates the directions of travel along the mainline of Commonwealth Avenue. North of the intersection, the MBTA Green Line B Branch travels within the median that separates Commonwealth Avenue southbound from the Westbound Commonwealth Avenue Carriage Road. Traffic signal equipment is provided for both vehicular movements and the MBTA Green Line B Branch. Pedestrian signal equipment and crosswalks are also provided at the intersection.

2.2.3 *Existing Traffic Conditions*

Traffic movement data was collected at the intersection of Commonwealth Avenue/Kelton Street/Warren Street on February 26, 2014. Manual turning movement counts (TMCs) and vehicle classification counts were conducted during the weekday a.m. and p.m. peak periods (7:00 – 9:00 a.m. and 4:00 – 6:00 p.m., respectively) for the study area intersections.

The vehicle classification counts included car, truck, pedestrian, and bicycle movements. Based on the TMCs, the peak hours of vehicular traffic throughout the study area are 7:45 – 8:45 a.m. and 5:00 – 6:00 p.m. The detailed traffic counts are provided in Appendix B.

Seasonal Adjustment

In order to account for seasonal variation in traffic volumes throughout the year, data provided by MassDOT were reviewed. Typically, nearby continuous traffic count stations are used to determine monthly fluctuations in traffic volumes. The most recent (2011) MassDOT Weekday Seasonal Factors were used to determine the need for seasonal adjustments to the February 2014 TMCs. The 2011 seasonal adjustment factor for February for roadways similar to the study area is 1.01, which indicates that average month traffic volumes are approximately 101 percent of typical February traffic volumes. The traffic counts were adjusted upward 1 percent to reflect average month conditions in order to provide a more conservative analysis consistent with the peak season traffic volumes. The 2014 Existing weekday a.m. and p.m. peak hour traffic volumes are shown in Figure 2-2 and Figure 2-3, respectively.

2.2.4 Existing Traffic Operations

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 6) 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 2-1 displays the intersection LOS criteria. LOS A indicates the most favorable condition, with minimum traffic delay, while LOS F represents the worst (unacceptable) condition, with significant traffic delay. LOS D or better is typically considered acceptable in an urban area. However, LOS E or F is often typical for a stop controlled minor street that intersects a major roadway.

Table 2-1 Level of Service Criteria

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

Source: 2000 Highway Capacity Manual, Transportation Research Board.

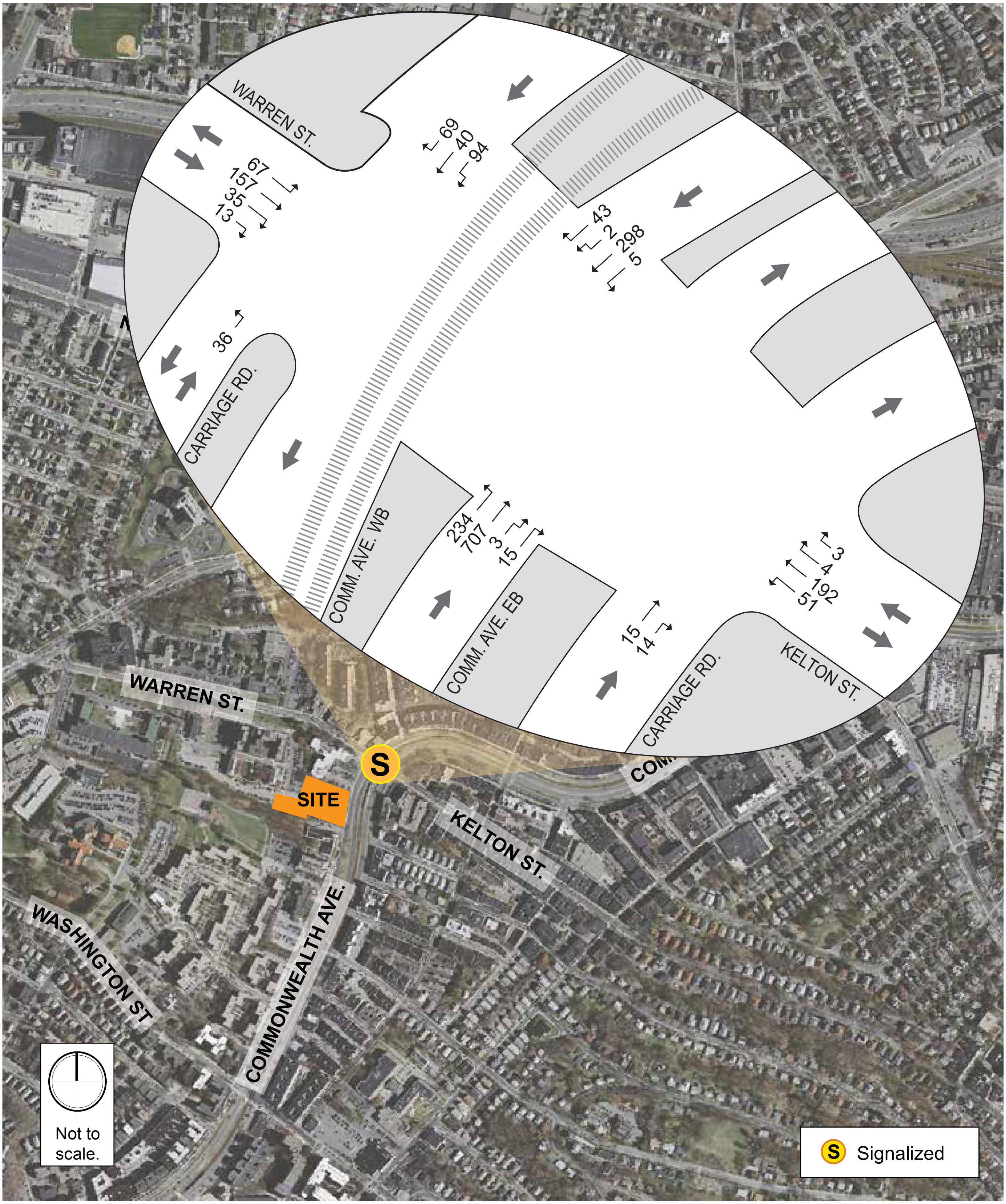

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Figure 2-2

Existing Conditions (2014) Turning Movement Volumes, a.m. Peak Hour

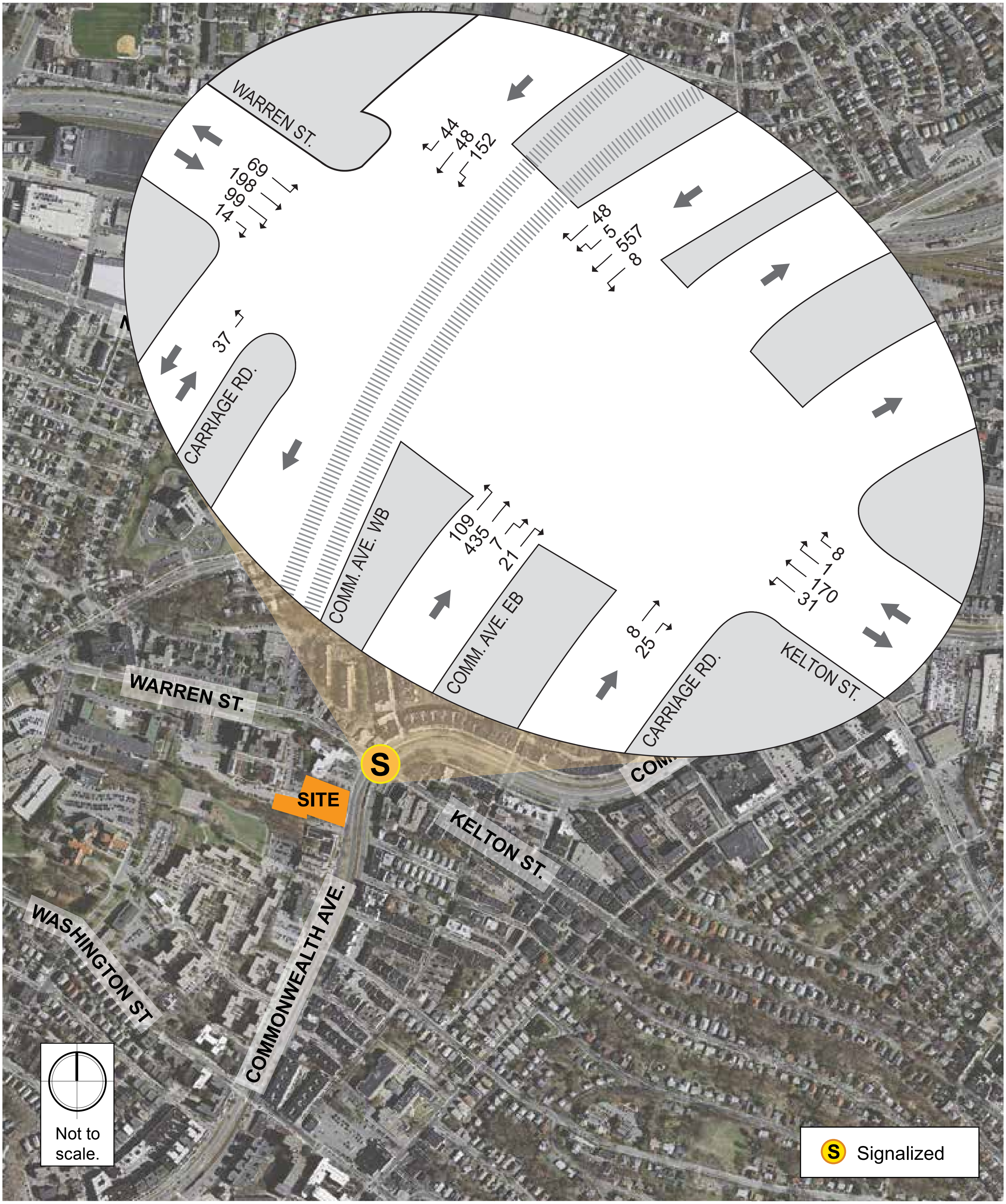

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Figure 2-3

Existing Conditions (2014) Turning Movement Volumes, p.m. Peak Hour

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

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

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

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

Table 2-2 presents the 2014 Existing conditions operational analysis for the study area intersection during the a.m. and p.m. peak hours. The detailed analysis sheets are provided in Appendix B.

As shown in Table 2-2, operations at the study area intersection currently operate at LOS D during both the a.m. and p.m. peak hours, with all movements also operating at LOS D or better. Queues at the intersection are longest along the Warren Street eastbound and Commonwealth Avenue northbound approaches during the a.m. peak hour, and along the Warren Street eastbound and Commonwealth Avenue southbound approaches during the p.m. peak hour. While there may be short periods of congestion at the intersection, there are no current operational deficiencies at the intersection related to vehicular traffic.

Table 2-2 Existing Conditions (2014), Capacity Analysis Summary, a.m. Peak Hour

Intersection	LOS	Delay (seconds)	V/C Ratio	50th Percentile Queue Length (ft)	95th Percentile Queue Length (ft)
a.m. Peak Hour					
Commonwealth Avenue at Warren Street/Kelton Street	**D**	**38.4**	-	-	-
Warren Street EB Left/Thru/Right	D	39.5	0.51	192	294
Kelton Street WB Left/Thru/Right	D	38.6	0.47	174	269
Commonwealth Avenue NB Left/Thru | Thru/Right	D	46.8	0.93	330	386
Commonwealth Avenue SB Left/Thru | Thru/Right	D	42.9	0.57	130	175
Eastbound Carriage Road NB Thru/Right	C	21.5	0.08	10	34
Westbound Carriage Road NB Left	D	44.1	0.13	26	59
Westbound Carriage Road SB Thru/Right	D	45.9	0.56	149	222
p.m. Peak Hour					
Commonwealth Avenue at Warren Street/Kelton Street	**D**	**46.6**	-	-	-
Warren Street EB Left/Thru/Right	D	45.9	0.69	283	407
Kelton Street WB Left/Thru/Right	C	34.4	0.38	139	215
Commonwealth Avenue NB Left/Thru | Thru/Right	C	24.6	0.58	160	204
Commonwealth Avenue SB Left/Thru | Thru/Right	D	52.2	0.83	252	321
Eastbound Carriage Road NB Thru/Right	B	15.7	0.08	5	32
Westbound Carriage Road NB Left	D	48.2	0.17	28	62
Westbound Carriage Road SB Thru/Right	D	45.7	0.60	179	266

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

2.2.5 Existing Parking and Curb Usage

On street parking surrounding the Project site generally consists of no parking, two-hour parking, residential permit parking, and unrestricted parking. Warren Street, adjacent to the north side of the Project site, is generally signed as two-hour parking or residential parking in the vicinity of the Project site. Warren Street west of the Project site is generally signed as no parking or no stopping anytime. The Commonwealth Avenue Carriage Road that is adjacent to the Project site is signed as two-hour parking. Commonwealth Avenue is generally signed as no stopping anytime. Kelton Street, east of the Project site, is generally signed as residential permit parking only in the vicinity of the Project site. The on-street parking regulations within the study area are shown on Figure 2-4.

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Figure 2-4

On-Street Parking Regulations

2.2.6 *Existing Public Transportation*

The Project site is ideally situated to take advantage of several public transportation opportunities, and is located less than a quarter-mile from the Warren Street Station that serves the MBTA Green Line B Branch, and less than a half-mile from several MBTA bus routes. Following is a description of each public transportation route located in the vicinity of the Project site, with a map of the nearby public transportation services shown in Figure 2-5.

MBTA Green Line B Branch – The Green Line B Branch of the MBTA subway system stops at Warren Street Station. The Green Line B Branch provides access between Lechmere Station to the northeast and Boston College Station to the southwest. The Green Line also provides convenient access to downtown Boston, Allston, Kenmore Square, Back Bay and east Cambridge. The Green Line B Branch operates with headways of approximately 7 to 11 minutes.

MBTA Bus Route 57 – This route provides service between Watertown Yard in Watertown and Kenmore Station. Weekday and Saturday service run from approximately 4:33 a.m. to 12:30 a.m., with Sunday service running from approximately 6:00 a.m. to 12:30 a.m. Headways range from approximately 5 minutes to 20 minutes. This route runs extended hours into Saturday and Sunday morning ending at approximately 2:19 a.m. and 2:24 a.m., respectively. The route runs along Cambridge Street, west of the Project site, with the nearest stops located at the intersection of Cambridge Street/Sparhawk Street.

MBTA Bus Route 65 – This route provides service between Brighton Center and Kenmore Station. Weekday service runs from approximately 6:20 a.m. to 8:06 p.m., with Saturday service running from approximately 6:45 a.m. to 5:45 p.m., with no service on Sunday. Headways range from approximately 12 minutes to 35 minutes. The route runs along Washington Street, south of the Project site, with the nearest stop located at Washington Street/Commonwealth Avenue.

2.2.7 *Existing Pedestrian Conditions*

The Project site is located immediately adjacent to the Westbound Commonwealth Avenue Carriage Road to the east. The Project site is located within the Brighton Marine campus, which is also adjacent to Warren Street to the north. Sidewalks are provided along the Commonwealth Avenue Carriage Road and Warren Street, and are generally in good condition, with the exception of the segment of the sidewalk adjacent to the parcel south of the Project site along the Westbound Commonwealth Avenue Carriage Road, and provide adequate capacity for the existing level of pedestrian activity. The parcel south of the Project site is currently under construction and it is expected that the adjacent sidewalk will be upgraded as part of that project. The sidewalk along the Westbound Commonwealth Avenue Carriage Road also has steep grades along the site frontage, with the lower points

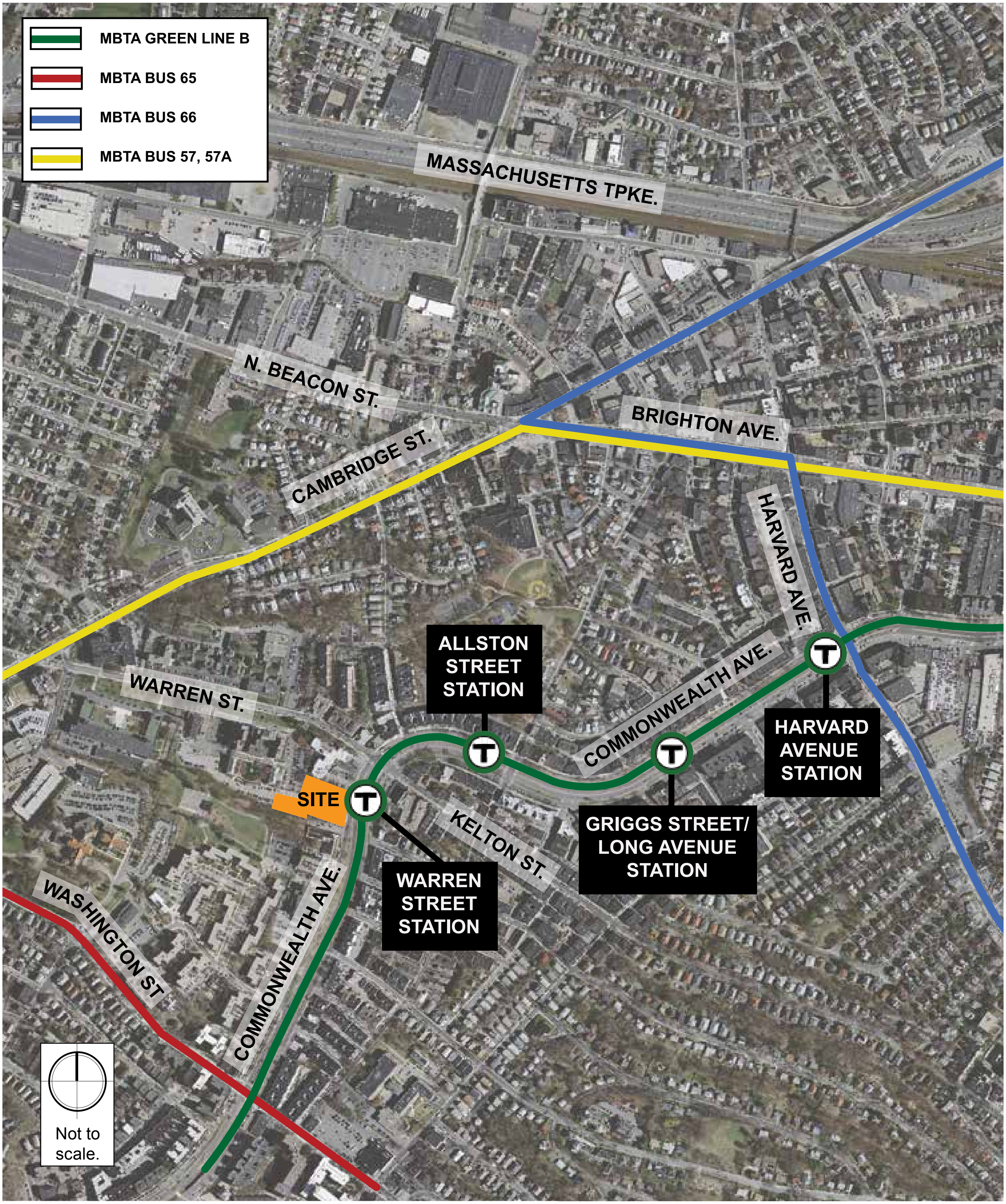

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Figure 2-5

Public Transportation Facilities

being to the north toward the Commonwealth Avenue/Warren Street/Kelton Street intersection. Convenient pedestrian access is provided between the Project site and the Warren Street Station. Crosswalks are provided at the study area intersection, with pedestrian signal equipment and phasing provided.

To estimate the amount of pedestrian activity within the study area, pedestrian counts were conducted concurrent with the TMCs at the study area intersection and are presented in Figure 2-6. The pedestrian activity within the study area is heaviest across the westerly legs of the Commonwealth Avenue/Warren Street/Kelton Street intersection. These crossings provide access to the Warren Street Station.

2.2.8 Existing Bicycle Facilities

In recent years, bicycle use has increased dramatically throughout the City of Boston. The Project site is conveniently located in close proximity to several bicycle facilities. The following roadways within the study area are designated bicycle routes on the City of Boston's "Bike Routes of Boston" map:

- **Commonwealth Avenue, Warren Street,** and **Kelton Street** are designated as advanced routes suitable for traffic-confident cyclists with on-road experience. Exclusive bicycle lanes have recently been installed along Warren Street between Commonwealth Avenue and Cambridge Street.

Bicycle counts were conducted concurrent with the vehicular TMCs and are presented in Figure 2-7. As shown in Figure 2-7, bicycle volumes are generally light around the Project site. The TMCs were conducted in February and it is likely that the bicycle volumes are higher during other parts of the year.

The Project site is also located in proximity to a bicycle sharing station provided by Hubway. Hubway is the bicycle sharing system in the Boston area, which was launched in 2011 and consists of over 100 stations and 1,000 bicycles. The nearest Hubway station is located along Commonwealth Avenue at Griggs Street, approximately one-third of a mile north of the Project site (see Figure 2-8).

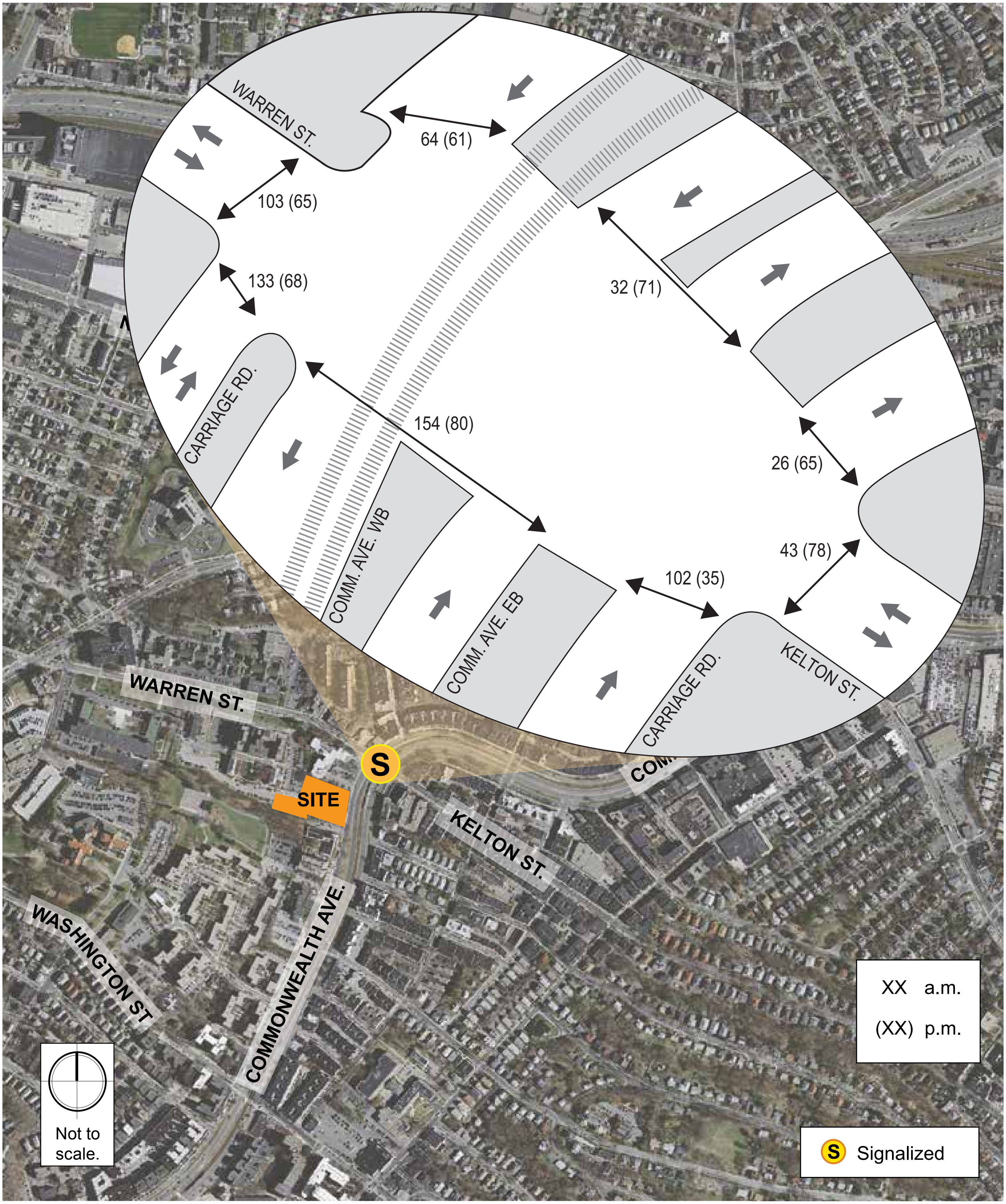

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Figure 2-6

Existing Pedestrian (2014) Volumes, a.m. and p.m. Peak Hour

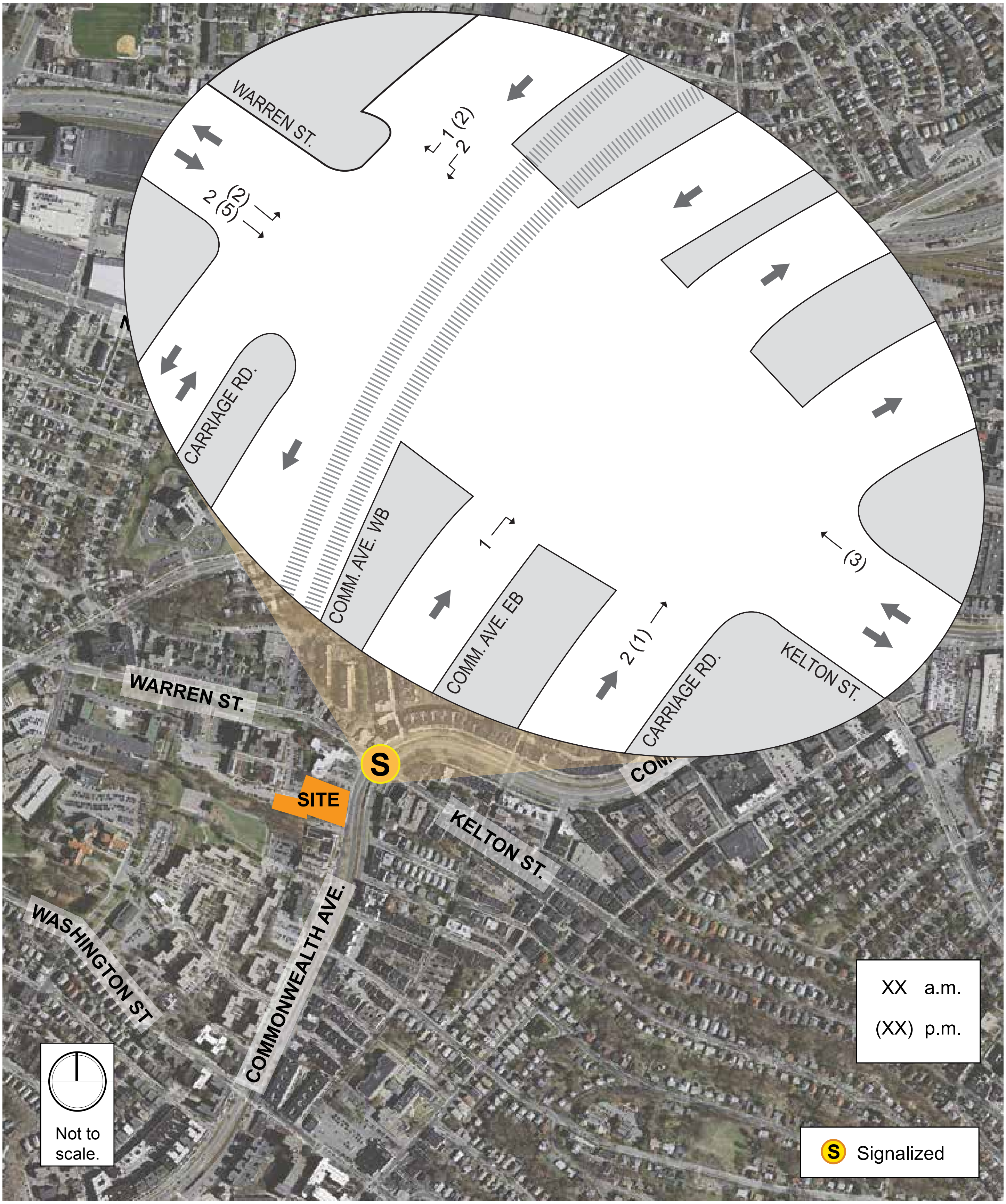

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Figure 2-7

Existing Bicycle (2014) Volumes, a.m. and p.m. Peak Hour

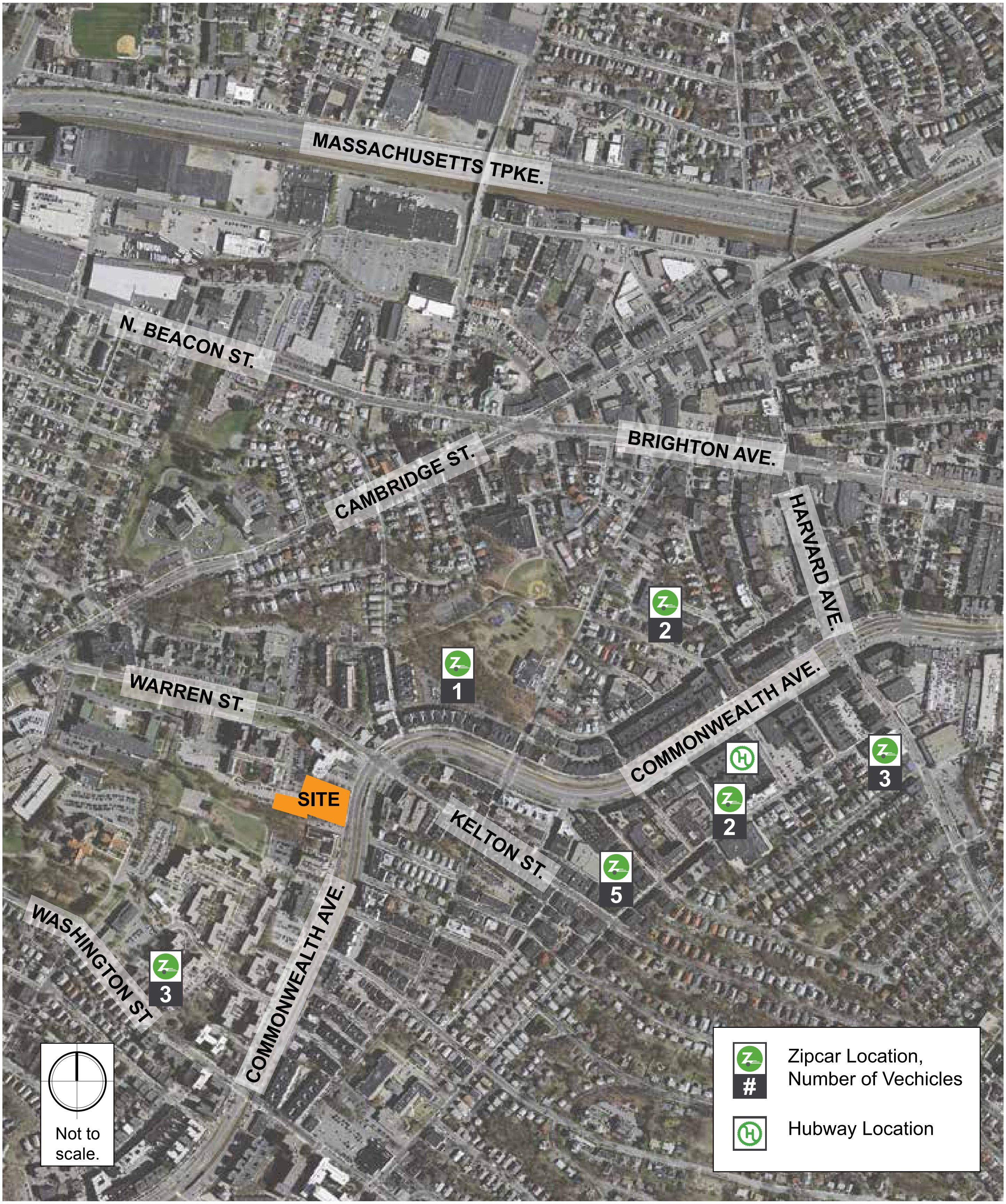

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Figure 2-8

Car and Bicycle Sharing Services

2.2.9 Car Sharing Services

Car sharing, predominantly served by Zipcar in the Boston area, provides 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.

There are currently six car sharing locations in proximity to the Project site:

- Commonwealth Avenue/Washington Street
- Commonwealth Avenue/Gordon Street
- Kelton Street/Corey Road
- Commonwealth Avenue/Griggs Street
- Brainerd Road/Fiske Terrace
- 20 Radcliffe Road

The nearby Zipcar locations are shown in Figure 2-8.

2.3 Future Conditions

For transportation impact analyses, it is standard practice to evaluate two future conditions: No Build conditions (without the proposed project) and Build conditions (with the proposed project). In accordance with BTD guidelines, these conditions are projected to a future date five years from the current year. For the evaluation of this Project, 2019 was selected as the horizon year for the future conditions analyses.

This section presents a description of the 2019 future conditions scenarios and includes an evaluation of the transportation facilities under the No Build and Build conditions.

2.3.1 No Build Conditions

The No Build conditions reflect a future scenario that incorporates anticipated traffic volume changes independent of the Project, and planned infrastructure improvements that will affect travel patterns throughout the study area. Infrastructure improvements include roadway, public transportation, pedestrian and bicycle improvements. Traffic volume changes are based on two factors: an annual growth rate and growth associated with specific developments near the Project.

2.3.1.1 Background Traffic Growth

The methodology to account for future traffic growth, independent of the Project, consists of two parts. The first part of the methodology accounts for general background traffic growth that may be affected by changes in demographics, automobile usage, and automobile ownership. Based on a review of recent and historic traffic data collected for nearby projects and to account for any additional unanticipated traffic growth, a half-percent per year annual traffic growth rate was used to develop the future conditions traffic volumes.

The second part of the methodology identifies any specific planned developments that are expected to affect traffic patterns throughout the study area within the future analysis time horizon. The following projects are located in the vicinity of the study area and are shown in Figure 2-9:

Charing Cross at 1501 Commonwealth Avenue – This project is currently under construction and will consist of 55 mixed-income residential units with parking for 55 vehicles. This project is located adjacent to the south side of the Project site. Traffic volumes for this project were assumed to be accounted for in the background growth rate.

75 Brainerd Road – This project is located northeast of the Project site and will consist of 108 residential units with parking for 108 vehicles. This project has been approved by the BRA. Traffic volumes were obtained from the traffic study conducted for this project and included in the future conditions traffic volumes.

60-66 Brainerd Road – This project is located northeast of the Project site and consists of 79 residential units. Construction of this project was recently completed. Traffic volumes for this project were assumed to be accounted for in the background growth rate.

Boston Landing (New Balance) – This development includes the construction of a 250,000 sf new world headquarters for New Balance, a 350,000 sf sports complex, a 140,000 sf boutique hotel, three office buildings totaling 650,000 sf and 65,000 sf of mixed-use retail and residential space. This project is located northwest of the Project site along Guest Street. This project is expected to add only a minimal amount of trips to the study area and was assumed to be accounted for in the background growth rate.

61-83 Braintree Street – This development includes the construction of 80 residential units with approximately 69 parking spaces. This project is located north of the Project site along Braintree Street in Allston and has been approved by the BRA. Traffic volumes for this project were assumed to be accounted for in the background growth rate.

37-43 North Beacon Street – This development includes the construction of a new five-story building with approximately 44 residential units. It is located west of the Project site along North Beacon Street and has been approved by the BRA. Traffic volumes for this project were assumed to be accounted for in the background growth rate.

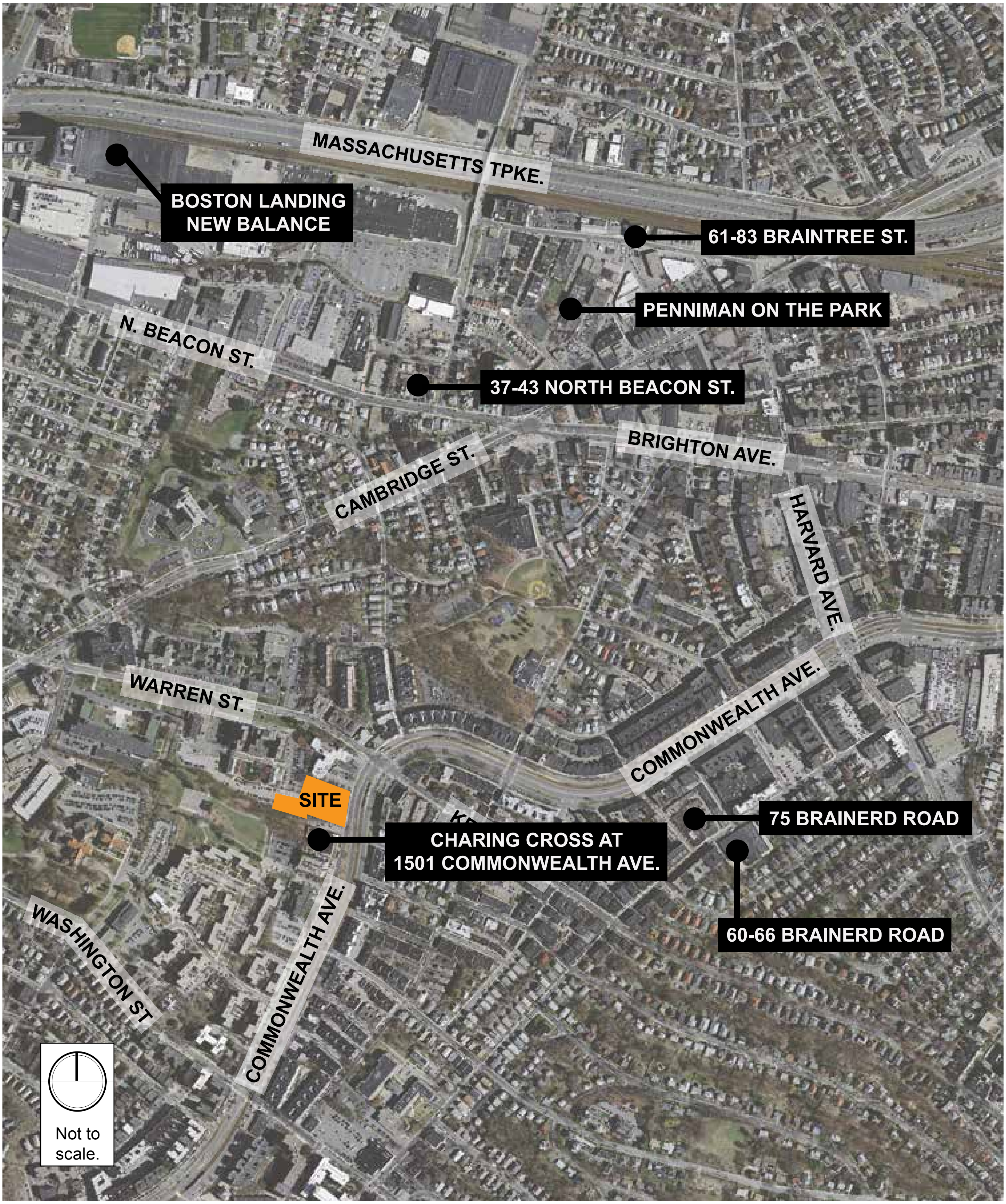

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Figure 2-9
Background Projects

Penniman on the Park – This development includes the construction of 32 condominium units with 27 parking spaces in an adjacent lot. It is located north of the Project site along Penniman Road in Allston and has been approved by the BRA. Traffic volumes were assumed to be accounted for in the background growth rate.

The half-percent per year annual growth rate was applied to the 2014 Existing conditions traffic volumes, then the traffic volumes associated with the background development projects were added to develop the 2019 No Build conditions traffic volumes. The 2019 No Build a.m. and p.m. peak hour traffic volumes are shown on Figure 2-10 and Figure 2-11, respectively.

2.3.1.2 Proposed Infrastructure Improvements

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

2.3.1.3 No Build Conditions Traffic Operations

The 2019 No Build conditions scenario analysis uses the same methodology as the 2014 Existing conditions scenario analysis. Table 2-3 presents the 2019 No Build conditions operations analysis for the a.m. and p.m. peak hours. The detailed analysis sheets are provided in Appendix B.

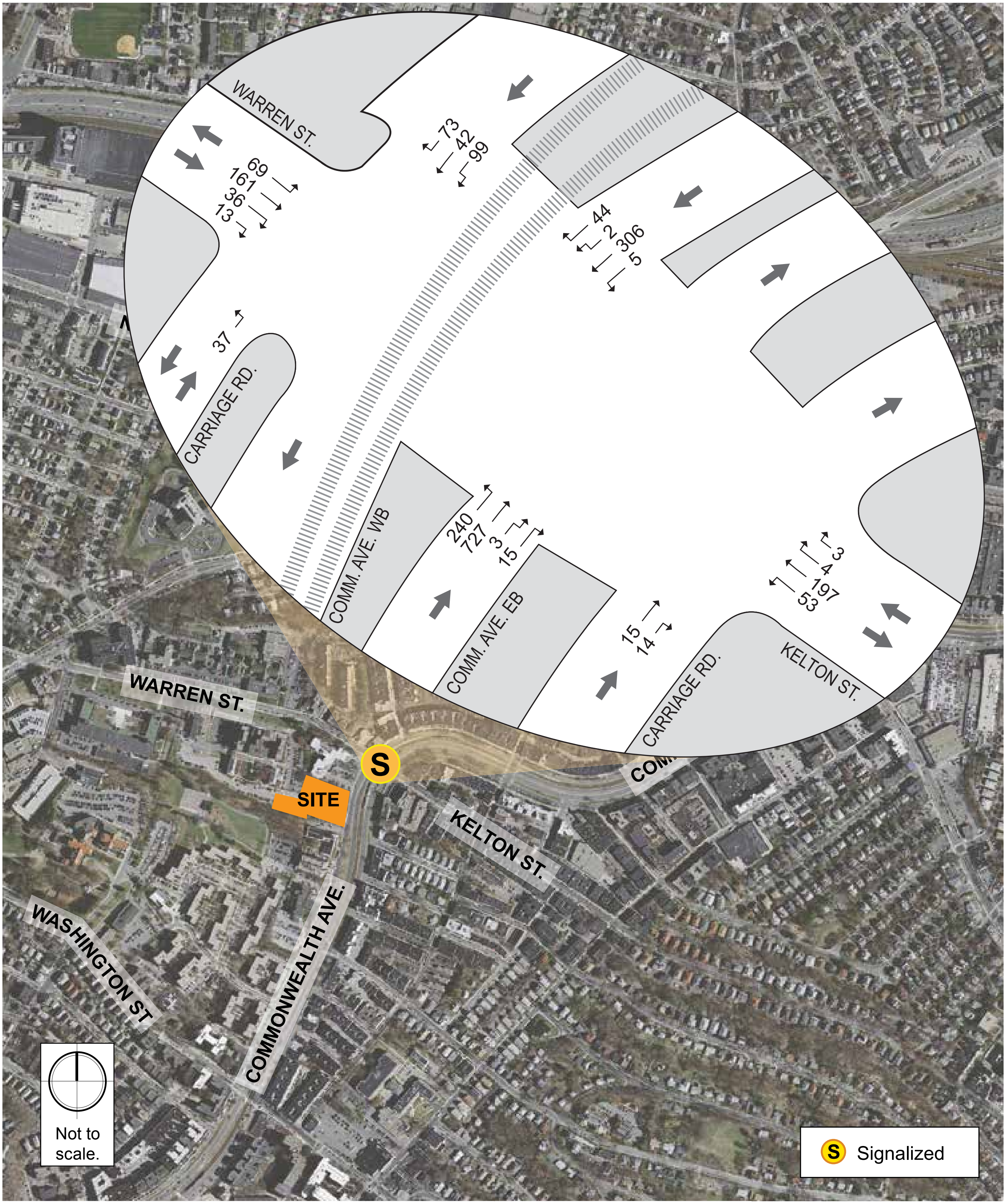

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Figure 2-10

No-Build Conditions (2019) Turning Movement Volumes, a.m. Peak Hour

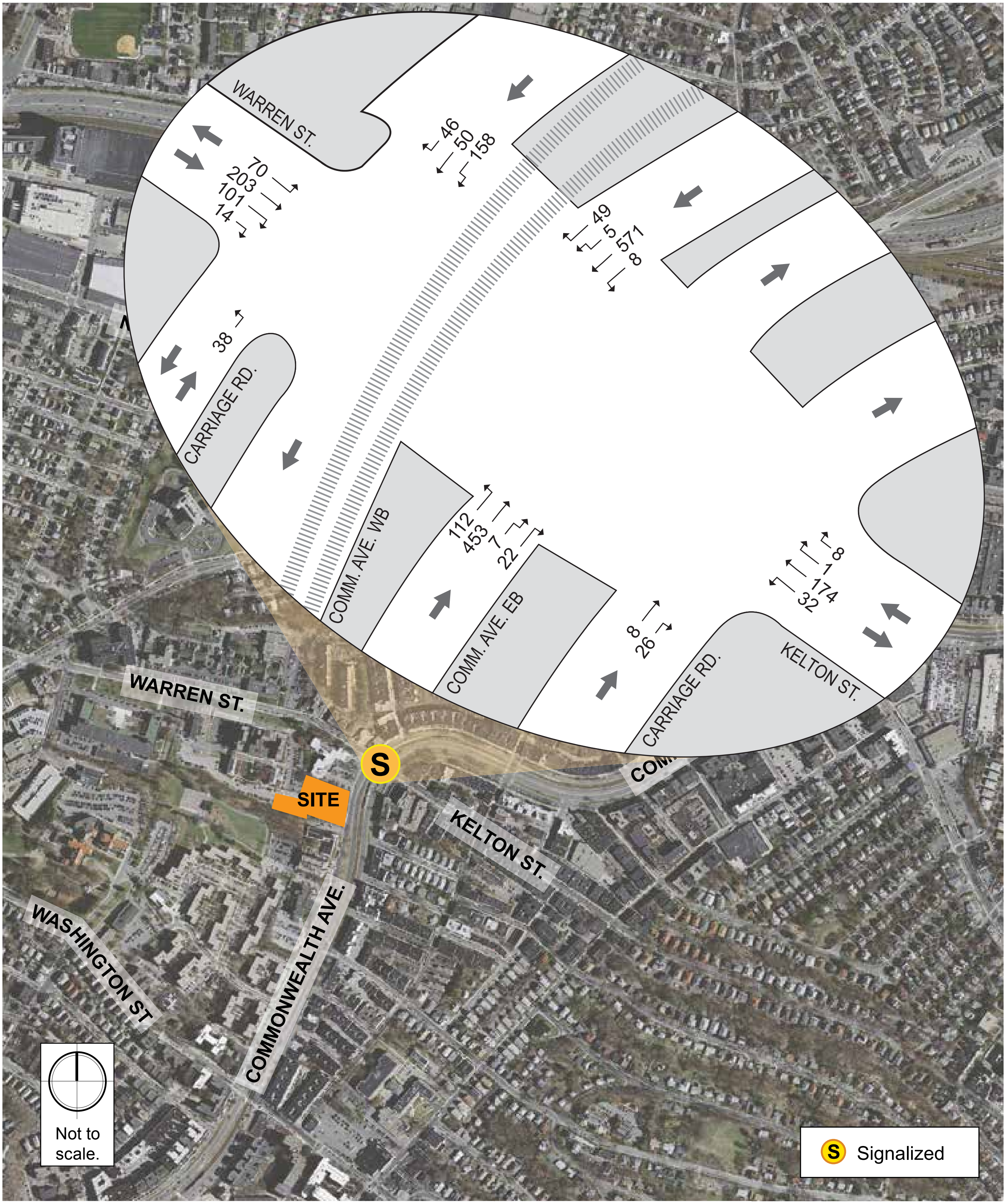

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Figure 2-11

No-Build Conditions (2019) Turning Movement Volumes, p.m. Peak Hour

Table 2-3 No Build Conditions (2019), Capacity Analysis Summary, a.m. Peak Hour

Intersection	LOS	Delay (seconds)	V/C Ratio	50th Percentile Queue Length (ft)	95th Percentile Queue Length (ft)
a.m. Peak Hour					
Commonwealth Avenue at Warren Street/Kelton Street	**D**	**41.4**	-	-	-
Warren Street EB Left/Thru/Right	D	42.3	0.55	205	302
Kelton Street WB Left/Thru/Right	D	40.5	0.51	187	277
Commonwealth Avenue NB Left/Thru | Thru/Right	D	45.7	0.94	326	#413
Commonwealth Avenue SB Left/Thru | Thru/Right	D	41.7	0.57	130	180
Eastbound Carriage Road NB Thru/Right	C	21.2	0.07	9	34
Westbound Carriage Road NB Left	D	44.1	0.14	27	60
Westbound Carriage Road SB Thru/Right	D	44.6	0.55	152	233
p.m. Peak Hour					
Commonwealth Avenue at Warren Street/Kelton Street	**D**	**51.9**	-	-	-
Warren Street EB Left/Thru/Right	D	48.4	0.71	294	418
Kelton Street WB Left/Thru/Right	C	34.8	0.39	144	220
Commonwealth Avenue NB Left/Thru | Thru/Right	C	24.9	0.61	166	213
Commonwealth Avenue SB Left/Thru | Thru/Right	D	52.7	0.84	258	331
Eastbound Carriage Road NB Thru/Right	B	15.4	0.09	5	32
Westbound Carriage Road NB Left	D	48.3	0.17	29	64
Westbound Carriage Road SB Thru/Right	D	46.1	0.61	185	276

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

As shown in Table 2-3, operations at the study area intersection are expected to continue to operate at LOS D during both the a.m. and p.m. peak hours, with all movements continuing to operate at LOS D or better.

2.3.2 Build Conditions

As previously summarized, the Project will consist of approximately 101 mixed-income residential units and approximately 101 parking spaces. The parking spaces will be split between an approximately 49 space garage and approximately 52 surface spaces. Secure storage for approximately 100 bicycles will also be provided on the site.

2.3.2.1 Site Access and Circulation

As shown in the Project site plan in Figure 2-12, access will be provided to the parking garage by a single driveway located along the Commonwealth Avenue Carriage Road, approximately 275 feet south of Warren Street. Vehicular access to the surface parking spaces will be provided by way of an existing curb cut located approximately 150 feet south of the proposed garage driveway. Loading and service, including trash, recycling,

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Figure 2-12

Site Plan

and deliveries will occur on-site. In addition, adequate space has been provided on-site to accommodate residential move-in/move-out without impacting the public sidewalk, parking, or roadway. Primary pedestrian access will be provided off of the Commonwealth Avenue Carriage Road to a central courtyard on the site.

2.3.2.2 Trip Generation Methodology

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

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

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

Residential Uses: LUC 220 – Apartment. The apartment land use is defined as rental dwellings located within the same building with at least three other dwelling units. Trip generation estimates are based on average vehicle rates per unit. The Apartment land use code was selected because it has slightly higher trip generation rates than the other similar residential land uses provided in the *Trip Generation Manual* and presents a more conservative scenario.

2.3.2.3 Mode Share

The BTD publishes vehicle, transit, and walking/bicycling mode split rates for different areas of Boston. The Project site is located within BTD's designated Area 10. The unadjusted vehicular trips were converted to person trips by using vehicle occupancy rates published by the Federal Highway Administration (FHWA)[2]. The BTD's travel mode share data for Area 10 are shown in Table 2-4.

---

1 *Trip Generation Manual*, 9th Edition; Institute of Transportation Engineers; Washington, D.C.; 2012.

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

Table 2-4 Travel Mode Shares

Land Use	Direction	Walk/ Bicycle Share	Transit Share	Auto Share	Vehicle Occupancy Rate
Daily					
Residential	In	19%	22%	59%	1.13
	Out	19%	22%	59%	1.13
a.m. Peak Hour					
Residential	In	19%	30%	51%	1.13
	Out	30%	20%	50%	1.13
p.m. Peak Hour					
Residential	In	30%	20%	50%	1.13
	Out	19%	30%	51%	1.13

2.3.2.4 Trip Generation

The mode share percentages shown in Table 2-4 were applied to the number of person trips to develop walk/bicycle, transit, and vehicle trip generation estimates. The existing uses on the Project site currently generate minimal traffic volumes and were not accounted for in the trip generation estimates. The trip generation for the Project by mode is shown in Table 2-5. The detailed trip generation information is provided in Appendix B.

Table 2-5 Project Trip Generation

Land Use		Walk/Bicycle Trips	Transit Trips	Vehicle Trips
Daily				
Residential[1] *100 units*	In	71	83	196
	Out	71	83	196
a.m. Peak Hour				
Residential[1] *100 units*	In	2	3	5
	Out	14	9	20
p.m. Peak Hour				
Residential[1] *100 units*	In	14	9	20
	Out	5	8	12

1 Based on ITE LUC 220 – Apartments for 100 units.

2.3.2.5 Vehicle Trip Generation

To develop the overall trip generation characteristics, the adjusted vehicular trips associated with the Project were estimated. The Project-generated new vehicle trips are summarized in Table 2-6, with the detailed trip generation information provided in Appendix B.

Table 2-6 Project Vehicle Trip Generation

Time Period	Direction	Residential [1]
Daily	In	196
	Out	196
	Total	**392**
a.m. Peak Hour	In	5
	Out	20
	Total	**25**
p.m. Peak Hour	In	20
	Out	12
	Total	**32**

1 Based on ITE LUC 220 – Apartments for 101 units.

As shown in Table 2-6, the Project is expected to generate approximately 392 new daily vehicle trips (196 entering and 196 exiting), with 25 new vehicle trips (5 entering and 25 exiting) during the a.m. peak hour and 32 new vehicle trips (20 entering and 12 exiting) during the p.m. peak hour.

2.3.2.6 Trip Distribution

The trip distribution identifies the various travel paths for vehicles arriving and leaving the Project site. Trip distribution patterns for the Project were based on BTD's origin-destination data for Area 10 and trip distribution patterns presented in traffic studies for nearby projects. The trip distribution patterns for the Project are illustrated in Figure 2-13.

The Project-generated vehicle trips were assigned to the study area roadway network based on the trip distribution patterns shown in Figure 2-13, and are shown in Figure 2-14 and Figure 2-15 for the a.m. and p.m. peak hours, respectively. The Project trips were assigned to a single site driveway to present a worst-case scenario for driveway operations. The Project-generated trips were added to the 2019 No Build conditions traffic volumes to develop the 2019 Build conditions peak hour traffic volume networks, and are shown in Figure 2-16 and Figure 2-17 for the a.m. and p.m. peak hours, respectively.

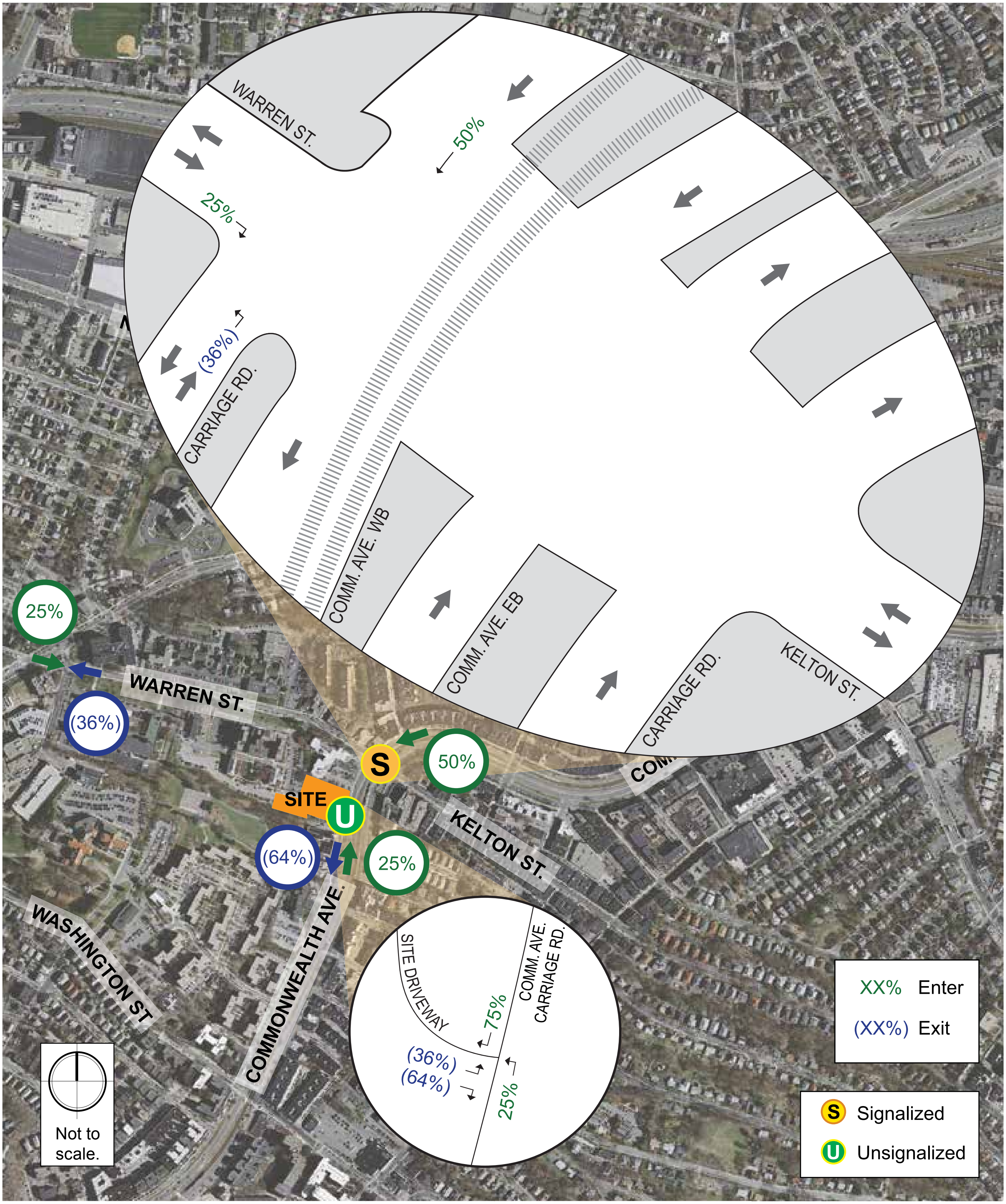

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Figure 2-13
Vehicle Trip Distribution

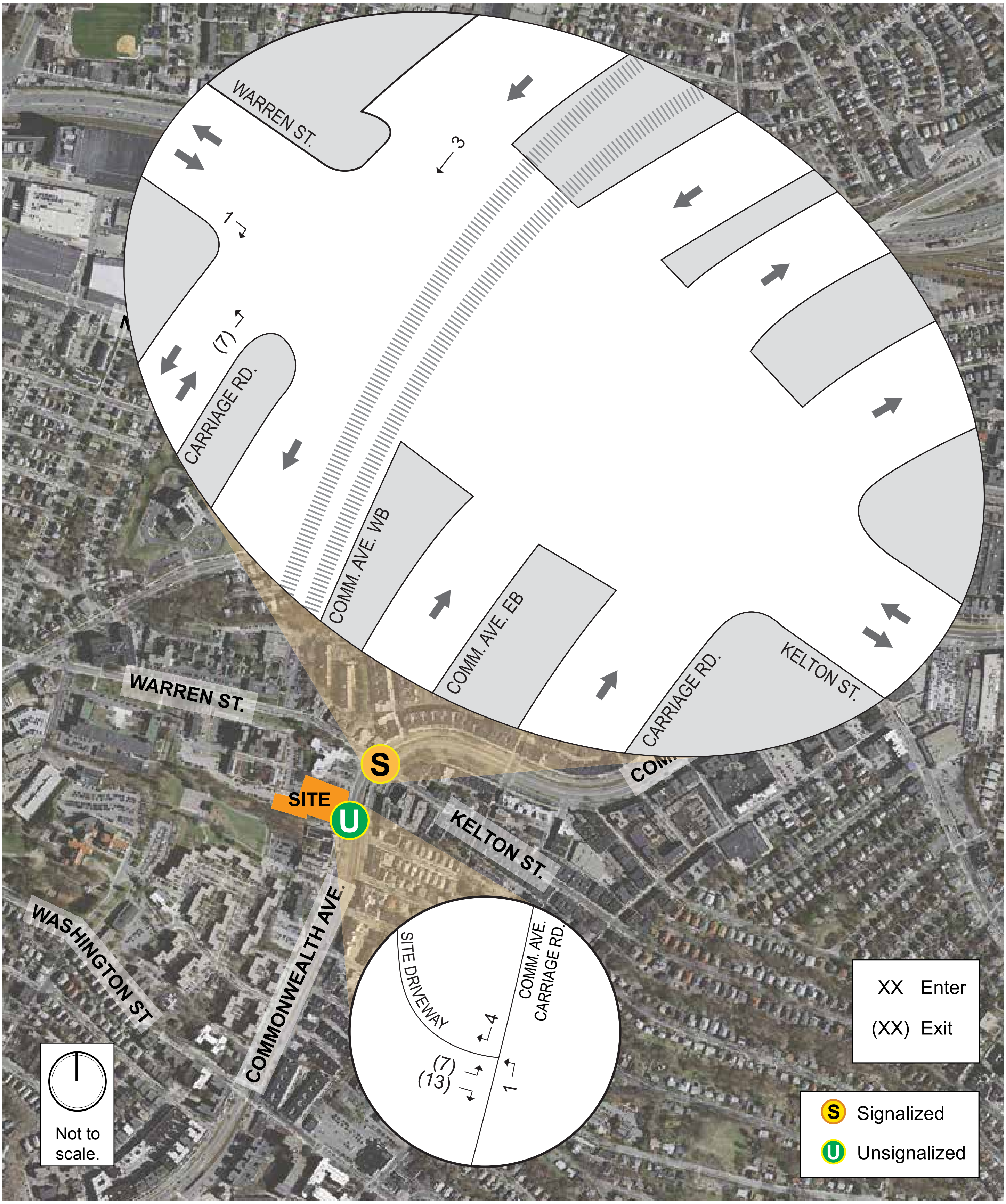

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Figure 2-14

Project-generated Trips, a.m. Peak Hour

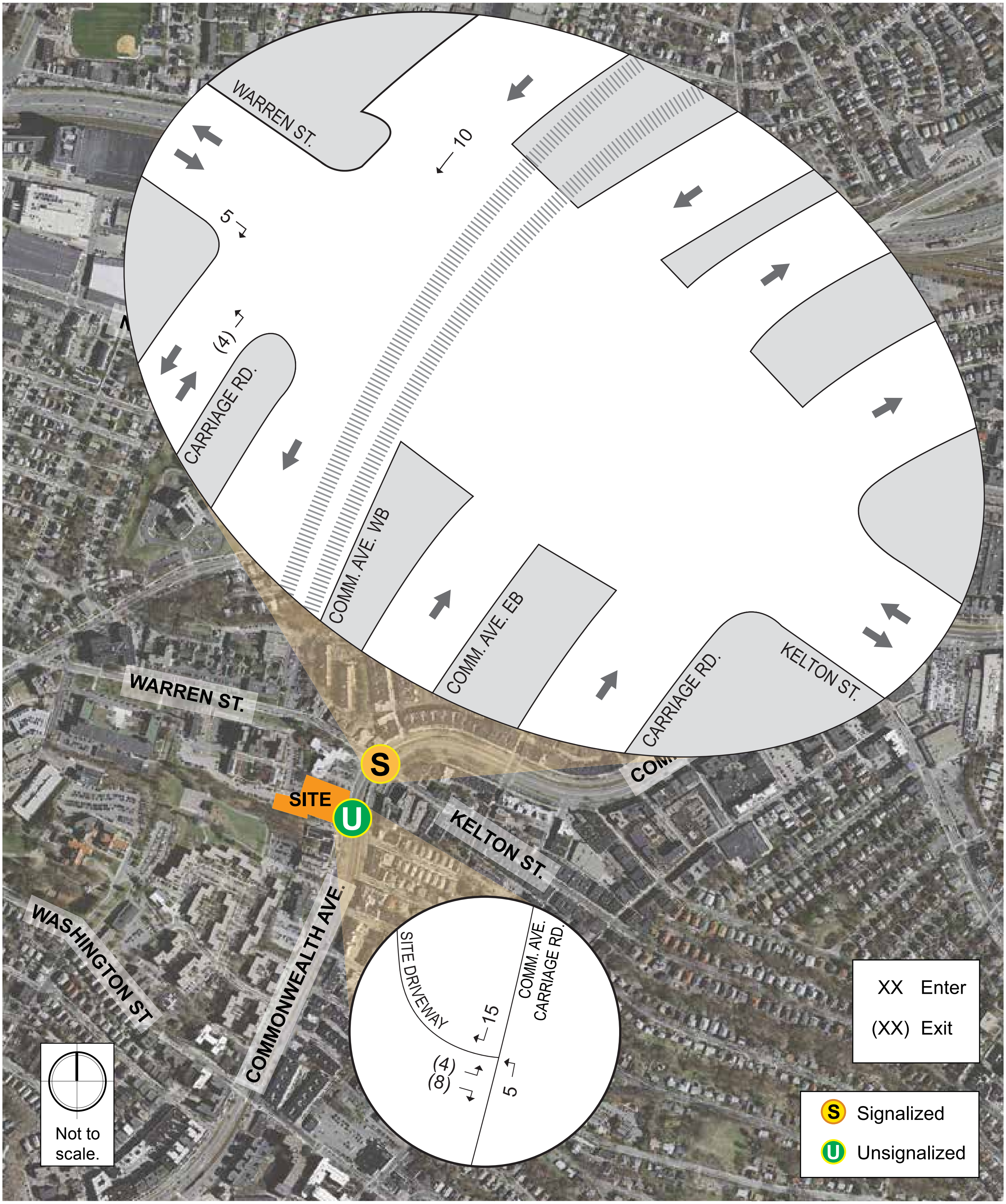

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Figure 2-15

Project-generated Trips, p.m. Peak Hour

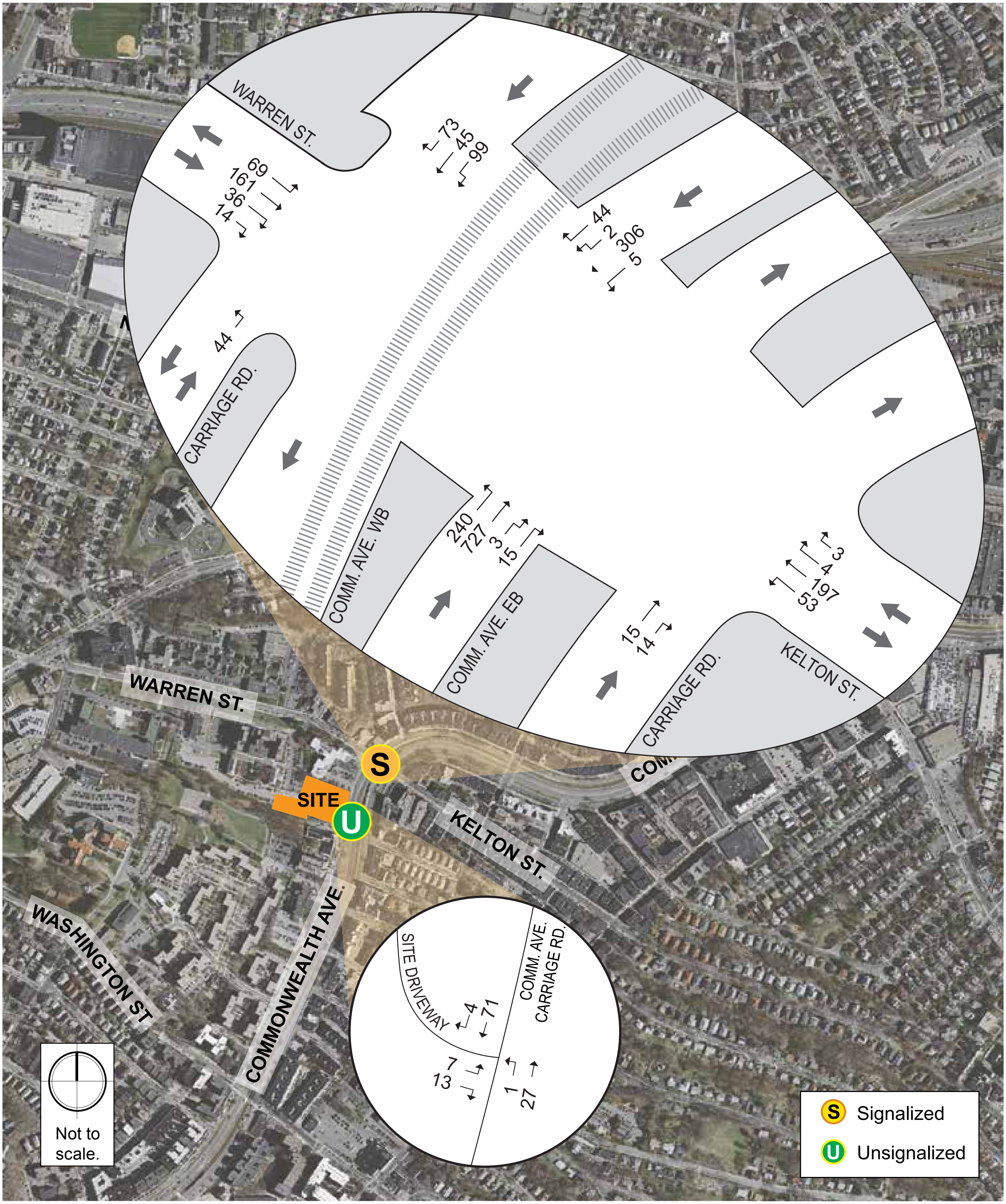

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Figure 2-16

Build Conditions (2019) Turning Movement Volumes, a.m. Peak Hour

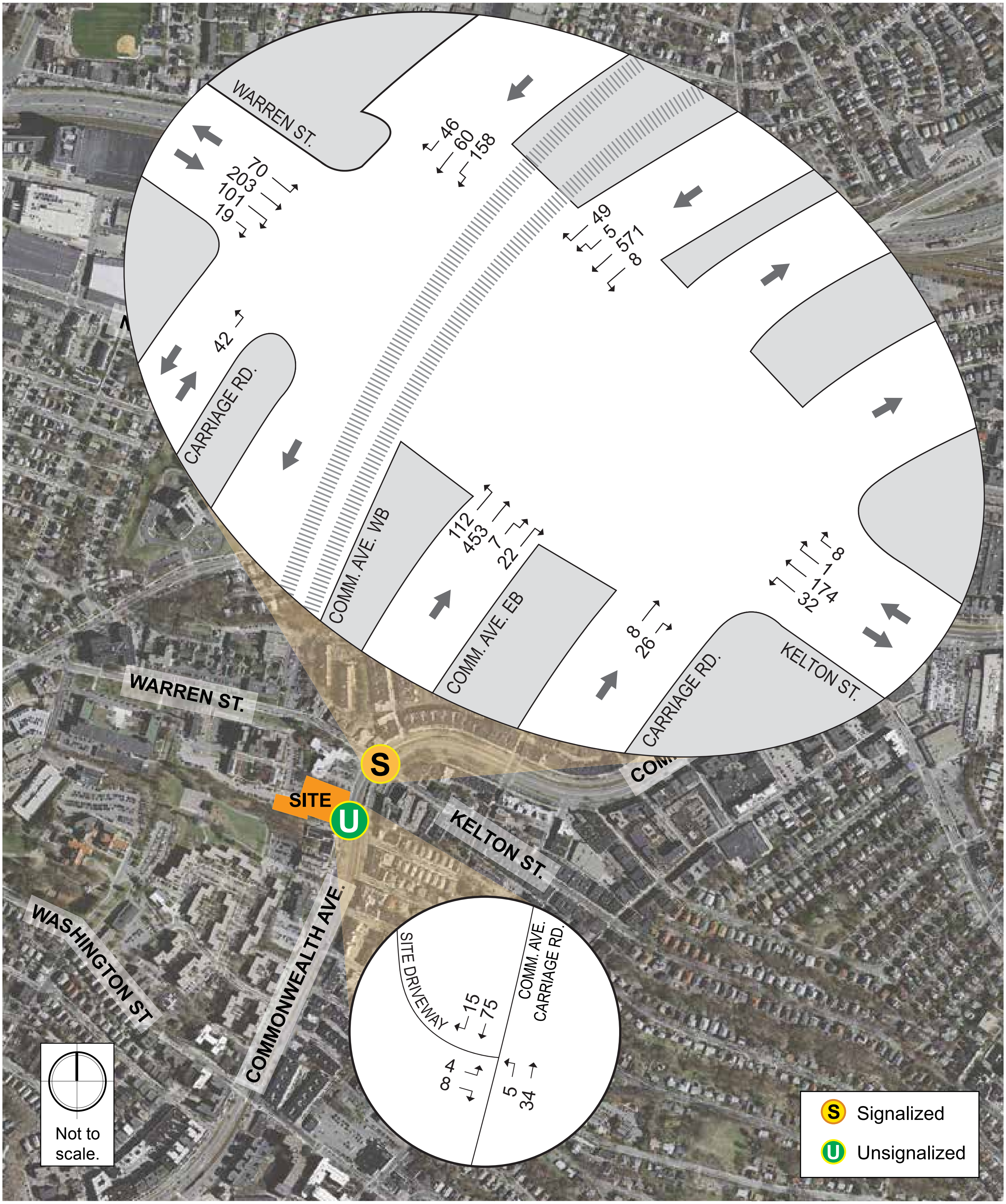

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Figure 2-17

Build Conditions (2019) Turning Movement Volumes, p.m. Peak Hour

2.3.2.7 Build Conditions Traffic Operations

The 2019 Build conditions scenario analysis uses the same methodology as the 2014 Existing and 2019 No Build conditions scenario analyses. The results of the 2019 Build condition traffic analysis at study area intersections are presented in Table 2-10 for the a.m. and p.m. peak hours. The detailed analysis sheets are provided in Appendix B.

As shown in Table 2-7, under the 2019 Build conditions, the signalized study area intersection is expected to continue to operate at an overall LOS D during both the a.m. and p.m. peak hours with the addition of the Project generated traffic volumes. The site driveway is expected to operate at LOS A with minimal queuing and delay. Based on the operations analysis, the Project is expected to have minimal impact to the surrounding roadways and the study area intersection. No additional mitigation measures are necessary to accommodate the Project.

2.3.2.8 Parking

This section presents the Project's parking supply and an evaluation of the Project's parking demand. The Project will provide a total of approximately 101 parking spaces on the site. A total of approximately 49 parking spaces will be located in a partially below-grade garage located below the residences, with an additional approximately 52 parking spaces to be located in a surface parking lot, resulting in a parking ratio of 1.0 space per residential unit. This parking ratio is consistent with the district-based parking goals developed by the BTD for Brighton (0.75-1.25 parking spaces per unit for developments near an MBTA station).

Table 2-7 Build Conditions (2019), Capacity Analysis Summary

Intersection	LOS	Delay (seconds)	V/C Ratio	50th Percentile Queue Length (ft)	95th Percentile Queue Length (ft)
a.m. Peak Hour - Signalized					
Commonwealth Avenue at Warren Street/Kelton Street	**D**	**41.4**	-	-	-
Warren Street EB Left/Thru/Right	D	42.4	0.55	206	303
Kelton Street WB Left/Thru/Right	D	40.5	0.51	187	277
Commonwealth Avenue NB Left/Thru | Thru/Right	D	45.7	0.94	326	#413
Commonwealth Avenue SB Left/Thru | Thru/Right	D	41.7	0.57	130	180
Eastbound Carriage Road NB Thru/Right	C	21.2	0.07	9	34
Westbound Carriage Road NB Left	D	44.6	0.16	32	69
Westbound Carriage Road SB Thru/Right	D	44.9	0.56	155	237
a.m. Peak Hour - Unsignalized					
Commonwealth Avenue Carriage Road at Site Driveway					
Carriage Road NB Left/Thru	A	0.3	0.00	-	0
Carriage Road SB Thru/Right	A	0.0	0.05	-	0
Site Driveway EB Left/Right	A	8.9	0.02	-	2

Table 2-7 Build Conditions (2019), Capacity Analysis Summary (Continued)

Intersection	LOS	Delay (seconds)	V/C Ratio	50th Percentile Queue Length (ft)	95th Percentile Queue Length (ft)
p.m. Peak Hour - Unsignalized					
Commonwealth Avenue at Warren Street/Kelton Street	**D**	**51.8**	-	-	-
Warren Street EB Left/Thru/Right	D	49.3	0.72	300	426
Kelton Street WB Left/Thru/Right	C	34.8	0.39	144	220
Commonwealth Avenue NB Left/Thru | Thru/Right	C	24.9	0.61	166	213
Commonwealth Avenue SB Left/Thru | Thru/Right	D	52.7	0.84	258	331
Eastbound Carriage Road NB Thru/Right	B	15.4	0.09	5	32
Westbound Carriage Road NB Left	D	48.7	0.19	32	69
Westbound Carriage Road SB Thru/Right	D	47.1	0.64	194	289
p.m. Peak Hour - Unsignalized					
Commonwealth Avenue Carriage Road at Site Driveway					
Carriage Road NB Left/Thru	A	1.0	0.00	-	0
Carriage Road SB Thru/Right	A	0.0	0.06	-	0
Site Driveway EB Left/Right	A	8.9	0.01	-	1

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

2.3.2.9 Public Transportation

As previously discussed, the Project is ideally situated to take advantage of nearby public transportation opportunities. The MBTA Green Line B Branch travels along Commonwealth Avenue, with the Warren Street Station located in close proximity to the Project site. Based on the transit mode shares presented earlier, the future transit trips associated with the Project were estimated and are summarized in Table 2-8.

Table 2-8 Project Transit Trips

Time Period	Direction	Residential
Daily	In	83
	Out	83
	Total	**166**
a.m. Peak Hour	In	3
	Out	9
	Total	**12**
p.m. Peak Hour	In	9
	Out	8
	Total	**17**

As shown in Table 2-8, the Project will generate an estimated 166 new transit trips on a daily basis. Approximately 12 new transit trips (3 alighting and 9 boarding) will occur during the a.m. peak hour and 17 new trips (9 alighting and 8 boarding) will occur during the p.m. peak hour. The majority of these transit trips will be accommodated by the MBTA Green B Branch at the Warren Street Station.

2.3.2.10 Pedestrians

Based on the walk mode shares presented earlier, the future walk trips were estimated and are summarized in Table 2-9.

Table 2-9 Project Pedestrian Trips

Time Period	Direction	Residential
Daily	In	71
	Out	71
	Total	**142**
a.m. Peak Hour	In	2
	Out	14
	Total	**16**
p.m. Peak Hour	In	14
	Out	5
	Total	**19**

Over the course of a day, the Project will generate an estimated 142 new pedestrian trips and an additional 166 new transit trips that will require a walk to or from the site. This results in an additional estimated 308 new pedestrian trips per day. Approximately 16 new pedestrian trips will occur during the a.m. peak hour and 19 new pedestrian trips will occur during the p.m. peak hour, in addition to the transit trips that will also require a walk from the site. The pedestrian facilities surrounding the site have adequate capacity to accommodate the pedestrian trips generated by the Project.

2.3.2.11 Bicycle Accommodations

BTD has established guidelines requiring projects subject to Transportation Access Plan Agreements to provide secure covered bicycle parking for residents and employees, and short-term bicycle racks for visitors. The Project will provide approximately 100 covered and secure bicycle storage spaces on-site in the garage. Additional storage will be provided by outdoor bicycle racks accessible to visitors to the site in accordance with BTD guidelines.

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

2.3.2.12 Loading and Service Activity

Loading and service operations will occur on-site in the surface parking lot. All trash truck activity and residential move-in/move-out activity will also take place in the surface parking lot near the rear of the site.

Residential units primarily generate delivery trips related to small packages and prepared food. Delivery trip estimates were based on data provided in the Truck Trip Generation Rates by Land Use in the Central Artery/Tunnel Project Study Area report[3]. Deliveries to the Project site will be limited to SU-36 trucks and smaller delivery vehicles. Based on the CTPS report, residential uses generate approximately 0.01 light truck trips per 1,000 sf of gross floor area. The Project is expected to generate approximately one delivery trip per day. These numbers do not include trash truck trips. The low number of anticipated deliveries will have minimal impact on the vehicular operations along the Commonwealth Avenue Carriage Road. All move-in/move-out activity can occur at the loading area on the Project site without impacting the public sidewalk, parking, or roadway.

2.4 Transportation Mitigation Measures

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

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

The Proponent will also produce a Construction Management Plan (CMP) for review and approval by BTD. The CMP will detail the schedule, staging, parking, delivery, and other associated impacts of the construction of the Project. See Section 2.6 for additional information related to the CMP.

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

2.5 Transportation Demand Management

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

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

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

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

- **Orientation Packets**: The Proponent will provide orientation packets to new residents and tenants containing information on available transportation choices, including transit routes/schedules and nearby vehicle sharing and bicycle sharing locations. On-site management will work with residents and tenants as they move in to help facilitate transportation for new arrivals.

- **Bicycle Accommodation**: The Proponent will provide bicycle storage in secure, sheltered areas for residents. Subject to necessary approvals, public use bicycle racks for visitors will be placed near building entrances.

- **Transportation Coordinator**: The Proponent will designate a transportation coordinator to oversee transportation issues, including parking, service and loading, and deliveries, and will work with residents as they move in to raise awareness of public transportation, bicycling, and walking opportunities.

- **Project Web Site**: The web site will include transportation-related information for residents, workers, and visitors.

- **Electric Charging Stations**: The Proponent will provide a total of three electric charging stations on the site.

- **Priority Parking Spaces**: The Proponent will provide priority parking spaces for hybrid and electric vehicles on the site.

- **Vehicle Sharing Program**: The Proponent will explore the feasibility of providing spaces in the garage for a car sharing service.

2.6 Evaluation of Short-term Construction Impacts

Details of the overall construction schedule, working hours, number of construction workers, worker transportation and parking, number of construction vehicles, and routes will be addressed in detail in a CMP to be filed with BTD in accordance with the City's transportation maintenance plan requirements. The CMP will also address the need for pedestrian detours, lane closures, and/or parking restrictions, if necessary to accommodate a safe and secure work zone.

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

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

The CMP will be executed with the City prior to commencement of construction and will document all committed measures.

Chapter 3.0

Environmental Review Component

3.0 ENVIRONMENTAL REVIEW COMPONENT

3.1 Wind

3.1.1 Introduction

Rowan Williams Davies & Irwin Inc. (RWDI) was retained to assess the potential wind conditions for the proposed Project. The approximate location of the Project is illustrated in Figure 3.1-1.

The object of the assessment is to provide a qualitative evaluation of wind comfort conditions around the Project.

The qualitative assessment is based on the following:

- a review of regional long-term meteorological data;
- RWDI's previous wind-tunnel tests on buildings in the Boston area;
- design drawings;
- RWDI's engineering judgment and expert knowledge of wind flows around buildings[1,2]; and
- use of software developed by RWDI (Windestimator[3]) for estimating the potential wind comfort conditions around generalized building forms.

The qualitative approach provides a screening-level estimation of potential wind conditions. Due to its limited size and height, it is RWDI's opinion that the proposed Project will not cause any adverse wind impact on the surrounding areas. The resultant wind conditions on and around the site are predicted to meet the BRA effective gust criterion throughout the year and are generally comfortable for the planned usage on site.

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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 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.

3 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

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Figure 3.1-1

Aerial Photograph of Existing Project Site

3.1.2 Building and Site Information

The proposed Project will be located on the west side of Commonwealth Avenue, near the intersection with Warren Street to the north. The building will be six stories in height with an L-shaped floor plate (as shown in Figures 3.1-2 and 3.1-3).

Pedestrian areas of concern include entrances to the proposed building (Locations A1 through A5 in Figure 3.1-2); sidewalks (B, B1 and B2) along Commonwealth Avenue; building corner areas (C1 and C2); parking lots and driveways (D); and potential outdoor seating areas (E1, E2 and E3).

The site is currently occupied by five two-story buildings, one of which (Building 3) will remain on the site. There are existing buildings of similar massing located to the south, and from the west through north directions, as shown in Figure 3.1-3. The terrain rises towards the south and southwest. There are also dense trees that currently exist around the site (Figure 3.1-1).

Further surroundings are of a typical moderately dense urban setting, with low buildings, trees and roadways in all directions.

3.1.3 Meteorological Data

Wind statistics at Boston's Logan International Airport between 1981 and 2013 were analyzed for the spring (March to May), summer (June to August), fall (September to November) and winter (December to February) seasons. Figure 3.1-4 graphically depicts the distributions of wind frequency and directionality for these four seasons and for the annual period. When all winds are considered, those that originate from the northwest and southwest quadrants are predominant. The northeasterly winds are also frequent, especially in the spring.

Strong winds with mean speeds greater than 20 miles per hour (mph) (red bands) measured at the airport are most prevalent from the northwesterly to southwesterly directions throughout the year, as well as frequently, but less often, from the northeast.

Therefore, winds from the northwest, southwest and northeast directions are considered most relevant to the current study, while winds from other directions are also considered in our analysis.

3.1.4 Explanation of Criteria

The BRA has adopted two standards for assessing the relative wind comfort of pedestrians. First, the BRA 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 of the time.

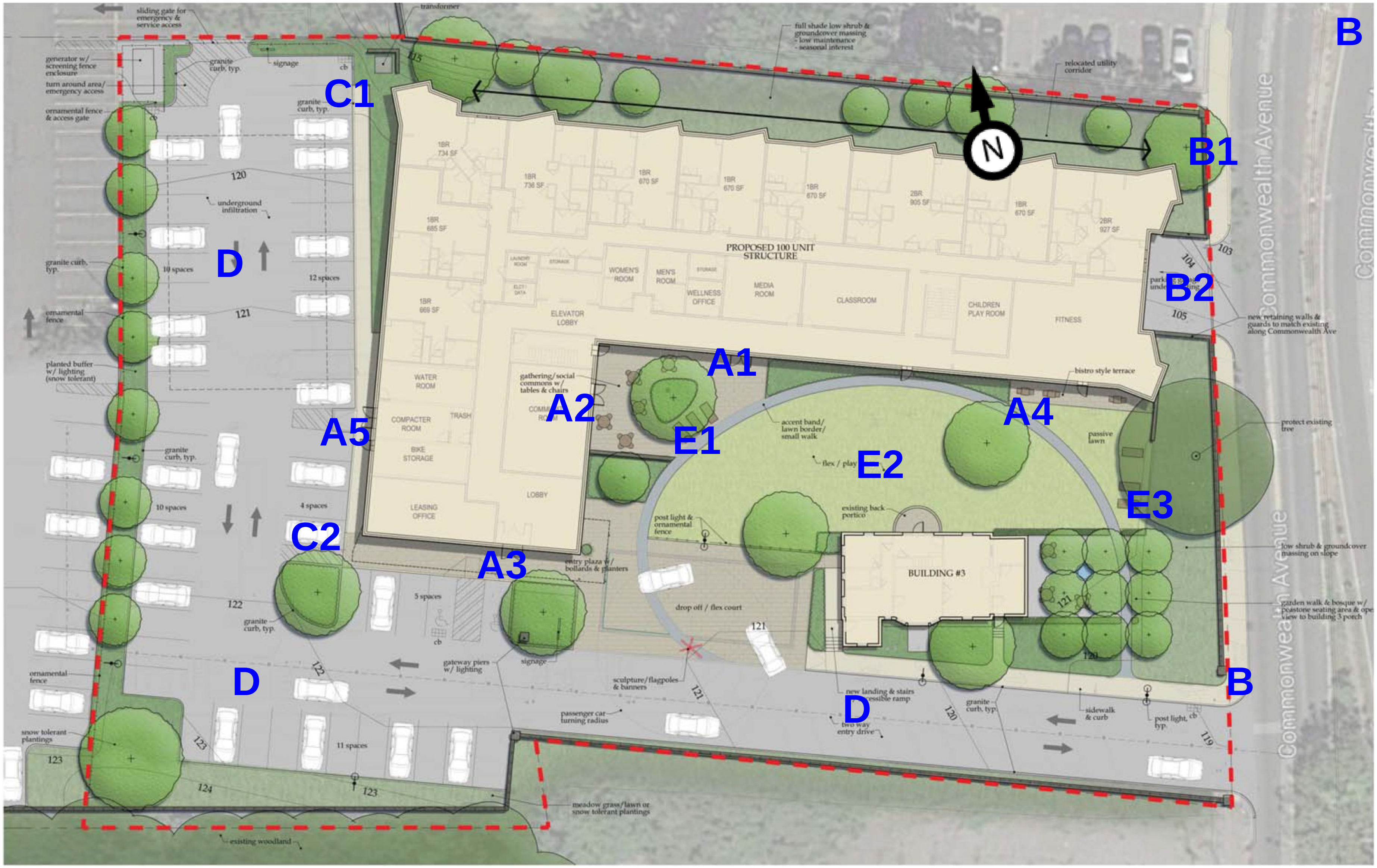

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Figure 3.1-2

Reference Plan

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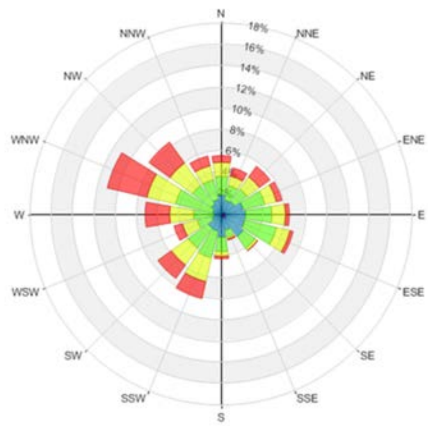
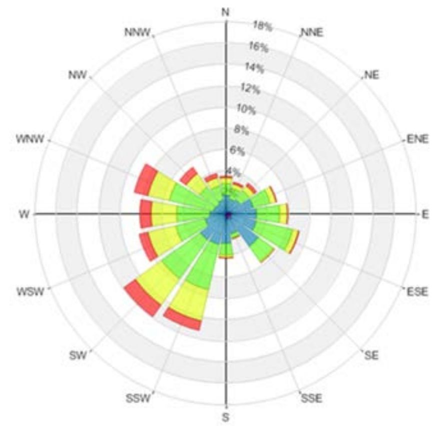
Figure 3.1-3

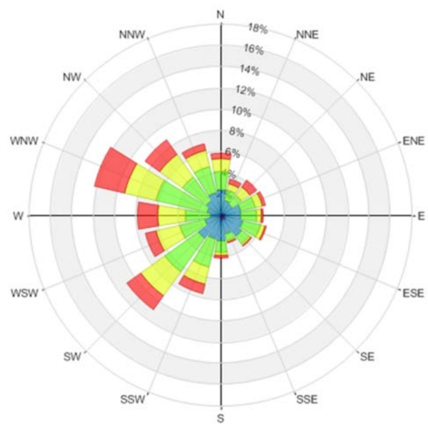
East View of the Project and Surroundings



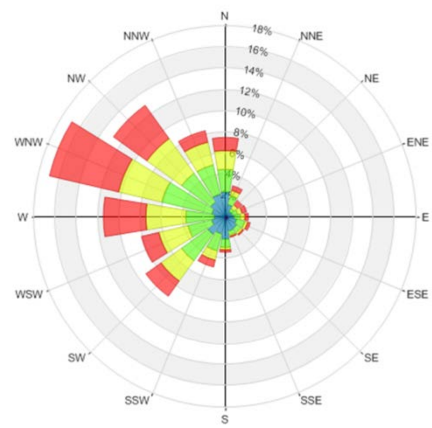
Spring (March to May)



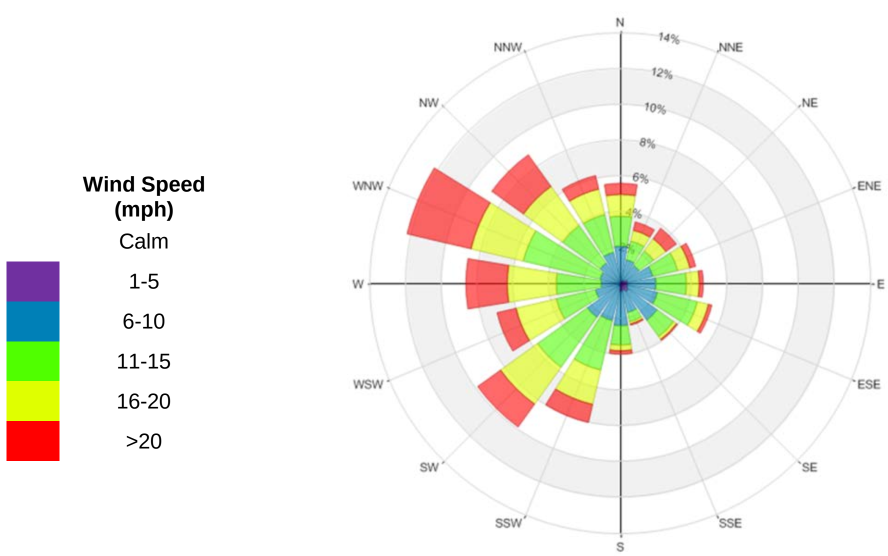
Summer (June to August)



Fall (September to November)



Winter (December to February)



Annual Winds

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Figure 3.1-4

Directional Distribution (%) of Winds (Blowing From) at Boston Logan International Airport (1981 to 2013)

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

BRA Mean Wind Criteria*

Dangerous	> 27 mph
Uncomfortable for Walking	> 19 and ≤ 27 mph
Comfortable for Walking	> 15 and ≤ 19 mph
Comfortable for Standing	> 12 and ≤ 15 mph
Comfortable for Sitting	< 12 mph

* Applicable to the hourly mean wind speed exceeded one percent of the time.

Pedestrians on walkways and parking lots will be active and wind speeds comfortable for walking are appropriate. Lower wind speeds comfortable for standing are desired for building entrances where people are apt to linger. Low wind speeds comfortable for sitting are desired for outdoor terraces in the summer, when these areas are typically in use.

The wind climate found in a typical location in Boston is generally comfortable for the pedestrian use of sidewalks and thoroughfares and meets the BRA effective gust velocity criterion of 31 mph. However, without any mitigation measures, the wind climate is likely to be frequently unsuitable for more passive activities such as sitting or standing, especially during the winter and spring seasons.

3.1.5 Pedestrian Wind Conditions

3.1.5.1 Background

Predicting wind speeds and occurrence frequencies is complex as it must consider the simultaneous interaction of building geometry, building orientation, position and height of surrounding buildings, upstream terrain, and the local wind climate. Over the years, RWDI has conducted more than 2,000 wind tunnel model studies on pedestrian wind conditions around buildings, yielding a broad knowledge base. This knowledge has been incorporated into RWDI's proprietary software that allows for a qualitative, screening-level numerical estimation of pedestrian wind conditions without wind tunnel testing. Nevertheless, some uncertainty remains in predicting wind comfort. For example, the sensation of comfort

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

among individuals can be quite variable. Variations in age, individual health, clothing, and other human factors can change a particular response of an individual. In addition, the prediction of wind speeds is necessarily a statistical procedure. The wind speeds reported are for the frequency of occurrence stated (one percent of the time). Higher wind speeds will occur, but on a less frequent basis and the other 99% of the time, the winds will be lower than the speeds stated.

The Project site is currently occupied by five two-story buildings, and surrounded by dense buildings and trees in most directions. As a result, the existing wind conditions on the site and adjacent areas are expected to be comfortable for standing on an annual basis, with walking conditions in the winter and spring, and sitting or standing conditions in the summer and fall. The wind conditions are also expected to meet the BRA effective gust criterion throughout the year.

The proposed building is slightly taller than its immediate surroundings and will be exposed to winds from the northeast and southwest. It has a long north façade, which will intercept the predominant northwest and northeast winds and deflect them down to the downwind corners (Figure 3.1-5a). In the gap areas between the existing and proposed buildings, wind flow accelerations may also occur due to a channeling effect (Figure 3.1-5b).

Figure 3.1-6 illustrates the general flow patterns and wind flow accelerations around exposed building corners and in the gaps between the proposed and existing buildings for winds from the prevailing northwest, southwest and northeast directions. The new massing will shelter downwind areas from the prevailing winds. The potential wind conditions in these and other areas on and around the site are discussed in detail in the next section.

3.1.5.2 Potential Wind Conditions

Given the building size and local wind climate, it is expected that the wind conditions around the site will meet the BRA effective gust criterion. The proposed Project is not expected to have adverse wind impact on the surrounding areas, and the future wind conditions are expected to be suitable for the intended use in general. The following is a detailed discussion of wind conditions in key pedestrian areas (as shown on Figure 3.1-2).

Building Entrances

Building entrances located at the inner corner of the building (Locations A1 and A2 in Figure 3.1-2) will be sheltered by the proposed building from all prevailing winds. Therefore, suitable wind conditions are expected throughout the year.

Other entrances identified in the site plan will face either south (A3 and A4) or west (A5). The southern entrances will be sheltered from the northwest and northeast winds, while the entrance that faces west will be exposed to the prevailing southwestern and northwestern winds.

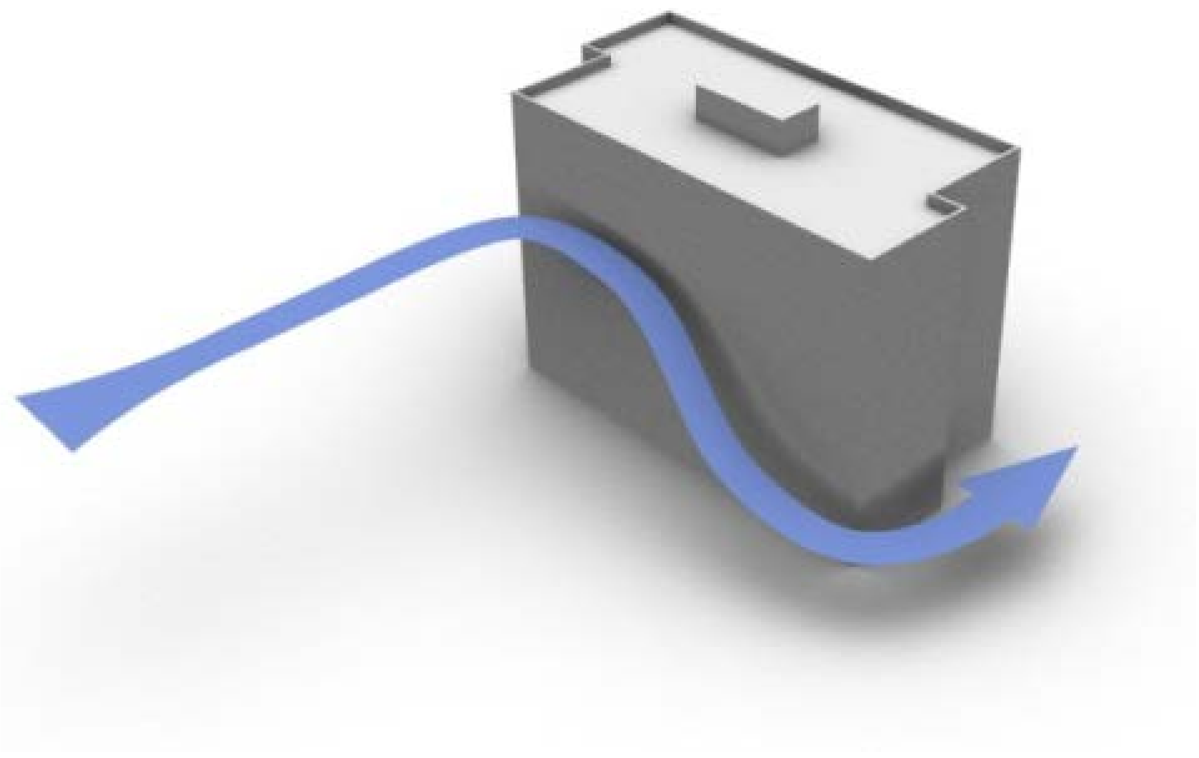


Figure 3.1-5a

Corner Acceleration

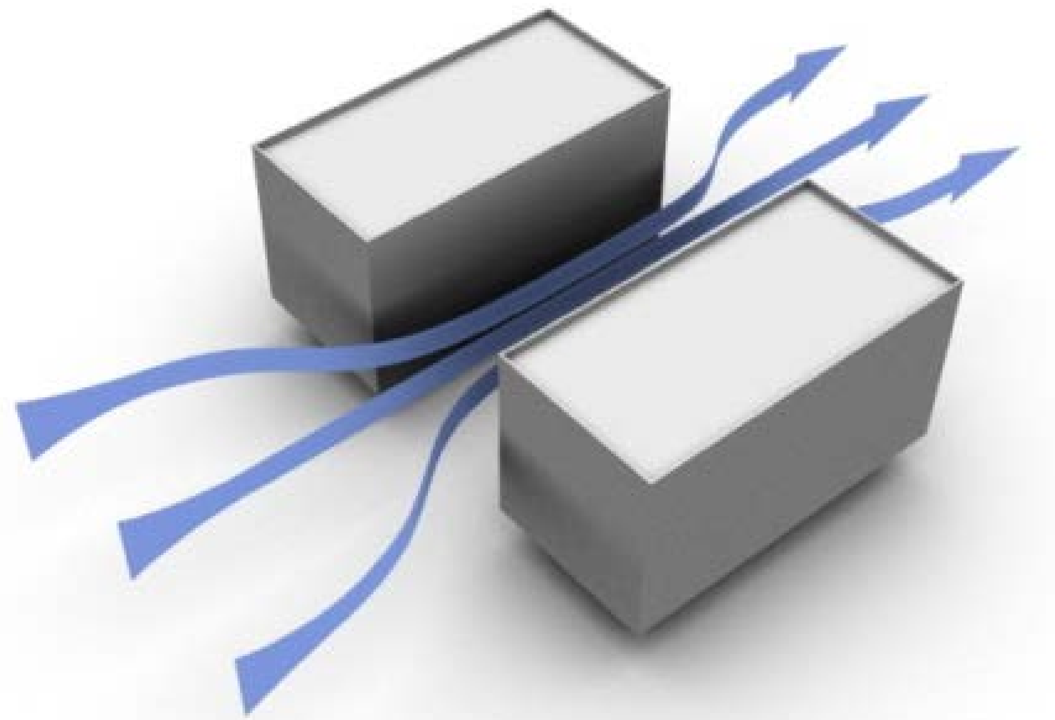
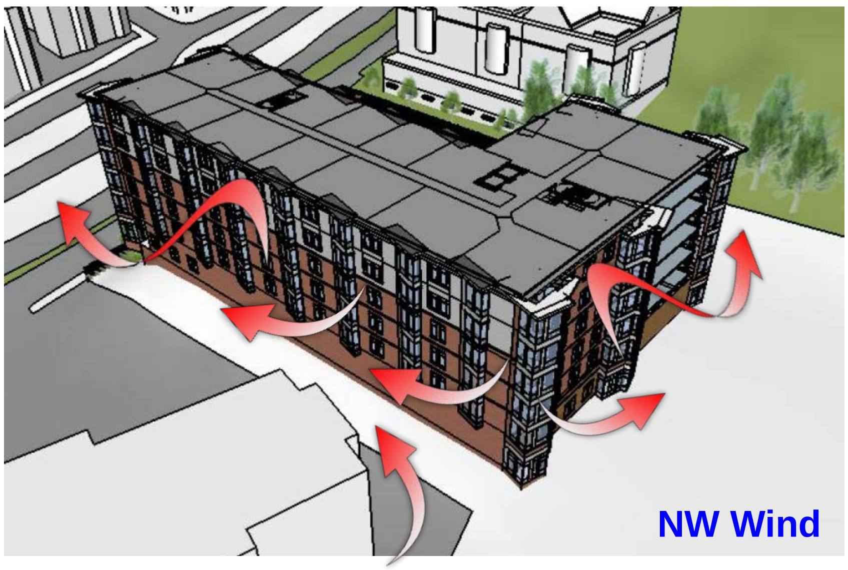


Figure 3.1-5b

Channeling Effect



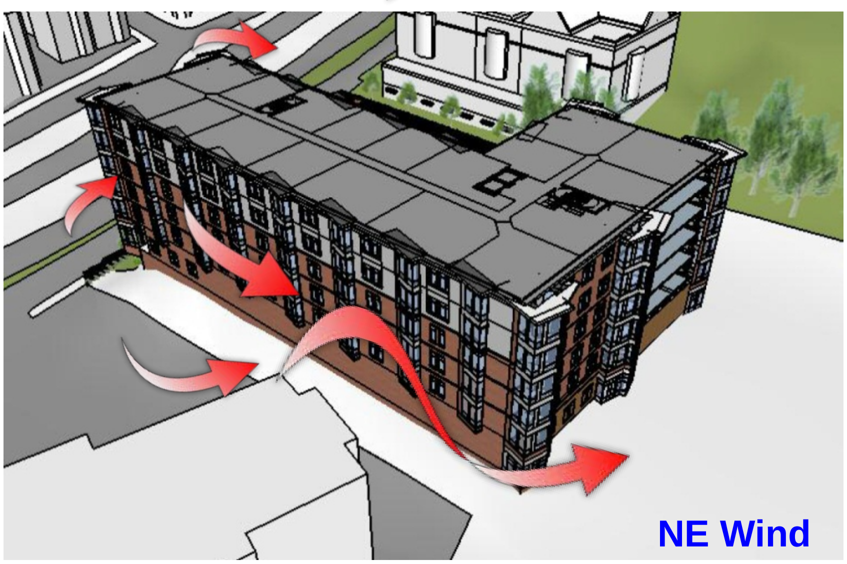


Figure 3.1-6

Flow Pattern Around Buildings from Southwest (top), Northwest (middle) and Northeast (bottom)

Entrance A3, in the middle of the south façade of the shorter wing, and Entrance A5, along the western façade, will both be exposed to the southwesterly winds, which are frequent in the summer, but not as strong as the northwesterly winds (see Figure 3.1-4). Entrance A5 may experience stronger activity as it will further be exposed to winds that originate from northwesterly directions. Dense trees and the raised terrain to the southwest of the proposed building will provide sheltering from those winds. Thus, suitable wind conditions are anticipated at the A3 entrance area most of the time. Additional control measures may be required around Entrance A5, which will be further pursued by the Proponent as the design evolves.

The entrance close to the southeast building corner (A4) will be windier, due to accelerations of winds from the southwest and northeast (Figure 3.1-6). The Proponent will continue to study this area as the design progresses to provide a safe entrance during the times it will be in use. If necessary, plantings, canopies and/or wind screens may be incorporated into the design to improve undesirable wind conditions.

Sidewalk Along Commonwealth Avenue

The proposed Project has a narrow façade fronting Commonwealth Avenue. The impact of this façade on the wind conditions along the sidewalk will be limited. It is expected that wind activity may increase at two small areas that are immediately adjacent to the building corners (Locations B1 and B2) due to the acceleration of northwest and southwest winds, respectively (Figure 3.1-6). The resultant wind conditions, however, are still expected to be comfortable for walking.

The proposed trees at these two corners (Figure 3.1-2) may reduce the wind activity around the building and on the sidewalk, depending on the species chosen.

Building Corners

Windy conditions are expected at the building corners at the west end of the proposed Project (Locations C1 and C2 in Figure 3.1-2). The addition of trees is a positive design feature that will slow down the wind flow accelerations and keep pedestrians away from the corners. Alternatives to trees may include screens and signage, if necessary. In general, the wind conditions are expected to be suitable for their intended uses.

Parking Lots and Driveways

Parking lots and driveways are located on the south and west sides of the new building (Location D in Figure 3.1-2). Wind conditions in these areas are expected to be similar to those that currently exist on site, which are appropriate for the intended use throughout the year.

Seating Area

Outdoor seating is proposed between the new building and the existing Building 3 (Locations E1, E2 and E3). The new massing will shelter pedestrians from the prevailing northwest and northeast winds. However, the southwesterly winds are most frequent in the summer (see wind roses in Figure 3.1-4) and they will be channeled into the gap (E2) between the existing and proposed buildings (top diagram in Figure 3.1-6). Wind flow accelerations are also expected for the northeast and southwest winds around the southeast corner of the proposed building (E3).

While suitable wind conditions are predicted for the seating area at the inner corner of the L-shaped building (E1), the other areas (E2 and E3) will be evaluated as the design progresses to ensure suitable winds will be expected for the proposed uses.

3.1.6 Summary

While the proposed building is similar in height to the surrounding buildings located to the south, and from the west through north, it is exposed to winds that originate from the southwest and northeast. Due to its limited size, it is RWDI's opinion that the proposed Project will not cause any adverse wind impact on the surrounding areas. The resultant wind conditions on and around the site are predicted to meet the BRA effective gust criterion throughout the year and are generally comfortable for the planned usage on site.

Wind control measures will be studied for relevant areas, such as building corners, entrances and outdoor seating areas, as the design progresses, if necessary.

3.2 Shadow

3.2.1 Introduction and Methodology

As typically required by the BRA, 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. Note that the analysis does not take into account the existing buildings on the site that will be demolished; therefore, the analysis presented in this PNF is conservative and actual new shadow will be less than presented. The analysis focuses on nearby open spaces, sidewalks and bus stops adjacent to and in the vicinity of the Project site. Shadows have been determined using the applicable Altitude and Azimuth data for Boston. 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.

The analysis shows that the Project's impacts will generally be limited to the Brighton Marine campus, the area north of the site, and, in the afternoon, Commonwealth Avenue. New shadow on the nearby Warren Street Station will be limited to the evening hours. No new shadow will be cast onto nearby open spaces during the time periods studied.

3.2.2 Vernal Equinox (March 21)

At 9:00 a.m. during the vernal equinox, new shadow from the Project will be cast to the northwest onto the Project's surface parking lot and landscaped areas on the Brighton Marine campus. No new shadow will be cast onto Warren Street Station or public open spaces.

At 12:00 p.m., new shadow will be cast to the north onto the Brighton Marine parking lot and landscaped area, as well as the surface parking on the abutting site to the north. No new shadow will be cast onto Warren Street Station or public open spaces.

At 3:00 p.m., new shadow will be cast to the northeast onto the surface parking lot north of the site, as well as a portion of the Commonwealth Avenue and its sidewalk. New shadow will be cast onto a small portion of the Project's courtyard. No new shadow will be cast onto Warren Street Station or public open spaces.

3.2.3 Summer Solstice (June 21)

At 9:00 a.m. during the summer solstice, new shadow from the Project will be cast to the west onto the Project's surface parking lot, as well as a portion of the Project's courtyard. No new shadow will be cast onto Warren Street Station or public open spaces.

At 12:00 p.m., new shadow will be cast to the north and will be limited to small areas north and west of the proposed building, mainly on the Project site. No new shadow will be cast onto Warren Street Station or public open spaces.

At 3:00 p.m., new shadow will be cast to the northeast onto a portion of the parking lot to the north of the site, a small portion of the Project's courtyard, and a small portion of the Commonwealth Avenue Carriage Road and its sidewalk. No new shadow will be cast onto Warren Street Station or public open spaces.

At 6:00 p.m., new shadow will be cast to the east onto Commonwealth Avenue and the Commonwealth Avenue Carriage Roads, as well as their sidewalks. New shadow will also be cast onto a portion of the Warrant Street Station. The Project's courtyard and the area immediately north of the proposed building will also be covered by new shadow. No new shadow will be cast onto nearby public open spaces.

3.2.4 Autumnal Equinox (September 21)

At 9:00 a.m. during the autumnal equinox, new shadow from the Project will be cast to the northwest onto the Project's surface parking lot, and an area of the Brighton Marine campus and its parking lot and surrounding landscaped area. No new shadow will be cast onto Warren Street Station or public open spaces.

At 12:00 p.m., new shadow will be cast to the north onto the Brighton Marine parking lot and the Project's parking lot, and the surrounding landscaped areas, as well as the surface parking on the abutting site to the north. No new shadow will be cast onto Warren Street Station or public open spaces.

At 3:00 p.m., new shadow will be cast to the northeast onto the surface parking lot north of the site, as well as a portion of the Commonwealth Avenue and its sidewalk. New shadow will be cast onto a small portion of the Project's courtyard. No new shadow will be cast onto Warren Street Station or public open spaces.

At 6:00 p.m., most of the area is under existing shadow. New shadow will be cast to the east onto a portion of the parking lot to the north of the site, across Commonwealth Avenue, the Commonwealth Avenue Carriage Roads and their sidewalks, as well as Warren Street Station. New shadow will also be cast onto a portion of Kelton Street and its sidewalks. A small area of new shadow will also be cast onto Commonwealth Avenue near its intersection with Allston Street. No new shadow will be cast onto nearby public open spaces.

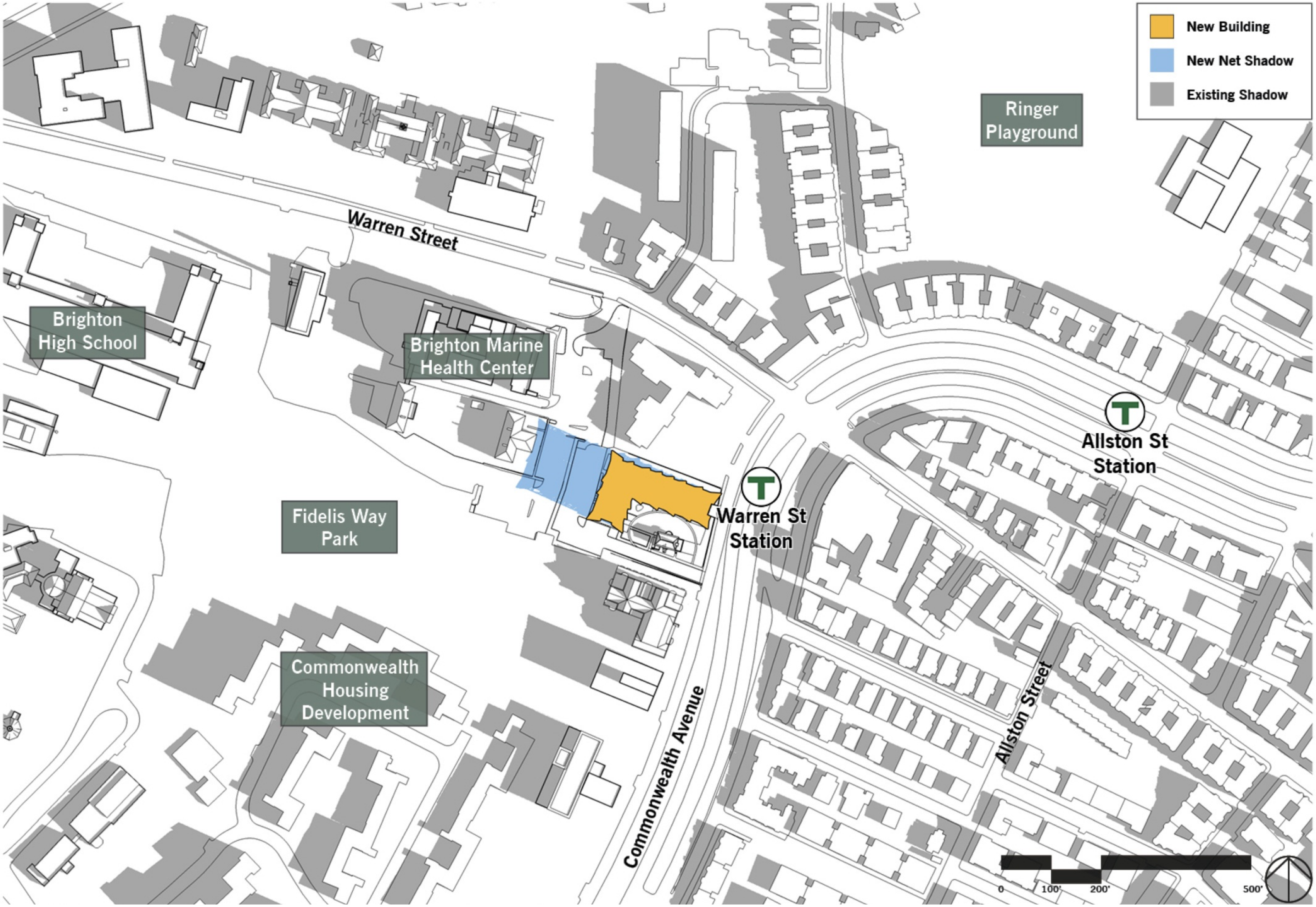
3.2.5 Winter Solstice (December 21)

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.

At 9:00 a.m., new shadow will be cast to the northwest onto the Brighton Marine campus, adjacent surface parking lots and landscaped areas, and a small portion of the parking lot to the north of the site. No new shadow will be cast onto Warren Street Station or public open spaces.

At 12:00 p.m., new shadow will be cast to the north across portions of the Brighton Marine and Project's surface parking lots and adjacent landscaped areas, as well as the parking lot north of the site. No new shadow will be cast onto Warren Street Station or public open spaces.

At 3:00 p.m., new shadow will be cast to the northeast onto the parking lot north of the site and portions of the Commonwealth Avenue Carriage Road and its sidewalks, and Warren Street and its sidewalks. No new shadow will be cast onto Warren Street Station or public open spaces.



BMHC – Veterans Mixed Income Housing Project   Boston, MA

Figure 3.2-1

Shadow Study: March 21, 9 AM

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Figure 3.2-2

Shadow Study: March 21, 12 PM

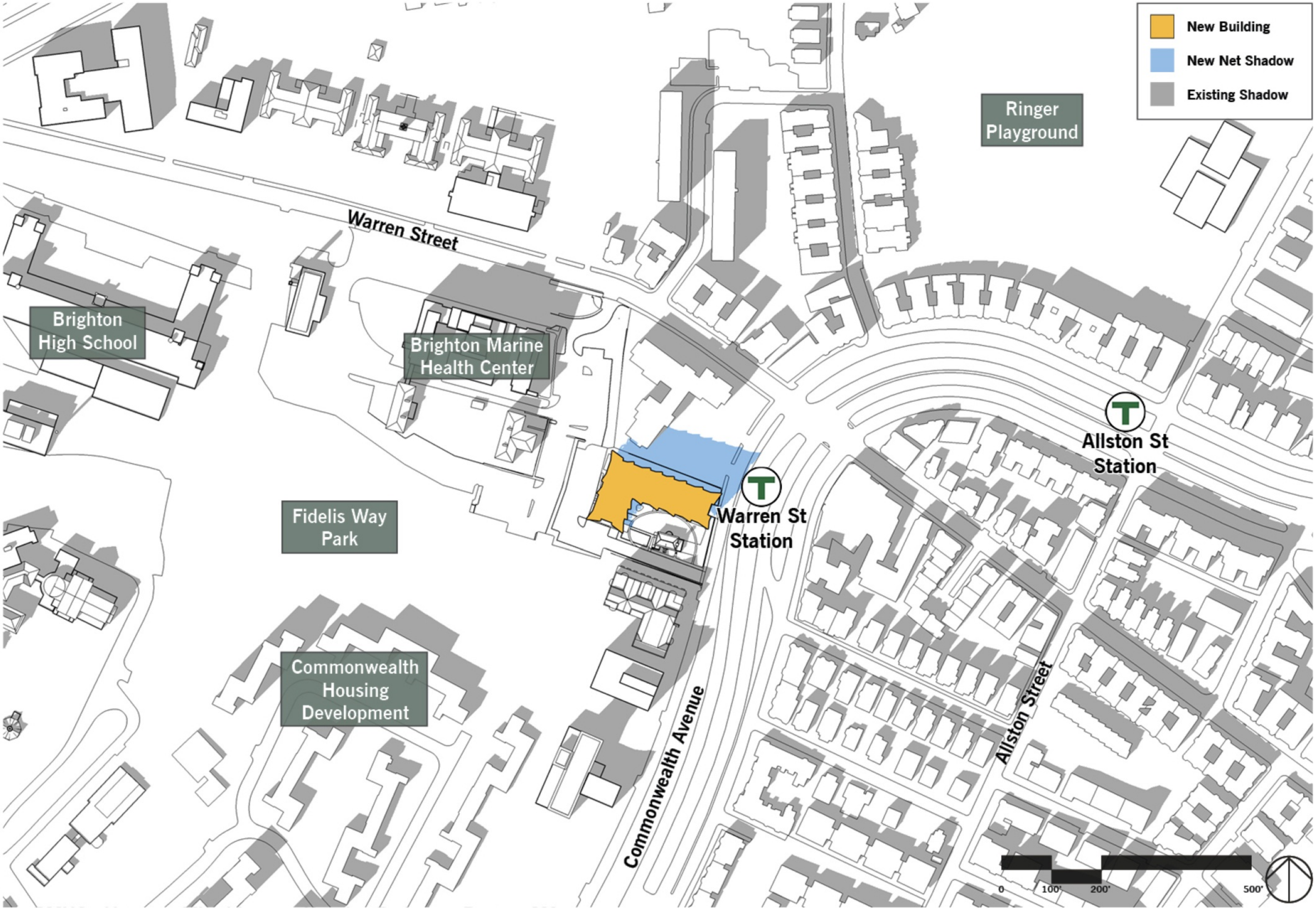

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Figure 3.2-3

Shadow Study: March 21, 3 PM

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Figure 3.2-4

Shadow Study: June 21, 9 AM

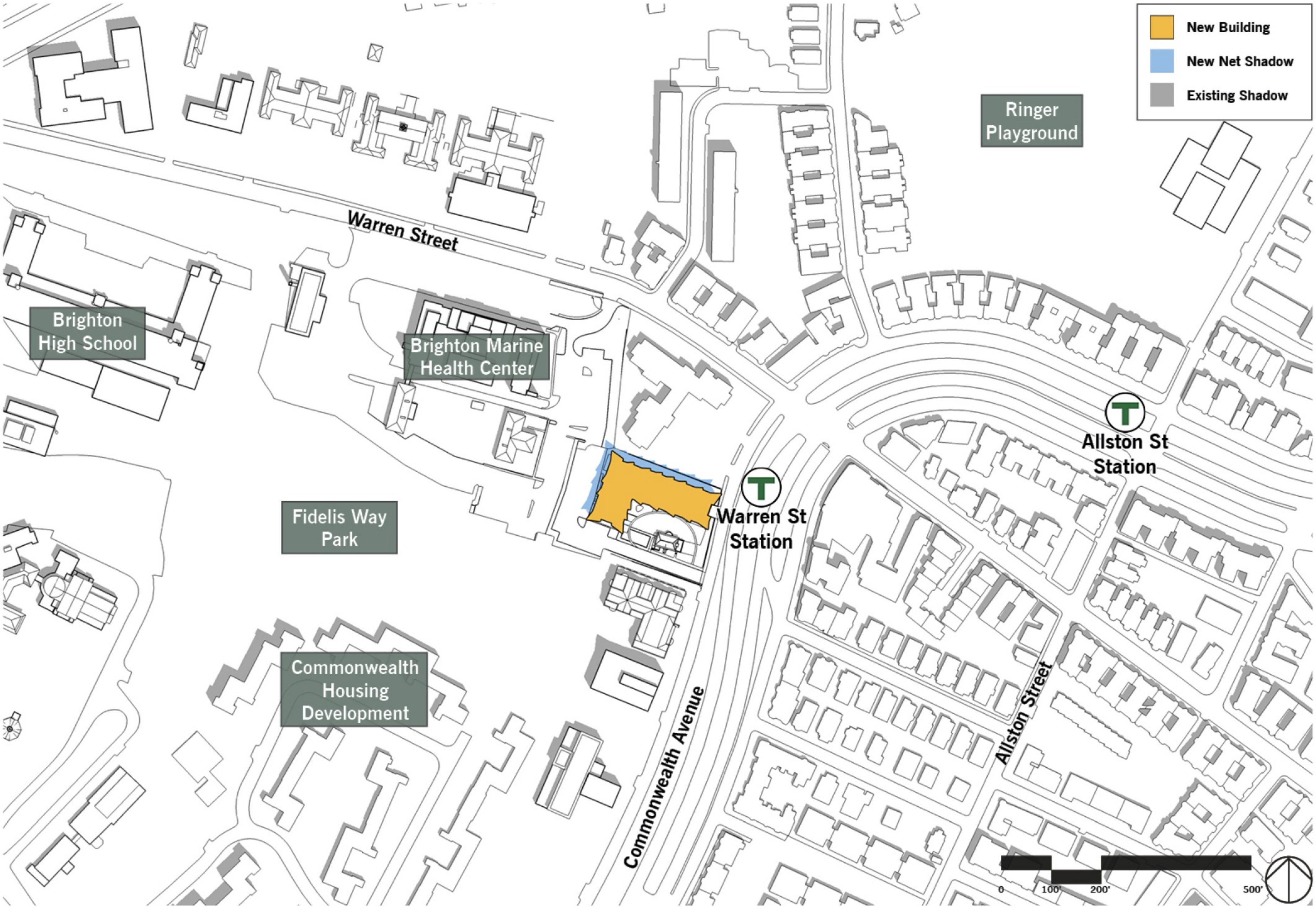

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Figure 3.2-5

Shadow Study: June 21, 12 PM

BMHC – Veterans Mixed Income Housing Project Boston, MA

Figure 3.2-6

Shadow Study: June 21, 3 PM

BMHC – Veterans Mixed Income Housing Project Boston, MA

Figure 3.2-7

Shadow Study: June 21, 6 PM

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Figure 3.2-8

Shadow Study: September 21, 9 AM

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Figure 3.2-9

Shadow Study: September 21, 12 PM

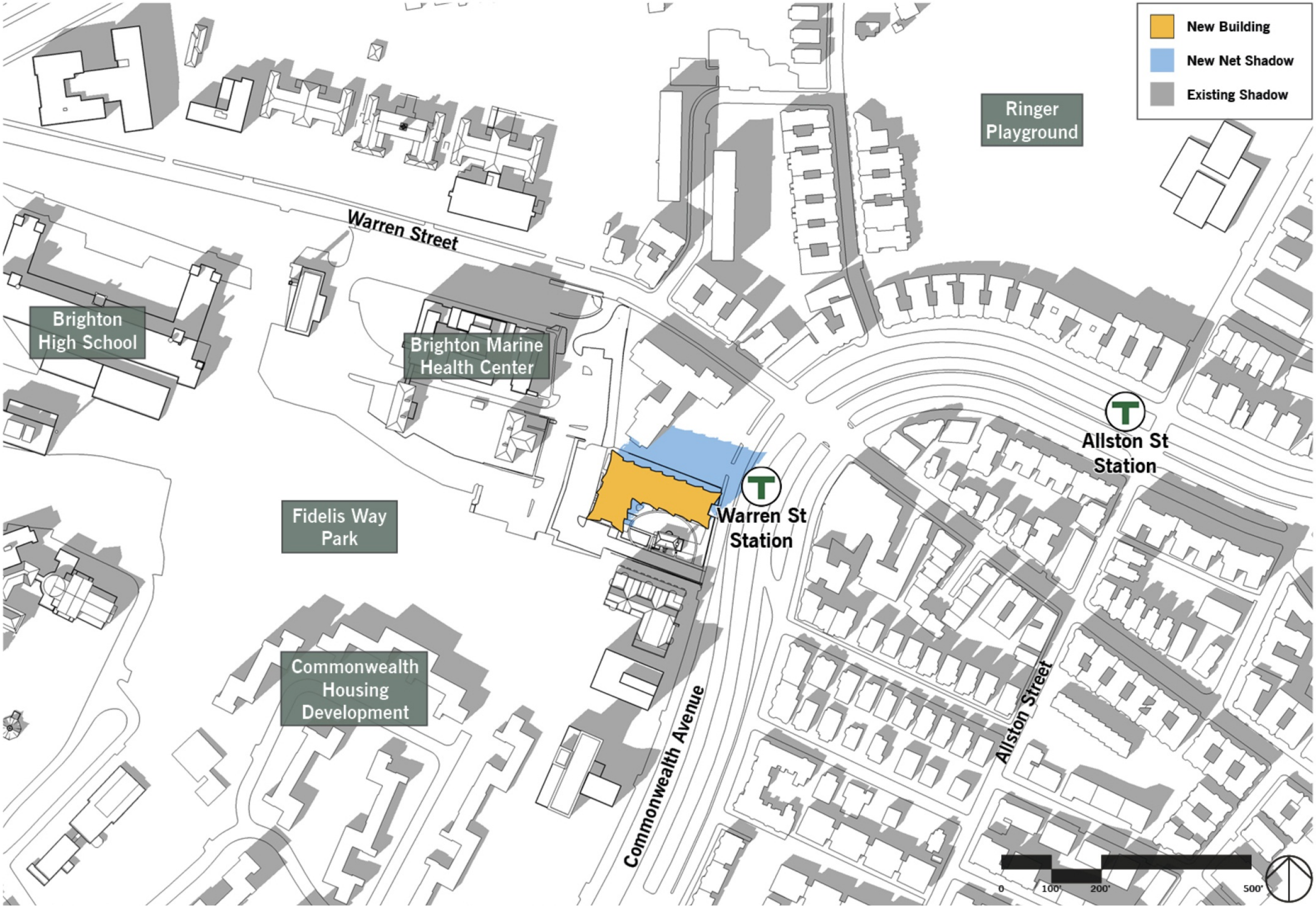

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Figure 3.2-10

Shadow Study: September 21, 3 PM

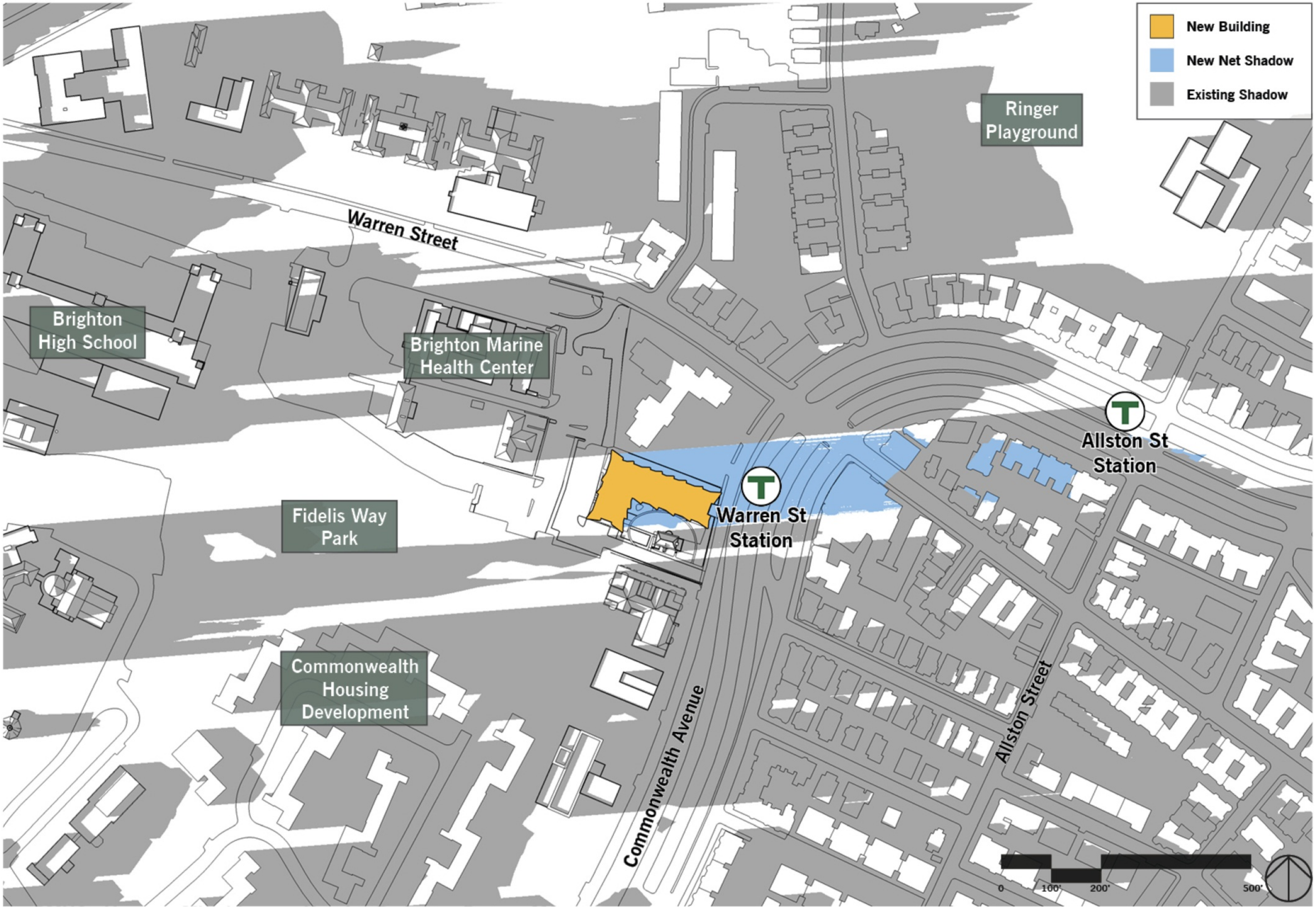

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Figure 3.2-11

Shadow Study: September 21, 6 PM

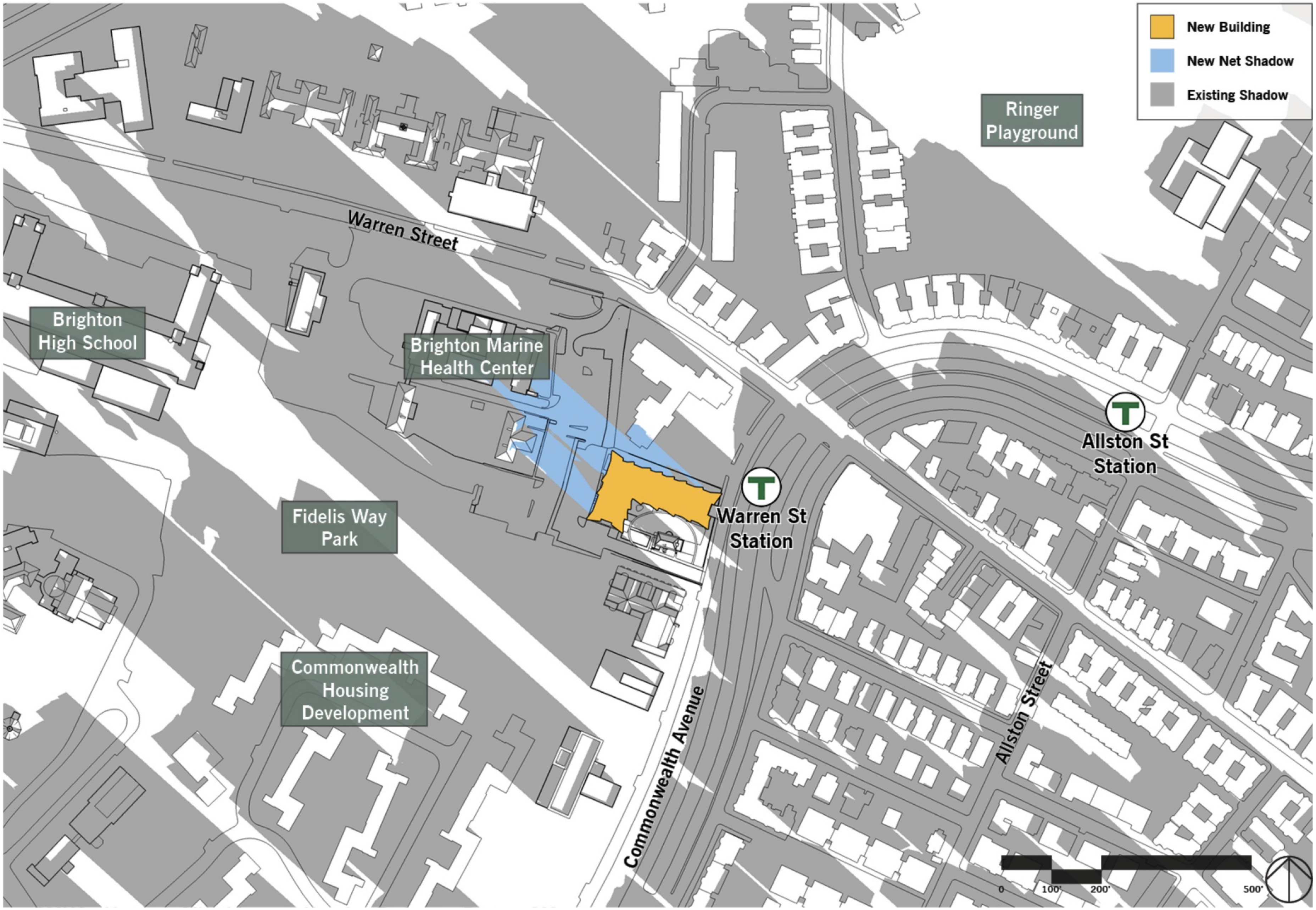

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Figure 3.2-12

Shadow Study: December 21, 9 AM

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Figure 3.2-13

Shadow Study: December 21, 12 PM

Figure 3.2-14

Shadow Study: December 21, 3 PM

3.2.6 Conclusions

The shadow impact analysis looked at net new shadow created by the Project during fourteen time periods. New shadow will generally be limited to the immediately surrounding Brighton Marine campus, Project site, and parking lot north of the site. New shadow on Warren Street Station will occur only during two of the 14 times periods studied (June 21 at 6:00 p.m. and September 21 at 6:00 p.m.). No new shadow will be cast onto nearby public open spaces.

3.3 Daylight

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. The daylight analysis for the Project considers the existing and proposed conditions, as well as typical daylight obstruction values of the surrounding area.

Because the Project site currently consists of low-rise buildings and parking lots, the proposed Project will increase daylight obstruction; however, the resulting conditions will be typical of the area.

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.

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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.

The analysis compares three conditions: Existing Conditions; Proposed Conditions; and the context of the area.

One viewpoint on Commonwealth Avenue, the only public street abutting the site, was chosen to evaluate the daylight obstruction for the Existing and Proposed Conditions. Two area context points were considered in order to provide a basis of comparison to existing conditions in the surrounding area. The viewpoint and area context viewpoints were taken in the following locations and are shown on Figure 3.3-1.

- **Viewpoint 1:** View from Commonwealth Avenue facing west toward the Project site
- **Area Context Viewpoint AC1:** View from Commonwealth Avenue facing west toward the building at 1501 Commonwealth Avenue
- **Area Context Viewpoint AC2:** View from Commonwealth Avenue facing west toward the building at 1505 Commonwealth 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 Commonwealth Avenue facing southwest toward the Project site	6.4%	27.8%
Area Context Points			
AC1	View from Commonwealth Avenue facing southwest toward the building at 1501 Commonwealth Avenue	16.6%	N/A
AC2	View from Commonwealth Avenue facing northwest toward the building at 1505 Commonwealth Avenue	40.4%	N/A

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

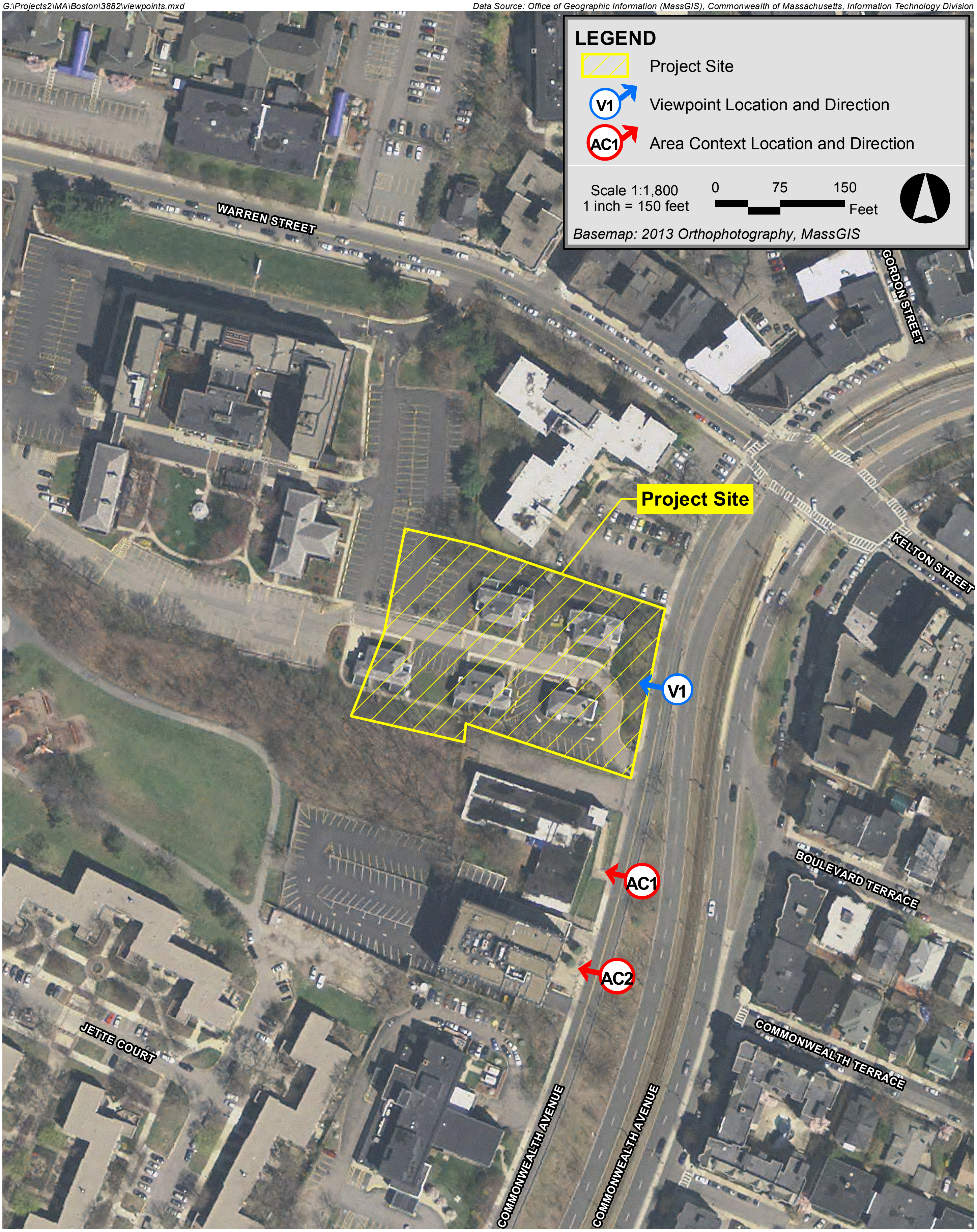

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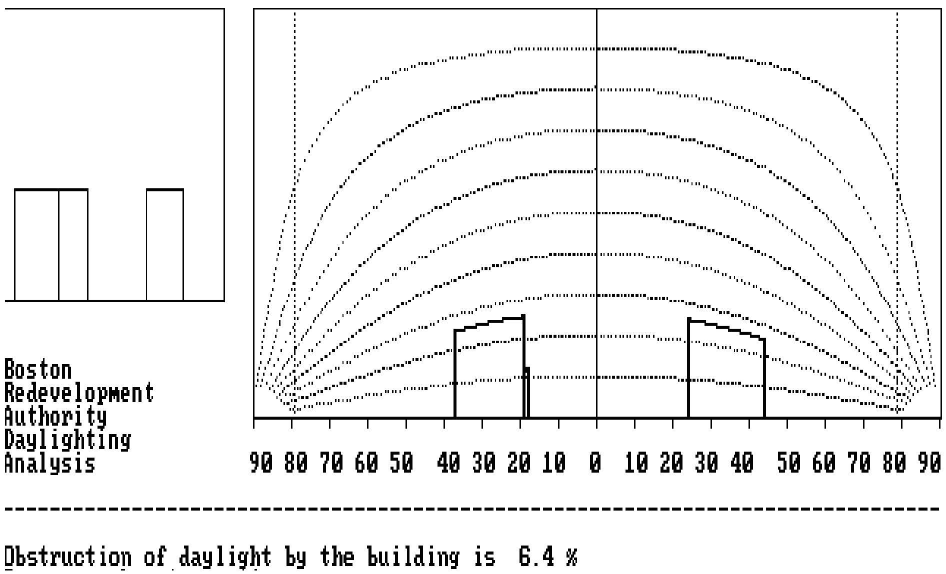
Figure 3.3-1

Viewpoint and Area Context Locations

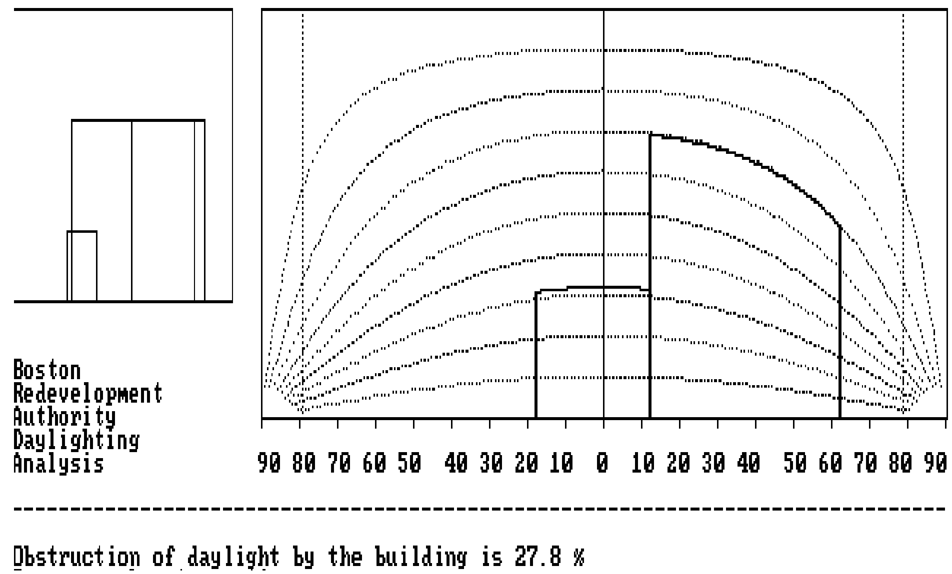
Existing Condition

Proposed Condition

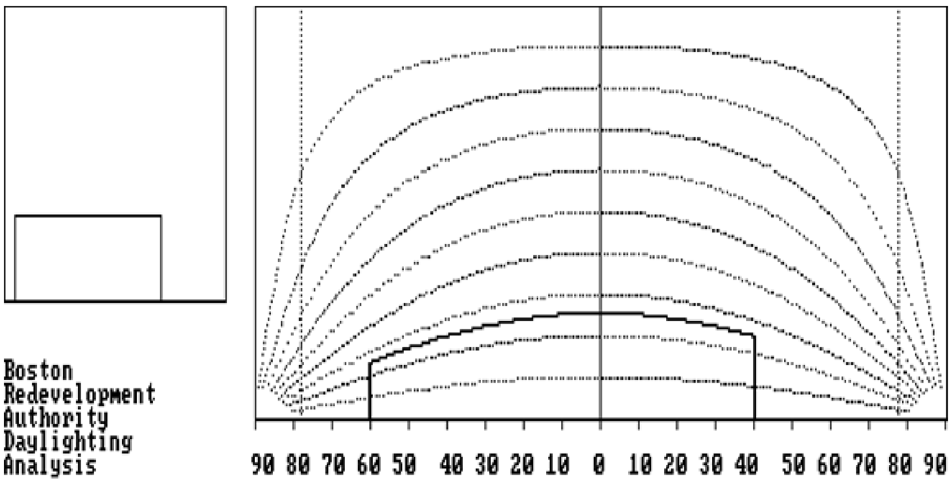
Viewpoint 1: View from Commonwealth Avenue facing southwest toward the Project site



Viewpoint 1: View from Commonwealth Avenue facing southwest toward the Project site

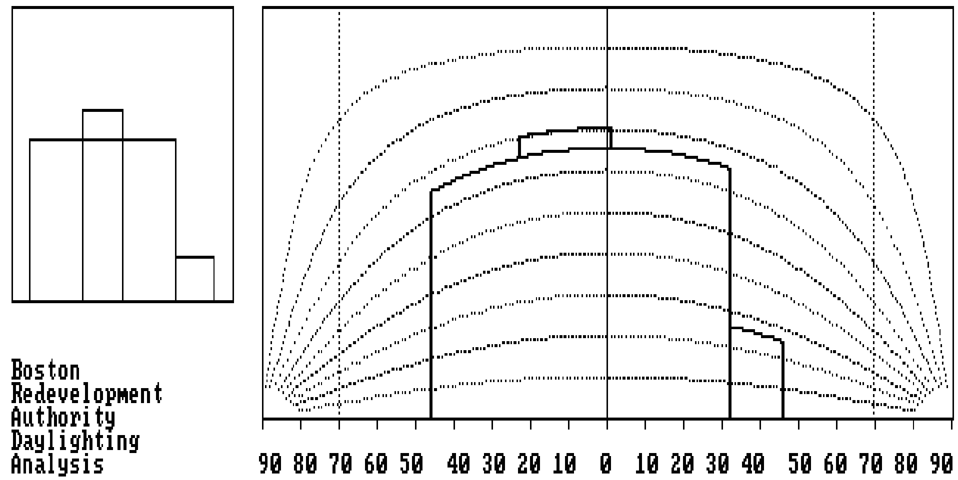


Area Context 1: View from Commonwealth Avenue facing southwest toward the building at 1501 Commonwealth Avenue



Obstruction of daylight by the building is 16.6 %

Area Context 2: View from Commonwealth Avenue facing northwest toward the building at 1505 Commonwealth Avenue



Obstruction of daylight by the building is 40.4 %

Commonwealth Avenue – Viewpoint 1

Commonwealth Avenue runs along the eastern edge of the Project site. Viewpoint 1 was taken from the center of Commonwealth Avenue looking west toward the Project site. The Project site is currently occupied by five low-rise buildings, parking lots and open space, and has an existing daylight obstruction of 6.4% because the buildings only occupy a portion of the site allowing for large views of the sky. The development of the Project will increase the daylight obstruction value to 27.8%. While this is an increase over existing conditions, the Project scale is similar to the areas to the north and south of the site, and therefore the daylight obstruction value is consistent with other buildings in the area, including the Area Context buildings.

Area Context Views

The Project area currently consists of a mix of low-rise and mid-rise residential towers, medical centers and low-rise commercial buildings. To provide a larger context for comparison of daylight conditions, obstruction values were calculated for the two Area Context Viewpoints described above and shown on Figure 3.3-1. The daylight obstruction values ranged from 16.6% for AC1 to 40.4% for AC2. Daylight obstruction values for the Project are consistent with the Area Context values.

3.3.4 Conclusions

The daylight analysis conducted for the Project describes existing and proposed daylight obstruction conditions at the Project site and in the surrounding area. The results of the BRADA analysis indicate that while the development of the Project will result in increased daylight obstruction over existing conditions, the resulting conditions will be similar to the daylight obstruction values within the surrounding area.

3.4 Solar Glare

The Project materials are still being studied and glazing of the windows will be determined as the design progresses. Due to the type of potential glass and glazing used, solar glare impacts are not currently anticipated.

3.5 Air Quality

3.5.1 Introduction

An air quality analysis was conducted to determine the impact of pollutant emissions from mobile sources generated by the Project. Specifically, a microscale analysis was performed to evaluate the potential air quality impacts of carbon monoxide (CO) resulting from traffic flow around the Project area. Any new stationary sources will be reviewed by the Massachusetts Department of Environmental Protection (MassDEP) during permitting under the Environmental Results Program (ERP), if necessary.

3.5.1.1 National Ambient Air Quality Standards

The 1970 Clean Air Act was enacted by the U.S. Congress to protect the health and welfare of the public from the adverse effects of air pollution. As required by the Clean Air Act, the U.S. Environmental Protection Agency (EPA) promulgated National Ambient Air Quality Standards (NAAQS) for these criteria pollutants: nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM) (PM-10 and PM-2.5), carbon monoxide (CO), ozone (O_3), and lead (Pb). The NAAQS are listed in Table 3.5-1. Massachusetts Ambient Air Quality Standards (MAAQS) are typically identical to NAAQS.

Table 3.5-1 National Ambient Air Quality Standards

Pollutant	Averaging Period	National Ambient Air Quality Standards and Massachusetts Ambient Air Quality Standards (micrograms per cubic meter)	
		Primary	Secondary
NO_2	Annual [1]	100	Same
	1-hour [7]	188	None
SO_2	Annual [1,8]	80	None
	24-hour [2,8]	365	None
	3-hour [2]	None	1,300
	1-hour [7]	195	None
PM-10 [6]	Annual	50	Same
	24-hour [3]	150	Same
PM-2.5	Annual [4]	12	15
	24-hour [5]	35	Same
CO	8-hour [2]	10,000	Same
	1-hour [2]	40,000	Same
Ozone	8-hour [3]	147	Same
Pb	3-month [1]	1.5	Same

Notes:
[1] Not to be exceeded.
[2] Not to be exceeded more than once per year.
[3] Not to be exceeded more than an average of one day per year over three years.
[4] Not to be exceeded by the arithmetic average of the annual arithmetic averages from three successive years.
[5] Not to be exceeded based on the 98th percentile of data collection.
[6] Due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution, EPA revoked the annual PM-10 standard in 2006 (effective December 17, 2006). However, the annual standard remains codified in 310 CMR 6.00.
[7] Not to be exceeded. Based on the three-year average of the 98th (NO_2) or 99th (SO_2) percentile of the daily maximum one-hour concentrations.
[8] The Annual and 24-hour SO_2 standards were revoked on June 2, 2010. However, these standards remain in effect until one year after an area is designated for the one-hour standard, unless currently in nonattainment.
Source: 40 CFR 50 and 310 CMR 6.00

NAAQS specify concentration levels for various averaging times and include both "primary" and "secondary" standards. Primary standards are intended to protect human health, whereas secondary standards are intended to protect public welfare from any known or anticipated adverse effects associated with the presence of air pollutants, such as damage to vegetation. The more stringent of the primary or secondary standards are applied when comparing to the modeling results for a project.

The NAAQS also reflect various durations of exposure. The short-term periods (24 hours or less) refer to exposure levels not to be exceeded more than once a year. Long-term periods refer to limits that cannot be exceeded for exposure averaged over three months or longer.

The standards were developed by EPA to protect the human health against adverse health effects with a margin of safety.

3.5.1.2 Background Concentrations

MassDEP guidance directs project proponents to use the three most recent years of available background air quality monitoring data from within 10 km of a project site. Background concentrations were determined from the closest available monitoring stations to the proposed development from the most recent air quality monitor data reported by the MassDEP as available in its Annual Air Quality Reports for 2010 to 2012. The closest monitor is located at Kenmore Square, all in Boston, and consistent with MassDEP guidance, is within 10 km of the Project site.

The Clean Air Act allows for one exceedance per year of the CO and SO_2 short-term NAAQS. The second highest concentration accounts for the one exceedance. Annual NAAQS are never to be exceeded. The 24-hour PM-10 standard is not to be exceeded more than once per year on average over three years. To attain the 24-hour PM-2.5 standard, the three-year average of the 98th percentile of 24-hour concentrations must not exceed 35 $\mu g/m^3$. For annual PM-2.5 averages, the average of the highest yearly observations was used as the background concentration. A new one-hour NO_2 standard was recently promulgated. To attain this standard, the three-year average of the 98th percentile of the maximum daily one-hour concentrations must not exceed 188 $\mu g/m^3$.

A summary of the background air quality concentrations are presented in Table 3.5-2.

Table 3.5-2 Observed Ambient Air Quality Concentrations and Selected Background Levels

Pollutant	Averaging Time	Form	2010	2011	2012	Background Concentration ($\mu g/m^3$)	Location
SO_2 (1)(5)	1-Hour (4)	99th %	54.9	50.2	34.3	54.9	Kenmore Sq., Boston
	3-Hour (6)	H2H	57.7	64.0	35.9	64.0	Kenmore Sq., Boston
	24-Hour	H2H	20.5	24.4	14.0	24.4	Kenmore Sq., Boston
	Annual	H	5.8	6.1	4.9	6.1	Kenmore Sq., Boston
PM-10	24-Hour	H2H	37	38	28	38.0	Kenmore Sq., Boston
	Annual	H	15.5	16.8	15.7	16.8	Kenmore Sq., Boston
PM-2.5	24-Hour (4)	98th %	21.9	21.2	22.1	21.7	Kenmore Sq., Boston
	Annual (4)	H	9.31	9.37	9.03	9.2	Kenmore Sq., Boston
NO_2 (3)	1-Hour (4)	98th %	96.8	99.5	92.1	96.1	Kenmore Sq., Boston
	Annual	H	35.9	38.3	35.9	38.3	Kenmore Sq., Boston
CO (2)	1-Hour	H2H	2052	1710	1482	2052.0	Kenmore Sq., Boston
	8-Hour	H2H	1026	1368	1026	1368.0	Kenmore Sq., Boston

Notes:

1 SO_2 reported in ppm or ppb. Converted to $\mu g/m^3$ using factor of 1 ppm = 2600 $\mu g/m^3$.

2 CO reported in ppm or ppb. Converted to $\mu g/m^3$ using factor of 1 ppm = 1140 $\mu g/m^3$.

3 NO_2 reported in ppm or ppb. Converted to $\mu g/m^3$ using factor of 1 ppm = 1880 $\mu g/m^3$.

4 Background level is the average concentration of the three years.

5 The 24-hour and Annual standards were revoked by EPA on June 22, 2010, Federal Register 75-119, p. 35520.

6 The 2010 - 2012 SO_2 three-hour value is not reported. Per MassDEP, current years' one-hour Second Highest value is used instead.

Air quality is generally good in the area, with all of the ambient concentrations well below their respective NAAQS. For use in the microscale analysis, background concentrations of CO in ppm were required. The corresponding maximum background concentrations in ppm were 1.8 ppm (2,052 $\mu g/m^3$) for one-hour and 1.2 ppm (1,368 $\mu g/m^3$) for eight-hour CO.

3.5.2 Methodology

3.5.2.1 Microscale Analysis

The BRA typically requests an analysis of the effect on air quality of the increase in traffic generated by projects subject to Large Project Review. This "microscale" analysis is typically required for any intersection (including garage entrances/exits) where 1) Project traffic would impact intersections or roadway links currently operating at 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 on roadways providing access to a single location. The microscale analysis involves modeling of carbon monoxide (CO) emissions from vehicles idling at and traveling through signaled intersections. Predicted ambient concentrations of CO for the Build and No Build cases are compared with federal (and state) ambient air quality standards for CO.

The microscale analysis typically examines ground-level CO impacts due to traffic queues in the immediate vicinity of a project. CO is used in microscale studies to indicate roadway pollutant levels since it is the most abundant pollutant emitted by motor vehicles and can result in so-called "hot spot" (high concentration) locations around congested intersections. The NAAQS standards do not allow ambient CO concentrations to exceed 35 parts per million (ppm) for a one-hour averaging period, and 9 ppm for an eight-hour averaging period, more than once per year at any location. The widespread use of CO catalysts on current vehicles has reduced the occurrences of CO hotspots. Air quality modeling techniques (computer simulation programs) are typically used to predict CO levels for both existing and future conditions to evaluate compliance of the roadways with the standards. The analysis for the Project followed the procedure outlined in EPA's intersection modeling guidance.[6]

The microscale analysis has been conducted using the latest versions of EPA's MOVES and CAL3QHC programs to estimate CO concentrations at sidewalk receptor locations.

Baseline (2014) and future year (2019) emission factor data calculated from the MOVES model, along with traffic data, were input into the CAL3QHC program to determine CO concentrations due to traffic flowing through the selected intersection.

Existing background values of CO at the nearest monitor location at Kenmore Square were obtained from MassDEP. CAL3QHC results were then added to background CO values of 1.8 ppm (one-hour) and 1.2 ppm (eight-hour), as provided by MassDEP, to determine total air quality impacts due to the Project. These values were compared to the NAAQS for CO of 35 ppm (one-hour) and 9 ppm (eight-hour).

The modeling methodology was developed in accordance with the latest MassDEP modeling policies and Federal modeling guidelines.[7]

Modeling assumptions and backup data for results presented in this section are provided in Appendix C.

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6 U.S. EPA, Guideline for Modeling Carbon Monoxide from Roadway Intersections; EPA-454/R-92-005, November 1992.

7 40 CFR 51 Appendix W, Guideline on Air Quality Models, 70 FR 68228, Nov. 9, 2005.

Intersection Selection

As stated previously, a "microscale" analysis is typically required for the Project at intersections where 1) Project traffic would impact intersections or roadway links currently operating at 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 on roadways providing access to a single location.

The traffic volumes and LOS calculations provided in Chapter 2 form the basis of evaluating the traffic data versus the microscale thresholds. One signalized intersection included in the traffic study meets the conditions for a microscale analysis, as described above (see Chapter 2):

- Warren Street, Kelton Street, and Commonwealth Avenue.

Microscale modeling was performed for the intersection based on the aforementioned methodology. The 2014 existing condition, and the 2019 No Build and Build conditions were each evaluated for both morning (a.m.) and afternoon (p.m.) peak periods.

Emissions Calculations (MOVES)

The EPA MOVES computer program was used to estimate motor vehicle emission factors on the roadway network. Emission factors calculated by the MOVES model are based on motor vehicle operations typical of daily periods. The Commonwealth's statewide annual Inspection and Maintenance (I&M) program was included, as well as the county specific vehicle age registration distribution, fleet mix, meteorology, and other inputs. The inputs for MOVES for the existing (2014) and Build year (2019) are provided by MassDEP.

All links for the modeled intersection were input into MOVES. Idle emission factors are obtained from factors for a link average speed of 0 miles per hour (mph). Moving emissions are calculated based on speeds at which free-flowing vehicles travel through the intersections as stated in traffic modeling (SYNCHRO) reports. A speed of 30 mph is used for all free-flow traffic. Speeds of 9 and 15 mph were used for right (and U-turns, if necessary) and left turns, respectively. Roadway emissions factors were obtained from MOVES using EPA guidance.[8]

Winter CO emission factors are typically higher than summer. Therefore, January weekday emission factors were conservatively used in the microscale analysis.

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8 U.S. EPA, 2010. Using MOVES in Project-Level Carbon Monoxide Analyses. EPA-420-B-10-041.

Receptors & Meteorology Inputs

Sets of up to 200 receptors were placed in the vicinity of the modeled intersection. Receptors extended approximately 300 feet on the sidewalks along the roadways approaching the intersection. The roadway links and receptor locations of the modeled intersection are presented in Figure 3.5-1.

For the CAL3QHC model, limited meteorological inputs are required. Following EPA guidance[9], a wind speed of one meter per second, stability class D (4), and a mixing height of 1,000 meters was used. To account for the intersection geometry, wind directions from 0° to 350°, every 10° were selected. A surface roughness length of 370 centimeters was selected for the intersection.[10]

Impact Calculations (CAL3QHC)

The CAL3QHC model predicts one-hour concentrations using queue-links at intersections, worst-case meteorological conditions, and traffic input data. The one-hour concentrations were scaled by a factor of 0.7 to estimate eight-hour concentrations.[11] The CAL3QHC methodology was based on EPA CO modeling guidance. Signal timings were provided directly from the traffic modeling outputs.

3.5.3 Air Quality Results

3.5.3.1 Microscale Analysis

The results of the maximum one-hour predicted CO concentrations from CAL3QHC are provided in Tables 3.5-3 through 3.5-5 for the 2014 and 2019 scenarios. Eight-hour average concentrations are calculated by multiplying the maximum one-hour concentrations by a factor of 0.7.[12]

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9 U.S. EPA, *Guideline for Modeling Carbon Monoxide from Roadway Intersections.* EPA-454/R-92-005, November 1992.

10 U.S. EPA, *User's Guide for CAL3QHC Version 2: A Modeling Methodology for Predicting Pollutant Concentrations Near Roadway Intersections*. EPA –454/R-92-006 (Revised), September 1995.

11 U.S. EPA, Screening Procedures for Estimating the Air Quality Impact of Stationary Sources; EPA-454/R-92-019, October 1992.

12 U.S. EPA, Screening Procedures for Estimating the Air Quality Impact of Stationary Sources; EPA-454/R-92-019, October 1992

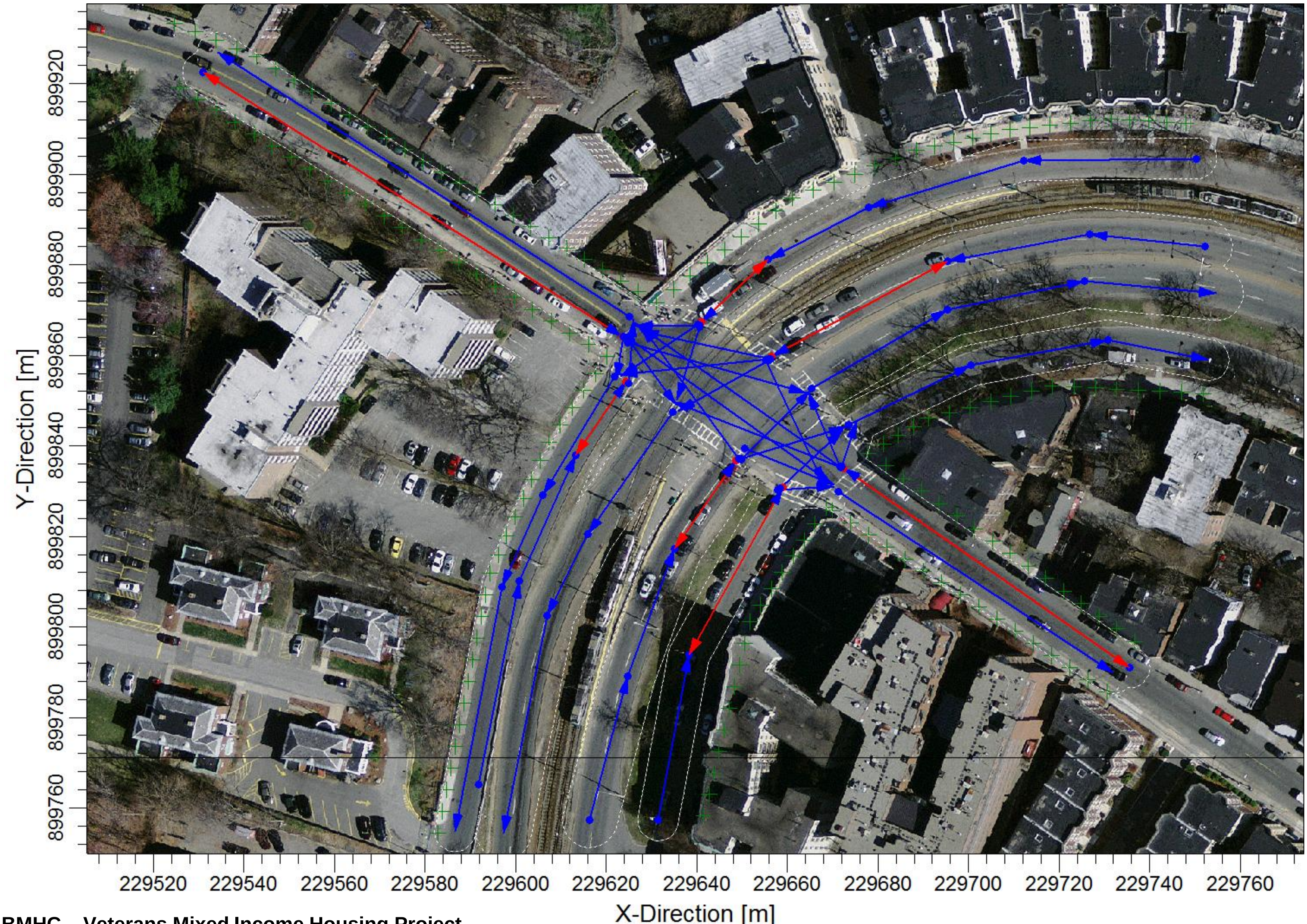

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Figure 3.5-1

Link and Receptor Locations for CAL3QHC modeling of Intersection of Warren St., Kelton St., & Commonwealth Ave

Table 3.5-3 Summary of Microscale Modeling Analysis (Existing 2014)

Intersection	Peak	CAL3QHC Modeled CO Impacts (ppm)	Monitored Background Concentration (ppm)	Total CO Impacts (ppm)	NAAQS (ppm)
1-Hour					
Warren Street, Kelton Street, & Commonwealth Avenue	AM	0.3	1.8	2.1	35
	PM	0.3	1.8	2.1	35
8-Hour					
Warren Street, Kelton Street, & Commonwealth Avenue	AM	0.2	1.2	1.4	9
	PM	0.2	1.2	1.4	9
Notes: CAL3QHC eight-hour impacts were conservatively obtained by multiplying one-hour impacts by a screening factor of 0.7.					

Table 3.5-4 Summary of Microscale Modeling Analysis (No-Build 2019)

Intersection	Peak	CAL3QHC Modeled CO Impacts (ppm)	Monitored Background Concentration (ppm)	Total CO Impacts (ppm)	NAAQS (ppm)
1-Hour					
Warren Street, Kelton Street, & Commonwealth Avenue	AM	0.3	1.8	2.1	35
	PM	0.2	1.8	2.0	35
8-Hour					
Warren Street, Kelton Street, & Commonwealth Avenue	AM	0.2	1.2	1.4	9
	PM	0.1	1.2	1.3	9
Notes: CAL3QHC eight-hour impacts were conservatively obtained by multiplying one-hour impacts by a screening factor of 0.7.					

Table 3.5-5 Summary of Microscale Modeling Analysis (Build 2019)

Intersection	Peak	CAL3QHC Modeled CO Impacts (ppm)	Monitored Background Concentration (ppm)	Total CO Impacts (ppm)	NAAQS (ppm)
1-Hour					
Warren Street, Kelton Street, & Commonwealth Avenue	AM	0.3	1.8	2.1	35
	PM	0.2	1.8	2.0	35
8-Hour					
Warren Street, Kelton Street, & Commonwealth Avenue	AM	0.2	1.2	1.4	9
	PM	0.1	1.2	1.3	9
Notes: CAL3QHC eight-hour impacts were conservatively obtained by multiplying one-hour impacts by a screening factor of 0.7.					

The results of the one-hour and eight-hour maximum modeled CO ground-level concentrations from CAL3QHC were added to EPA supplied background levels for comparison to the NAAQS. These values represent the highest potential concentrations at the intersection as they are predicted during the simultaneous occurrence of "defined" worst case meteorology. The highest one-hour traffic-related concentration predicted in the area of the Project, for the modeled conditions (0.3 ppm) plus background (1.8 ppm) is 2.1 ppm for all afternoon peak hour cases. The highest eight-hour traffic-related concentration predicted in the area of the Project for the modeled conditions (0.2 ppm) plus background (1.2 ppm) is 1.4 ppm for the same location and scenarios. All concentrations are well below the one-hour NAAQS of 35 ppm and the eight-hour NAAQS of 9 ppm.

3.5.4 Conclusions

3.5.4.1 Microscale Analysis

Results of the microscale analysis show that all predicted CO concentrations are well below one-hour and eight-hour NAAQS. Therefore, it can be concluded that there are no anticipated adverse air quality impacts resulting from increased traffic in the area.

3.5.5 Stationary Sources

Stationary sources of air pollution are typically units that combust fuel. In this case, these sources consist of heating and hot water units and emergency electrical generators. Cooling towers, although not a combustion source, are a source of particulate emissions.

3.5.5.1 Boilers

The current plans are include a number of small (approximately 1.8 MMBtu/hr) high efficiency condensing boilers for heat. All units will be natural gas-fired and located in a penthouse mechanical area on the roofs of the buildings. The units are expected to be exhausted through individual stacks. Domestic hot water will be provided through the use of indirect-fired storage tanks.

3.5.5.2 Emergency Generators

Current design plans include an approximately 100 kilowatt emergency generator to be installed for the building to be constructed. The unit will provide life safety and standby emergency power to the building, as well as power a safe room. Typically, generators operate for approximately one hour each month for testing and general maintenance and as needed for emergency power. The unit will be natural gas-fired and located in an enclosure in the parking area away from the building. The generator will be designed to minimize impacts on sensitive locations (functional doors/windows and neighbors), and not cause or contribute to a condition of air pollution.

3.5.5.3 Cooling Towers

Current plans call for a cooling tower to be installed on the building to be constructed. These units will remove the excess heat generated by the building's mechanical equipment. All units will be located on the roof of the buildings.

3.5.5.4 Permitting

It is expected that the majority of stationary sources (boilers, engines, etc) would be subject to the MassDEP's Environmental Results Program (ERP).

The boilers are expected to be within the requirements of the ERP since individual estimated heat inputs are within or below the 10 to 40 MMBtu/hour ERP range.

The ERP regulation applies to new emergency generators greater than 37 kW. The regulation is similar to the boiler ERP in that new engines are subject to emission standards, recordkeeping, certification, and compliance with the MassDEP noise policy. Since the generator maximum rating capacity will be greater than the ERP limit of 37 kW, it will be subject to the ERP program. Per the ERP, the generator owner will limit operation of the generator to less than 300 hours per year and submit a certification form to MassDEP within 60 days of installation.

3.6 Stormwater/Water Quality

Chapter 7 includes a discussion of stormwater and water quality.

3.7 Flood Hazard Zones/Wetlands

The most current version of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map for this area (25025C0057G) shows that the Project site is located outside of the 500-year flood zone area. The Project site remains outside of the 500-year flood zone area in the Preliminary FEMA Flood Hazard Map.

The Project site does not contain wetlands.

3.8 Geotechnical/Groundwater

3.8.1 Subsurface Soil and Bedrock Conditions

A limited subsurface exploration program, planned and monitored by Haley & Aldrich, consisting of seven test borings was performed. The test borings advanced to depths ranging from 8.5 to 23.5 feet.

In general, site subsurface conditions consist of fill soils overlying dense glacial deposits and relatively shallow bedrock. The test borings encountered the following strata, progressing downward from ground surface beneath surficial bituminous pavements or landscaping materials. Some strata were not encountered in all test borings, or in a different sequence than indicated.

- Miscellaneous Fill – consisted of loose to very dense sand to sandy silt with varying amounts of gravel, clay, silt, brick fragments, ash, bituminous pavement, roots and other materials including loamy soil and loess subsoil. The fill thickness ranged from approximately 2.4 to 9 feet where encountered; fill was not encountered below the surficial topsoil in one test boring.

- Glacial Till - consisted of medium dense to very dense poorly graded sand to well-graded gravel with varying amounts of clay, silt and sand. Numerous cobbles and boulders were encountered within the unit. In two test borings, pockets of weathered bedrock were identified within the unit. The glacial till thickness ranged from approximately 5.5 to 15 feet when encountered and fully penetrated.

- Glaciofluvial Deposits - encountered below the glacial till at a depth of 8.5 feet in one test boring, consisted of very dense, well-graded sand with gravel. The test boring terminated after penetrating 4.5 feet into the glaciofluvial deposits.

- Bedrock - cored from 18.5 to 23.5 feet depth in one test boring, consisted of hard, slightly weathered sandstone. At one test boring, probable highly weathered bedrock consisting of very dense, well-graded gravel with silt was encountered at 2.5 feet in depth. The weathered bedrock in this test boring was penetrated using normal soil drilling techniques until refusal was encountered at 8.5 feet.

3.8.2 Groundwater

Groundwater was not encountered during this investigation. Due to the elevated topography and relatively low permeability of the glacial till and bedrock, water levels may fluctuate significantly during normal seasonal cycles, and may become perched above or within these strata during wet periods.

3.8.3 Building Foundations and Site Improvements

Conventional foundation systems are anticipated for the proposed building. The building will be supported on reinforced concrete spread footing foundations, which will bear in naturally-deposited glacial soils or bedrock after excavation to the required depths. The lowest floor (parking level) will be constructed as a soil-supported concrete slab-on-grade.

Basement walls will be damp-proofed, and provided with perimeter foundation drains to protect the below-grade space from water infiltration. Due to the low permeability of the very dense glacial till soils, very limited discharge from these systems is anticipated, and any discharge will be directed to the site stormwater infiltration system for recharge back into the ground.

Pavements, utilities, lighting, signage and other site improvements will be installed using normal construction methods. Excavations for the building and site improvements can be open-cut and performed using normal earth moving equipment and methods. No pile driving or other similar vibration-inducing methods will be used for foundation installation or for excavation support. Some local bedrock removal may be required.

Although the planned subsurface work is anticipated to be above normal groundwater levels, some minor temporary construction dewatering may be required to remove water from excavations and enable all construction to be performed in-the-dry. Dewatering effluent will be recharged on-site to the extent feasible. Any off-site discharge will be directed to the municipal storm drainage system in accordance with all applicable permits and regulations.

3.9 Solid and Hazardous Waste

3.9.1 Hazardous Waste

Loureiro Engineering Associates, Inc. conducted a site reconnaissance survey for the Project site. The site reconnaissance was performed as part of a Phase I Environmental Site Assessment (ESA) to document current and historical environmental conditions and activities at the site. The site reconnaissance was performed in general accordance with the guidance provided in the ASTM International Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, ASTM E1527-13 (the ASTM Standard) [rev. November 1, 2013]. Conditions indicative of a release and/or past release of hazardous substances or petroleum products in, on, or at a property were not observed at the site. Conditions indicative of Recognized Environmental Conditions (RECs) were also not observed.

Any hazardous wastes found during demolition of the existing buildings, such as asbestos, and excavation of the site will be handled and disposed of in accordance with local, state and federal laws.

3.9.2 Solid Waste and Recycling

The Project will generate solid waste typical of residential uses. Solid waste is expected to include wastepaper, cardboard, glass bottles and food. Recyclable materials will be recycled through a program implemented by building management. The Project will generate approximately 111 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. Typical waste generated by the uses will be handled in compliance with all local, state and federal regulations.

The building will include trash and recycling chutes on ever residential floor. The Project will be a part of a single stream recycling program. The main trash/recycling rooms will have power and water to wash down and clean the area.

3.10 Noise

3.10.1 Introduction

A noise analysis was conducted for the Project, including an estimate of future sound levels once the Project is in operation. The analysis was conducted in accordance with the BRA's typical guidance to address potential impacts solely from the Project.

Baseline noise levels were measured in the vicinity of the Project. Future Project related sound levels were calculated based on reference sound data for likely mechanical equipment identified by the Proponent for the Project. These predicted noise levels were compared to the City of Boston Zoning District Noise Standards (City Noise Standards). The analysis indicates that predicted noise levels from Project-related mechanical equipment with appropriate noise mitigation will comply with the City Noise Standards.

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 noise measurement terminology used in this analysis.

The decibel scale is logarithmic to accommodate the wide range of sound intensities found in the environment. One property of the decibel scale is that the sound pressure levels of two separate sounds are not directly additive. For example, if a sound of 50 dB is added to another sound of 50 dB, the total is only a three-decibel increase (to 53 dB), not a doubling to 100 dB. Thus, every three dB change in sound levels represents a doubling or halving of sound energy. Related to this is that a change in sound levels of fewer 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 sound level is simply the sound level of the higher source. For example, a source of sound at 60 dB plus another source of sound at 47 dB is 60 dB.

The sound-level meter used to measure noise is a standardized instrument.[13] It contains "weighting networks" to adjust the frequency response of the instrument to approximate that of the human ear under various circumstances. One network is the A-weighting network (there are also B- and C-weighting networks). The A-weighted scale (dBA) most closely approximates how the human ear responds to sound at various frequencies. Sounds are frequently reported as detected with the A-weighting network of the sound-level meter. A-weighted sound levels emphasize the middle frequency (i.e., middle pitched—around 1,000 Hertz sounds), and de-emphasize lower and higher frequency sounds.

Because the sounds in our environment vary with time, they cannot simply be described with a single number. Two methods are used for describing variable sounds, exceedance levels and the equivalent level, both of which are derived from a large number of moment-to-moment, A-weighted sound-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 of 0 to 100 percent. Several sound-level metrics that are commonly reported in community noise studies are described below.

- L_{90} is the sound level in dBA exceeded 90 percent of the time during the 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.

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13 *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_{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}, the equivalent level, is the level of a hypothetical steady sound that would have the same energy (i.e., the same time-averaged mean square sound pressure) as the actual fluctuating sound observed. The equivalent level is designated L_{eq} and is also A-weighted. 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 linear mean square sound pressure values, the L_{eq} is mostly determined by occasional loud, intrusive noises.

By using various noise metrics, it is possible to separate prevailing, steady sounds (the L_{90}) from occasional, louder sounds (L_{10}) in the noise environment or combined average levels (L_{eq}). This analysis of sounds expected from the Project treats all noises as though they will be steady and continuous, and hence the L_{90} exceedance level was used. In the design of noise control treatments, it is essential to know something about the frequency spectrum of the noise of interest. Noise control treatments do not function like the human ear, so simple A-weighted levels are not useful for noise-control design. The spectra of noises are usually stated in terms of octave-band sound pressure levels, in dB, with the octave frequency bands being those established by a generally-accepted standard. 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.

3.10.3 Noise Regulations and Criteria

The primary set of regulations relating to the potential increase in noise levels is the City Noise Standards (City of Boston Code – Ordinances: Section 16–26 Unreasonable Noise; and City of Boston Air Pollution Control Commission Regulations for the Control of Noise in the City of Boston). Separate regulations within the City Noise Standards provide criteria to control different types of noise. Regulation 2 is applicable to the effects of the proposed building, as completed, and was considered in the noise study for the Project. Table 3.10-1 includes the City Noise Standards.

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

Octave Band Center	Residential 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:	Noise standards are extracted from Regulation 2.5, City of Boston Air Pollution Control Commission, "Regulations for the Control of Noise in the City of Boston", adopted December 17, 1976. All standards apply at the property line of the receiving property. dB and dBA based on a reference pressure of 20 micropascals. Daytime refers to the period between 7:00 a.m. and 6:00 p.m. daily except Sunday.					

3.10.4 Existing Conditions

3.10.4.1 Baseline Noise Environment

An ambient sound level survey was conducted to characterize the "baseline" acoustical environment in the vicinity of the Project site. Existing noise sources consisted of: vehicular traffic (including trucks) on the local roadways and parking areas, the MBTA Green Line in parallel with Commonwealth Avenue, construction activity (daytime only) to the immediate south of the Project parcel, rooftop mechanical equipment, some aircraft, birds, and the general din of the city.

3.10.4.2 Noise Measurement Locations

The selection of the sound-monitoring locations was based upon a review of the current land uses in the Project area. Four sound monitoring locations were selected as representative in obtaining a sampling of the ambient baseline noise environment. The measurement locations are depicted in Figure 3.10-1 and are described below.

- ♦ Location 1 is located on the southwestern Project boundary near a wooded area that is part of an open space. This location is representative of the noise sensitive receivers to the southwest of the Project. Noise sources at this location include vehicular traffic on the Brighton Marine campus and faintly on local roadways, the MBTA Green Line, some construction noise from south of the Project site (daytime only), rooftop mechanical equipment, birds chirping (daytime only), and light leaf rustle.

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Figure 3.10-1

Sound Level Measurement Locations

- Location 2 is at the northern property line of the Project site, which is adjacent to the Regency Building apartments at 1455 Commonwealth Avenue. This location is representative of the noise sensitive receivers to the north of the Project. Noise sources at this location include rooftop exhaust equipment from a Brighton Marine campus building, vehicular traffic on the Brighton Marine campus and local roadways, the MBTA Green Line, some construction activity from south of the Project site (daytime only), some pedestrian activity (daytime only), birds chirping (daytime only), occasional air traffic, and light vegetation rustle.

- Location 3 is at the southern property line of the Project site just south of Hospital Road at the Commonwealth Avenue outlet. This location is representative of the noise sensitive receivers to the south of the Project. Construction activity is currently taking place on a residential parcel to the south and is the current primary noise source at this location during the day. Other noise sources also include vehicular traffic on Commonwealth Avenue, the MBTA Green Line, occasional planes flying overhead (daytime only), mechanical equipment from apartment buildings across Commonwealth Avenue (nighttime only), and faint vegetation rustle.

- Location 4 is on the sidewalk in front of 1444 Commonwealth Avenue, an apartment building east of the Project site. This location is representative of the noise sensitive receivers to the east of the Project. Noise sources include vehicular and pedestrian traffic on Commonwealth Avenue, the MBTA Green Line, construction activity to the south of the Project site (daytime only), and leaf rustle (nighttime only).

3.10.4.3 Noise Measurement Methodology

Sound-level measurements were taken for approximately 20 minutes per location during the daytime (12:00 p.m. to 2:00 p.m.) on Friday, June 6, 2014, and during nighttime hours (12:00 a.m. to 2:00 a.m.) on June 19, 2014. Since noise impacts are greatest at night when existing noise levels are lowest, the study was designed to measure community noise levels under conditions typical of a "quiet period" for the area. Daytime measurements were scheduled to exclude peak traffic conditions.

The sound levels were measured at the Brighton Marine campus and at a publicly-accessible location at a height of approximately 1.5 meters above the ground. The measurements were made under low wind conditions, and roadway surfaces were dry. Wind speed measurements were made with a Davis Instruments TurboMeter electronic wind speed indicator, and temperature and humidity measurements were made using a General Tools digital psychrometer. Unofficial observations about meteorology, including wind speed, temperature, and humidity, as well as 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 proposed Project.

3.10.4.4 Measurement Equipment

A Larson Davis model 831 Sound Level Analyzer, equipped with a Larson Davis model PRM831 Preamplifier, a PCB Piezotronics half-inch microphone, and a manufacturer windscreen were used to collect broadband and octave band ambient sound pressure level data. The instrumentation meets the "Type 1 – Precision" requirements set forth in American National Standards Institute (ANSI) S1.4 for acoustical measuring devices. The meter was tripod-mounted at a height of five feet above ground level (AGL). The meter has data logging capability and was programmed to log statistical data for each 20-minute sampling period for the following parameters: L_{10}, L_{50}, L_{90}, L_{max}, L_{min}, and L_{eq}.

All measurement equipment was calibrated in the field before and after the surveys with a LD CAL200 acoustical calibrator, which meets the standards of IEC 942 Class 1L and ANSI S1.40-1984. The meters were calibrated and certified as accurate to standards set by the National Institute of Standards and Technology. These calibrations were conducted by an independent laboratory within the past 12 months.

3.10.4.5 Baseline Ambient Noise Levels

The existing ambient noise environment consists primarily of vehicular traffic on nearby roadways, MBTA Green Line, rooftop mechanical equipment, and construction activity (daytime only). Baseline noise monitoring results are presented in Table 3.10-2, and summarized below.

- The daytime residual background (L_{90}) measurements ranged from 52 to 61 dBA;
- The nighttime residual background (L_{90}) measurements ranged from 45 to 49 dBA;
- The daytime equivalent level (L_{eq}) measurements ranged from 54 to 72 dBA; and
- The nighttime equivalent level (L_{eq}) measurements ranged from 52 to 61 dBA.

Table 3.10-2 Baseline Ambient Sound Level Measurements

Receptor I.D	Start Time	L_{eq} (dBA)	L_{max} (dBA)	L_{10} (dBA)	L_{50} (dBA)	L_{90} (dBA)	L_{90} Sound Level (dB) per Octave Band Center Frequency (Hz)								
							31.5	63	125	250	500	1000	2000	4000	8000
1 - Day	12:07 PM	54	63	55	53	52	59	57	55	48	48	47	41	36	26
2 - Day	12:30 PM	54	62	56	54	52	59	59	54	50	48	47	42	37	28
3 - Day	12:58 PM	72	83	77	66	61	65	67	66	59	57	55	51	45	36
4 - Day	1:37 PM	65	74	69	63	59	77	69	61	56	54	54	51	45	35
1 - Night	12:00 AM	48	56	49	48	47	55	54	51	47	44	42	35	28	20
2 - Night	12:23 AM	52	66	51	49	49	54	54	52	51	45	42	38	32	26
3 - Night	12:49 AM	53	74	53	47	45	53	52	50	46	42	39	35	28	21
4 - Night	1:34 AM	55	71	56	50	49	53	54	51	48	47	44	38	32	25

Notes:

1. Daytime weather: Temperature = 77˚ F, Relative Humidity = 40%, mostly clear skies, north to west winds 1-6 miles per hour.
   Nighttime weather: Temperature = 73˚ F, Relative Humidity = 67%, clear skies, northwesterly winds 1-4 miles per hour.
2. All road surfaces were dry during measurements.
3. Sampling periods were at least 20 minutes in duration.
4. Daytime measurements were collected on June 6, 2014.
   Nighttime measurements were collected on June 19, 2014.

3.10.5 Overview of Potential Project Noise Sources

The primary sources of continuous sound exterior to the Project will consist of ventilation, heating, cooling, and emergency power noise sources. Multiple noise sources will be located on the roof and there will be a garage exhaust fan on the western façade of the building.

Two condensing units are proposed for heating and cooling which will be located south of Building #3. Based on the interior sound level provided for one unit (51 dBA), these are not anticipated to be significant noise sources; therefore, these two condensing units were not included in the numeric sound level modeling.

It is anticipated at this point in the design that the major sources of sound exterior to the Project will be: one 158-ton cooling tower, two 123.8 MMBTU/hr central energy recovery units (ERV), one 13,000 CFM garage exhaust fan, and one 150 kW emergency generator.

The exhaust point for the garage will be below grade and shielded by the areaway walls. The cooling tower on the roof will be oriented with the "back" of the cooling tower facing west and the air inlet facing east. The modeling accounts for the variations in the sound levels of these sides through the application of a directivity correction.

A tabular summary of the modeled mechanical equipment proposed for the Project is presented below in Table 3.10-3a. Sound power levels used in the acoustical modeling of each piece of equipment are presented in Table 3.10-3b. Sound power level data were provided by the manufacturer of each piece of equipment except for the cooling tower. The sound power level of the cooling tower was calculated using the sound-pressure levels provided by the manufacturer at a reference distance of 50 feet.

The Project includes various noise-control measures that are necessary to achieve compliance with the applicable noise regulations. If mechanical equipment changes as the design progresses, appropriate measures will be taken to ensure compliance with the City Noise Standards. The cooling tower will be oriented in such a manner as to minimize noise at the closest residences and will incorporate additional noise mitigation, specifically a Whisper Quiet Fan. An acoustical louver will be utilized at the garage fan exhaust point. The emergency generator will be controlled using a custom acoustical enclosure and exhaust silencer. To further limit impacts from the standby generator, its required periodic, routine testing will be conducted during daytime hours, when background sound levels are highest. A summary of the noise mitigation proposed for the Project is presented below in Table 3.10-3c.

Table 3.10-3a Modeled Noise Sources

Noise Source	Quantity	Approximate Location	Size/Capacity
Cooling Tower	1	Roof	158 Ton
Central Energy Recovery Unit	2	Roof	123.8 MMBTU/hr
Garage Exhaust Fan	1	Western façade; below grade	13,000 CFM
Emergency Generator	1	Northwest corner of the parcel boundary, at grade	150 kW

Table 3.10-3b Modeled Sound Power Levels per Noise Source

Noise Source	Broadband (dBA)	Sound Level (dB) per Octave Band Center Frequency (Hz)								
		31.5	63	125	250	500	1k	2k	4k	8k
Cooling Tower – 158 Ton[1]	82[5]	93[6]	93	90	84	79	77	69	64	59
Central Energy Recovery Unit – Supply [2]	81	94[6]	94	87	80	77	75	72	70	63
Central Energy Recovery Unit – Exhaust[2]	72	84[6]	84	79	66	66	62	64	65	62
Garage Exhaust Fan – 13,000 CFM[3]	92	86[6]	86	95	91	88	87	84	77	74
150 kW Emergency Generator – Includes Level III Enclosure[4]	100	119[7]	106	106	101	94	93	92	92	88

Notes:
Sound power levels do not include mitigation identified in Table 3.10-3c or a directivity correction.
1. Baltimore Aircoil 1500 Series – S15E-1285-06JN
2. Greenheck ERCH-45-15H
3. Greenheck SCE3-30-620-B15
4. Cummins generator
5. Sound power level calculated based on sound pressure levels from the "back".
6. Sound level assumed to be equal to dB level in 63 Hz band.
7. No data provided by manufacturer. Octave band sound level estimated.

Table 3.10-3c 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
Garage Exhaust Fan	Acoustical Louver[1]	0	8	9	12	13	20	18	16	15
Emergency Generator	Additional Reduction from a Custom Enclosure[2]	8	4	4	4	3	9	13	16	13

Notes:
1. Vibro Acoustics louver ALA-HV-18
2. Sound level reduction estimated.

3.10.6 Modeling Methodology

The noise impacts associated with the Project were predicted at the nearest receptors using the Cadna/A 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 more refined set of computations due to the inclusion of topography, ground attenuation, multiple building reflections, drop-off with distance, and atmospheric absorption. The Cadna/A software allows for octave band calculation of noise from multiple noise sources, as well as computation of diffraction around building edges.

3.10.6.1 Future Sound Levels – Nighttime

The analysis of sound levels at night considered all of the mechanical equipment without the emergency generator running, to simulate typical nighttime operating conditions at nearby receptors. Five modeling locations were included in the analysis. Locations A through D are similar to measurement locations 1 through 4. A fifth location, E, was added along the southern property line to provide additional coverage between modeling points A and C. These modeling receptors, which correspond to the closest residential or recreational locations, are depicted in Figure 3.10-2. The predicted exterior Project-only sound levels range from 34 to 45 dBA at nearby receptors. According to data available through the Massachusetts Office of Geographic Information (MassGIS), the immediate area in the vicinity of the Project site is zoned residential use. Therefore, the City of Boston Residential limits have been applied to these locations. Predicted sound levels from Project-related equipment are within these broadband and octave-band nighttime limits under the City Noise Standards at the modeling locations. The evaluation is presented in Table 3.10-4.

Table 3.10-4 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	Recreational	35	50	47	47	38	32	23	19	12	2
B	Residential	45	58	50	56	48	42	33	30	23	17
C	Residential	43	51	51	50	44	40	38	31	25	15
D	Residential	34	46	44	38	36	31	28	21	13	-5
E	Residential	42	53	53	49	43	38	38	30	24	15
City of Boston Limits	Residential	50	68	67	61	52	46	40	33	28	26

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Figure 3.10-2
Sound Level Modeling Locations

3.10.6.2 Future Sound Levels – Daytime

As noted above, 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 mechanical equipment and its emergency generator to reflect worst-case conditions. The sound levels were calculated at the same receptors as in the nighttime analysis, and then were evaluated against daytime limits. The predicted exterior Project-only daytime sound levels range from 43 to 59 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 modeling locations. This evaluation is presented in Table 3.10-5.

Table 3.10-5 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	Recreational	51	67	58	58	55	49	42	36	31	25
B	Residential	59	76	67	68	62	56	50	44	40	38
C	Residential	43	54	51	51	44	40	38	31	25	15
D	Residential	45	63	54	54	48	42	36	31	24	10
E	Residential	43	60	54	51	44	38	38	30	24	15
City of Boston Limits	Residential	60	76	75	69	62	56	50	45	40	38

3.10.7 Conclusion

Baseline noise levels were measured in the vicinity of the Project during the day and at night. At similar locations, future Project-only sound levels were calculated based on information provided by the manufacturers of the expected mechanical 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 below the broadband requirements of City Noise Standards. The predicted sound levels from Project-related equipment, as modeled, are expected to remain below 50 dBA, within the nighttime residential zoning limits for the City of Boston at the nearest residential receptors. The results indicate that the Project can operate without significant impact on the existing acoustical environment and will be lower than the quietest existing nighttime sound levels in the area.

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

3.11.1 Introduction

A Construction Management Plan (CMP) prepared in compliance with the City's Construction Management Program will be submitted to BTD once final plans are developed and the construction schedule is fixed. 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 as necessary. The CMP will include routing plans for trucking and deliveries, plans for the protection of existing utilities, and control of noise and dust.

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. The construction contact will be a person who is responsible for responding to the questions, comments, and complaints of the residents of the neighborhood.

The Proponent intends to follow the guidelines of the City of Boston and the MassDEP, which direct the evaluation and mitigation of construction impacts.

3.11.2 Construction Methodology/Public Safety

Construction methodologies that ensure public safety and protect nearby tenants will be employed. Techniques such as barricades and signage will be used. Construction management and scheduling will minimize impacts on the surrounding environment and will include plans for construction worker commuting and parking, routing plans for trucking and deliveries, and the control of noise and dust.

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. These measures will be incorporated into the CMP which will be submitted to BTD for approval prior to the commencement of construction work.

3.11.3 Construction Schedule

Construction of the Project is estimated to commence in the third quarter of 2015 and occur over approximately 21 months.

Typical construction hours will be from 7:00 a.m. to 6:00 p.m., Monday through Friday, with most shifts ordinarily ending at 3:30 p.m. No substantial sound-generating activity will occur before 7:00 a.m. If longer hours, additional shifts, or Saturday work is required, the Proponent will place a work permit request to the Boston Air Pollution Control Commission and BTD in advance. It is noted that some activities such as finishing activities could run beyond 6:00 p.m. 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 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.

A CMP will be submitted to BTD for review and approval prior to issuance of a Building Permit. The CMP will include detailed information on specific construction mitigation measures and construction methodologies to minimize impacts to abutters and the local community. The CMP will also define truck routes which will help in minimizing the impact of trucks on City and neighborhood streets.

"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 80-100 construction jobs will be created over the length of construction. The Proponent will make reasonable good-faith efforts to have at least 50% of the total employee work hours be for Boston residents, at least 25% of total employee work hours be for minorities and at least 10% of the total employee work hours be for women. The Proponent will enter into a jobs agreement 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 construction team 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 this Article 80 approval. 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;
- Periodic street and sidewalk cleaning with water to minimize dust accumulations; and
- Tackifiers will be applied if needed to stabilize exposed soil surfaces and limit dust generation.

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 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

Some localized bedrock removal may be required, which would generate low level vibrations. Bedrock removal methods will be selected to be protective of nearby facilities. Vibration control criteria will be established in the construction specifications. Vibration monitoring will be conducted at nearby facilities using engineering seismographs during the bedrock removal activities.

3.11.11 Construction Waste

Excavated soils will be re-used on the site as fill and backfill, to the extent feasible, to limit the quantity of materials that must be removed from or imported to the site. Over-size cobbles and boulders, and bedrock fragments, will be removed from the site and recycled.

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 Geotechnical Mitigation

The following mitigation measures will be implemented in the geotechnical construction:

- Specifications will be incorporated into the construction contract documents to establish performance requirements for protection of nearby structures and facilities.

- The design team will review and comment on contractor submittals for conformance to the Project contract documents.

- The submittals will include contingency measures that would be implemented in the event that problems or concerns related to the geotechnical construction arise during the work.

- The geotechnical aspects of the construction will be monitored by engineering personnel on behalf of the owner.

- Geotechnical instrumentation will be used to monitor the contractor's performance including elevation reference points on adjacent buildings and structures, as acceptable to the owners.

3.11.13 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 MWRA, BWSC, 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.

3.12 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 each phase of the Project, in compliance with the City's requirements.

3.13 Wildlife Habitat

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

Chapter 4.0

Sustainable Design and Climate Change

4.0 SUSTAINABLE DESIGN AND CLIMATE CHANGE

4.1 Green Building

The Proponent intends to certify the Project's new building and renovated Building 3 under Leadership in Energy and Environmental Design (LEED) for Homes. Below are descriptions of the credits anticipated to be achieved for each part of the Project.

4.1.1 New Building

Conservation Services Group (CSG) conducted a LEED for Homes Mid-rise preliminary meeting with the Project team to create a LEED for Homes Mid-rise checklist. The Proponent will register the Project with USGBC and plans to be certified.

CSG was able to assess that at this point, with the intent and decisions made thus far, that all the applicable prerequisite items in LEED for Homes Mid-rise are being met. Sufficient optional credits would allow the Project to achieve the LEED Silver threshold. The Project is currently tracking 57.5 points with 2.5 maybe points (maybe points are italicized in the description below).

The following is a detailed credit-by-credit analysis of the Project team's approach for achieving LEED for Homes Mid-rise at the Silver level. The preliminary LEED for Homes Mid-rise checklist is included at the end of this section. Please note that this is an initial credit checklist and applicable credits may change as the building design advances.

Innovation & Design Process

ID 1.1 Preliminary Rating - (Prerequisite): CSG led the Project team through the LEED for Homes process on May 22, 2014 and determined which credits were reasonable to be pursued at that point in design. Silver was determined to be the most appropriate goal considering the type of project, the site, and its location in Boston.

ID 1.2 Energy Expertise for Mid-rise - Prerequisite: Petersen Engineering, the Project's MEP engineer, meets the stated requirements.

ID 2.1 Durability Planning - Prerequisite: The durability evaluation form and durability inspection checklist will be created as design elements are finalized. This is a customized checklist for the Project that is required prior to the beginning of construction.

ID 2.2 Durability Management - Prerequisite: The builder will use the durability inspection checklist throughout the construction as both an inspection tool and a project meeting item to be reviewed weekly, to ensure those measures are included in the Project.

ID 3.1 Innovation 1 - 1 point: SS07-02 Exemplary Performance: proximity to transit. The Project is located adjacent to the Warren Street Station which provides frequent service on the MBTA Green Line B Branch.

ID 3.2 Innovation 2 - 1 point: LL 05-05 Exemplary Performance: Community Resources. The Project is located in an urban area with enough community services within ½ mile to meet the credit's criteria.

Location & Linkages

LL 2 Site Selection - 2 points: The Project site is above floodplain level; not on habitat for threatened species; not with 100 feet of water; not built on public parkland; and not on land with prime soils.

LL 3.2 Infill - 2 points: The Project is bordered on one side by a public road, Commonwealth Avenue, and on the remaining sides (75% or more) by previously developed land.

LL 4 Existing Infrastructure - 1 point: The lot has existing water and sewer service lines.

LL 5.1 – 5.3 Community Resources - 3 points: Proximity to over 14 basic community services on Commonwealth Avenue, Warren Street, and Cambridge Street results in three points for this item.

LL 6 Access to Open Space - 1 point: From the center of the Project to Fidelis Way Park is less than ½ mile to a greater than ¾ acre open space.

Sustainable Sites

SS 1.1 Erosion Controls during Construction – Prerequisite: The Project team will develop an erosion control plan prior to start of construction.

SS 1.2 Minimize Disturbed Area of Site - 1 point: A calculation of density from 100 units on a lot of 1.53 acres is over 65 units per acre, surpassing the density requirement of 40 units per acre.

SS 2.1 No Invasive Plants – Prerequisite: The landscape architect will provide a list of plants to be installed and will cross reference a list of invasive plants for the area to ensure no invasive plants are used. (http://www.newfs.org/docs/docs/MIPAG040105.pdf)

SS 2.4 Drought Tolerant Plants - 1 point: The landscape architect will select drought tolerant plants (45% or more) for the landscaping plan. Lists of plants and their quantities of each plant and the percentage of drought tolerance will be calculated.

SS 3.2 Reduce Roof Heat Island Effects - 1 point: The Project will use a high albedo product for the roof membrane.

SS 4.2 Permanent Erosion Controls - 1 point: The landscaping plan will reflect the goal of replanting disturbed areas following the LEED algorithm of one tree, four five- gallon shrubs, or 50 square feet of native groundcover per 500 square feet of disturbed area.

SS 4.3 Stormwater Quality Control for Midrise - 2 points: The stormwater management plan will be designed in accordance with Boston Water and Sewer Commission requirements.

SS 5 Pest Control Alternatives - 2 points: All exterior wood will be kept 12 inches or more above the soil. External cracks, joints, etc. will be sealed with caulking, and permanent pest-proof screens will be installed. No wood-to-concrete connections will exist; all planting will be located so a mature plant will be at least 24 inches from the building. All foundations will be solid concrete. The Project will be eligible for using four of the five practices.

SS 6.2 Compact Development - 3 points: Providing 100 Units on 1.53 acres of lot area calculates to 65.4 units per acre which meets the High Density requirement of 60 or greater units per acre.

SS 7.1 Public Transit for Mid-rise - 2 points: The Project is located adjacent to the Warren Street Station providing service on the MBTA Green Line B Branch which provides over 240 daily transit rides.

SS 7.2 Bicycle Storage for Mid-rise - 1 point: The Project will have indoor bicycle storage for 100 bicycles, as required by BTD, and in excess of the LEED requirement.

SS 7.3 Parking Capacity/Low-emitting Vehicles for Mid-rise – 1 point: The Project will provide electric charging stations for three percent of the total parking on site.

Water Efficiency

WE 3.1 and 3.2 Indoor Water Use - 5 points: The Project will include shower heads with 1.75 or less gallons per minute (GPM), lavatory faucets will use 1.5 or less GPM and the toilets selected will be under 1.3 gallons per flush.

Energy & Atmosphere

EA 1.1 Optimize Energy Performance – Prerequisite: The Project will meet the requirements of the energy code at the time of construction, currently 20% above the state baseline, and in excess of the LEED requirement.

EA 1.2 Testing and Verification for Mid-rise – Prerequisite: The Project intends to follow option 2, complying with the Multifamily Mid-rise Thermal Enclosure Checklist, and utilizing a commissioning agent to perform the fundamental testing and commissioning tests on the central mechanical and HVAC systems.

EA 1.3 Optimize Energy Performance for Mid-rise - 7 points: The Project will achieve 20% energy savings compared with ASHRAE 90.1-2007. The intent is also to achieve a 20% energy cost savings.

EA 7.2 Pipe Insulation - 1 point: All domestic hot water piping may have R4 pipe insulation installed.

EA 11.1 Refrigerant Charge Test: - Prerequisite: All refrigerant lines for air conditioning will be charge tested per the manufacturer's standards.

EA 11.2 Appropriate HVAC Refrigerants - 1 point: Non hydrochlorofluorocarbon (HCFC) refrigerants will be used.

Materials & Resources

MR 1.1 Framing Order Waste Factor – Prerequisite: A calculation of the material necessary to frame the building and orders of the amount of wood purchased will be made. The waste factor will not exceed more than 10% by calculation.

MR 1.5 Off Site Fabrication - 4 points: The Project will utilize panelized construction to reduce the amount of wood waste in the framing process.

MR 2.1 FSC Certified Tropical Woods – Prerequisite: Suppliers will be sent a notice of preference for FSC products, and a request for the country of manufacture for each wood product by the contractor. No tropical wood will be installed.

MR 2.2 Environmentally Preferable Products ½ point each – 1 to 1.5 points: The Project will use hard flooring in at least 45% of the buildings floor area. The Project will use local aggregate in all concrete.

MR 3.1 Construction Waste Management Planning – Prerequisite: The Project will investigate any recycling opportunities in the area and document the waste diverted from the landfill.

MR 3.2 Construction Waste Reduction - 1.5 point: With stringent recycling protocols, the Project will limit the total amount of waste that will go to the landfill, intending to divert 50% of the construction waste stream.

Indoor Environmental Quality

EQ 2 Basic Combustion Venting – Prerequisite: The requirements for control of combustion products are included in the design; no unvented combustion appliances, CO monitors in each unit, no fireplaces, and heating equipment will have closed combustion.

EQ 4.1 Basic Outdoor Air Ventilation – Prerequisite: Continuous ventilation will be provided to each unit to meet the ASHRAE 62.2 – 2007 ventilation requirement.

EQ 4.2 Enhanced Outdoor Ventilation - 2 points: The ventilation in each unit will be provided by a heat recovery ventilation (HRV) device.

EQ 4.3 Third Party Performance Testing - 1 point: The ventilation system in each unit will be tested by a third party to document the performance as meeting the ASHRAEA 62.2 - 2007 standard.

EQ 5.1 Basic Local Exhaust - Prerequisite: The central system will provide exhausts for each unit, exhausting to the exterior and meeting the ASHRAE 62.2 standard.

EQ 5.2 Enhanced Local Exhaust - 1 point: The central exhaust system will run continuously in the units.

EQ 5.3 Third Party Performance Testing - 1 point: The exhausts in each unit will be tested by a third party to document the performance as meeting the ASHRAEA 62.2 air flow requirement.

EQ 6.1 Room by Room Load Calculations – Prerequisite: Room by room load calculations will be provided by the HVAC engineer or responsible party stating the calculations were performed according to ACCA Manual J and D or equivalent.

EQ 7.1 – 7.3 Air Filtering – Prerequisite: The Project intends to use non-ducted systems, which are exempt from any filter MERV level requirement.

EQ 8.1 Indoor Contaminant Control During Construction - 1 point: Ductwork (including exhaust) will be sealed throughout construction so that debris does not contaminate.

EQ 8.2 Indoor Contaminant Control for Mid-rise: - 1 point: The Project will install a walk-off mat at each central entryway system.

EQ 9.1 Radon–Resistant Construction in High Risk Areas (Zone 1) – Prerequisite: The Project is located in EPA Zone 3/ low risk and is not required to be radon resistant construction.

EQ 9.2 Radon Resistant Construction in Moderate Risk Areas - 1 point: Radon resistant construction techniques are planned for the Project although they are not required.

EQ 10.1 No HVAC in Garage – Prerequisite: There will be no HVAC equipment located in the garage.

EQ 10.2 Minimize Pollutants from Garage - 2 points: All penetrations, cracks at the base of walls, as well as joist bays will be sealed. At conditioned spaces, all doors will be weather-stripped. CO detectors will be installed at stairwells leading from the garage to living space.

EQ 12.1 Compartmentalization of Units – Prerequisite: The units will be sealed, all openings will be weather-stripped, and the units will successfully achieve a leakage rate of less than 0.30 CFM per 50 sf of enclosure.

Awareness & Education

AE 1.1 Education of the Homeowner – Prerequisite: A home owner's manual will be created and provided to all occupants. A one hour walk through will be conducted with the occupants in group trainings.

AE 1.3 Public Awareness - 1 point: The developer will create a website about the site, containing features and benefits of LEED homes. The developer will work with regional publications to ensure a newspaper article is published about the Project. The contractor's Project sign will include LEED signage at the exterior of the building site.

AE 2 Education of the Building Manager - 1 point: An operations and training manual will be created and provided to the building manager. A one hour walk through will be conducted with the building manager.

4.1.2 Building 3

Conservation Services Group (CSG) conducted a LEED for Homes preliminary meeting with the Project team to create a LEED for Homes checklist. The Proponent will register the Project with USGBC and plans to be certified.

CSG was able to assess that at this point, with the intent and decisions made thus far, that all the applicable prerequisite items in LEED for Homes are being met. Sufficient optional credits would allow the Project to achieve the LEED Silver threshold. The Project is currently tracking 58 points with 5 maybe points (maybe points are italicized in the description below).

The following is a detailed credit-by-credit analysis of the Project team's approach for achieving LEED for Homes at the Silver level. The preliminary LEED for Homes checklist is included at the end of this section. Please note that this is an initial credit checklist and applicable credits may change as the building design advances.

Innovation & Design Process

ID 1.1 Preliminary Rating - Prerequisite: CSG led the Project team through the LEED for Homes process on May 22, 2014 and determined which credits were reasonable to be pursued at that point in design. Silver was determined to be the most appropriate goal considering the type of project, the site, and its location in Boston.

ID 2.1 Durability Planning - Prerequisite: The durability evaluation form and durability inspection checklist will be created as design elements are finalized. This is a customized checklist for the Project that is required prior to the beginning of construction.

ID 2.2 Durability Management - Prerequisite: The builder will use the durability inspection checklist throughout the construction as both an inspection tool and a project meeting item to be reviewed weekly, to ensure those measures are included in the Project.

ID 3.1 Innovation 1 - 1 point: SS07-02 Exemplary Performance: proximity to transit. The Project is located adjacent to the Warren Street Station which provides frequent service on the MBTA Green Line B Branch.

ID 3.2 Innovation 2 - 1 point: LL 05-05 Exemplary Performance: Community Resources. The Project is located in an urban area with enough community services within ½ mile to meet the credit's criteria.

Location & Linkages

LL 2 Site Selection - 2 points: The Project site is above floodplain level; not on habitat for threatened species; not with 100 feet of water; not built on public parkland; and not on land with prime soils.

LL 3.2 Infill - 2 points: The Project is bordered on one side by a public road, Commonwealth Avenue, and on the remaining sides (75% or more) by previously developed land.

LL 3.3 Previously Developed – 1 point: As an existing building, Building 3 meets the credit's criteria for a previously developed site.

LL 4 Existing Infrastructure - 1 point: The lot has existing water and sewer service lines.

LL 5.1 – 5.3 Community Resources - 3 points: Proximity to over 14 basic community services on Commonwealth Avenue, Warren Street, and Cambridge Street results in three points for this item.

LL 6 Access to Open Space - 1 point: From the center of the Project to Fidelis Way Park is less than ½ mile to a greater than ¾ acre open space.

Sustainable Sites

SS 1.1 Erosion Controls during Construction – Prerequisite: The Project team will develop an erosion control plan prior to start of construction.

SS 2.1 No Invasive Plants – Prerequisite: The landscape architect will provide a list of plants to be installed and will cross reference a list of invasive plants for the area to ensure no invasive plants are used. (http://www.newfs.org/docs/docs/MIPAG040105.pdf)

SS 2.4 Drought Tolerant Plants - 1 point: The landscape architect will select drought tolerant plants (45% or more) for the landscaping plan. Lists of plants and their quantities of each plant and the percentage of drought tolerance will be calculated.

SS 3 Reduce Heat Island Effects - 1 point: The Project will use a high albedo product for at least 50% of the hardscapes – sidewalks, patios and driveways.

SS 4.2 Permanent Erosion Controls - 1 point: The landscaping plan will reflect the goal of replanting disturbed areas following the LEED algorithm of one tree, four five- gallon shrubs, or 50 square feet of native groundcover per 500 square feet of disturbed area.

SS 4.3 Management of Runoff from Roof- 2 points: The stormwater management plan will be designed such that all runoff from the roof is managed through an onsite design element.

SS 5 Pest Control Alternatives - 2 points: All exterior wood will be kept 12 inches or more above the soil. External cracks, joints, etc. will be sealed with caulking, and permanent pest-proof screens will be installed. No wood-to-concrete connections will exist; all planting will be located so a mature plant will be at least 24 inches from the building. All foundations will be solid concrete. The Project will be eligible for using four of the five practices.

Water Efficiency

WE 3.1 and 3.2 Indoor Water Use - 5 points: The Project will include shower heads with 1.75 or less gallons per minute (GPM), lavatory faucets will use 1.5 or less GPM and the toilets selected will be under 1.3 gallons per flush.

Energy & Atmosphere

EA 1.1 Optimize Energy Performance – Prerequisite: The Project achieves compliance with Energy Start Homes Version 2

EA 1.2 Exceptional Energy Performance – 13 points: The Project intends to achieve a HERS score of 70 or better with high efficiency mechanical equipment, improved envelope, and good performance testing on the infiltration and ducts.

EA 7.1 Efficient Hot Water Distribution – 2 points: The Project intends to locate the domestic hot water heater and the plumbing lines to achieve a compact design of a conventional DHW system.

EA 7.2 Pipe Insulation - 1 point: All domestic hot water piping may have R4 pipe insulation installed.

EA 11.1 Refrigerant Charge Test: - Prerequisite: All refrigerant lines for air conditioning will be charge tested per the manufacturer's standards.

EA 11.2 Appropriate HVAC Refrigerants - 1 point: Non hydrochlorofluorocarbon (HCFC) refrigerants will be used.

Materials & Resources

MR 1.1 Framing Order Waste Factor – Prerequisite: A calculation of the material necessary to frame the building and orders of the amount of wood purchased will be made. The waste factor will not exceed more than 10% by calculation.

MR 2.1 FSC Certified Tropical Woods – Prerequisite: Suppliers will be sent a notice of preference for FSC products, and a request for the country of manufacture for each wood product by the contractor. No tropical wood will be installed.

MR 2.2 Environmentally Preferable Products ½ point each – 5.5 to 6.5 points: As a gut rehab project, many of the items in the building's structure will be maintained and count towards recycled and local credits. The Project will use hard flooring in at least 45% of the buildings floor area. The Project will use local aggregate in all concrete.

MR 3.1 Construction Waste Management Planning – Prerequisite: The Project will investigate any recycling opportunities in the area and document the waste diverted from the landfill.

MR 3.2 Construction Waste Reduction - 1.5 point: With stringent recycling protocols, the Project will limit the total amount of waste that will go to the landfill, intending to divert 50% of the construction waste stream.

Indoor Environmental Quality

EQ 2.1 Basic Combustion Venting – Prerequisite: The requirements for control of combustion products are included in the design; no unvented combustion appliances, CO monitors in each unit, no fireplaces, and heating equipment will have closed combustion.

EQ 4.1 Basic Outdoor Air Ventilation – Prerequisite: Continuous ventilation will be provided to the unit to meet the ASHRAE 62.2 – 2007 ventilation requirement.

EQ 4.2 Enhanced Outdoor Ventilation - 2 points: The ventilation in the unit will be provided by a heat recovery ventilation (HRV) device.

EQ 4.3 Third Party Performance Testing - 1 point: The ventilation system in the unit will be tested by a third party to document the performance as meeting the ASHRAEA 62.2 -2007 standard.

EQ 5.1 Basic Local Exhaust - Prerequisite: The central system will provide exhausts for each unit, exhausting to the exterior and meeting the ASHRAE 62.2 standard.

EQ 5.2 Enhanced Local Exhaust - 1 point: The central exhaust system will run continuously in the units.

EQ 5.3 Third Party Performance Testing - 1 point: The exhausts in each unit will be tested by a third party to document the performance as meeting the ASHRAEA 62.2 air flow requirement.

EQ 6.1 Room by Room Load Calculations – Prerequisite: Room by room load calculations will be provided by the HVAC engineer or responsible party stating the calculations were performed according to ACCA Manual J and D or equivalent.

EQ 7.1 – 7.3 Air Filtering – Prerequisite: The unit intends to use a non-ducted system, which is exempt from any filter MERV level requirement.

EQ 8.1 Indoor Contaminant Control During Construction - 1 point: Ductwork (including exhaust) will be sealed throughout construction so that debris does not contaminate.

EQ 8.2 Indoor Contaminant Control: - 1 point: The Project will install a walk-off mat at each entryway.

EQ 9.1 Radon–Resistant Construction in High Risk Areas (Zone 1) – Prerequisite: The Project is located in EPA Zone 3/ low risk and is not required to be radon resistant construction.

EQ 9.2 Radon Resistant Construction in Moderate Risk Areas - 1 point: Radon resistant construction techniques are planned for the Project although they are not required.

EQ 10.1 No HVAC in Garage – Prerequisite: There will be no HVAC equipment located in the garage.

EQ 10.4 Minimize Pollutants from Garage - 3 points: There will be no garage in Building 3.

Awareness & Education

AE 1.1 Education of the Homeowner – Prerequisite: A home owner's manual will be created and provided to all occupants. A one hour walk through will be conducted with the occupants in group trainings.

AE 1.2 Enhanced Training – 1 point: The Project will look at the viability of providing an additional two hours of training to the occupant of Building 3.

AE 1.3 Public Awareness - 1 point: The developer will create a website about the site, containing features and benefits of LEED homes. The developer will work with regional publications to ensure a newspaper article is published about the Project. The contractor's Project sign will include LEED signage at the exterior of the building site.

AE 2 Education of the Building Manager - 1 point: An operations and training manual will be created and provided to the building manager. A one hour walk through will be conducted with the building manager.

4.2 Climate Change Preparedness

Projects subject to Article 80, Large Project Review are required to complete the Climate Change Preparedness Checklist. Climate change conditions considered include sea level rise, higher maximum and mean temperatures, more frequent and longer extreme heat events, more frequent and longer droughts, more severe freezing rain and heavy rainfall events, and increased wind gusts.

The expected life of the Project is anticipated to be approximately 50 years. Therefore, the Proponent planned for climate change conditions projected at a 50 year time span. Copies of the completed checklists for both the new building and Building 3 are included in Appendix D. Given the preliminary level of design, the responses are also preliminary and may be updated as the Project design progresses.

Extreme Heat Events

The Intergovernmental Panel on Climate Change (IPCC) has predicted that in Massachusetts the number of days with temperatures greater than 90°F will increase from the current five-to-twenty days annually, to thirty-to-sixty days annually[1].

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[1] IPCC (Intergovernmental Panel on Climate Change), 2007. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K. B. Avery, M. Tignor, and H. L. Miller (eds.)]. Cambridge University Press, Cambridge, UK, and New York, 996 pp.

The Project design will incorporate a number of measures to minimize the impact of high temperature events, including:

- Using the amenity space with bathrooms as a safe room during periods of extreme heat and during blackouts;
- Installing operable windows where possible;
- Using Energy Recovery Ventilation to reduce cooling loads;
- External shading devices;
- Specifying high reflective paving materials for the courtyard and high albedo roof tops to minimize the heat island effect; and
- Planting new trees to shade areas of hardscape around the site.

Energy modeling for the Project has not yet been completed; however, as indicated on the LEED Checklist, the Proponent will strive to reduce the Project's overall energy demand and greenhouse gas emissions that contribute to global warming. Part of the Project's strategy to reduce greenhouse gas emissions is a planned approximately 44 kW solar PV array on the building that will cover approximately 17%-20% of the Project's common area electric load. The Project's proposed TDM program described in Section 2.5 will also help to lessen fossil fuel consumption.

Rain Events

As a result of climate change, the Northeast is expected to experience more frequent and intense storms. To mitigate this, the Proponent will take measures to minimize stormwater runoff. These measures include:

- Decreasing stormwater runoff from the two-year 24-hour design storm;
- Providing landscaped areas on the site;
- Directing stormwater runoff from the roof to a subsurface recharge system on-site; and
- Ensuring wastewater and stormwater back flow prevention.

Drought Conditions

Under the high emissions scenario, 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. Aeration fixtures and appliances will be chosen for water conservation qualities, conserving potable water supplies. In public areas, sensor operated faucets and toilets will be installed.

Sea Level Rise

Due to the Project's location, sea level rise is not anticipated to be a relevant issue of concern.

Chapter 5.0

Urban Design

5.0 URBAN DESIGN

The Project includes a six-story multi-family residential building and the renovation of an existing building on an approximately 1.5-acre portion of the Brighton Marine campus fronting Commonwealth Avenue.

The site is located on the west side of Commonwealth Avenue at the juncture of existing institutional buildings located to the north and west, and residential blocks that otherwise surround the Project site, to the east and south. Immediately to the south is the new Charing Cross residential building, currently under construction and planned for five stories. The existing six-story Regency Building apartments and a surface parking lot are located immediately north, at the corner of Commonwealth Avenue and Warren Street. Across the street, on the east side of Commonwealth Avenue, the street is lined mostly with rows of four and five-story multi-family residential blocks. The site is adjacent to the Warren Street MBTA Station which is serviced by the MBTA Green Line.

The proposed design complements and reinforces the existing scale and pattern of the surrounding neighborhood, and like many buildings in the neighborhood, is shaped by the topography of the site. Commonwealth Avenue slopes at about a 10% grade across the front of the site. To take best advantage of the existing topography, an L-shape is proposed for the new building with the long leg of the building set along the low side of the slope on the north property line, therefore nestling the basement parking garage into the slope and allowing easy access to the garage from Commonwealth Avenue, without the need for a garage ramp (see Figure 5-1). The new shape and location of the proposed building creates a new south-oriented courtyard on the high side of the site's slope that aligns with the first floor level of both the proposed building and Building 3. The interior amenity spaces look out onto the courtyard through large floor to ceiling windows, integrating the indoor amenities with the outdoors.

The proposed courtyard, featuring a variety of spaces for both active and passive use, provides the primary public identity for the development, especially when viewed from Commonwealth Avenue (see Figure 5-2). The courtyard includes a generous lawn, with an arcing walkway at its perimeter, providing a large area for active uses. Terrace areas of varying sizes are proposed near the fitness center, community room and Building 3 common space, providing many options for residents to enjoy the outdoors and interact with the community. A new driveway, providing vehicular access to the main entry and rear parking lot, lines the southern edge of the site. The driveway widens near the main entry, providing an area for vehicles to turnaround and drop-off. Paved with specialty paving, the drop-off is intended as an area for shared pedestrian and vehicle use. An existing mature tree, located close to Commonwealth Avenue, will be retained as an important element of the landscape design. Overall, the landscape design gives priority to the creation of outdoor open space, maintaining more than one-third of the parcel as green open space.

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Figure 5-1

North Elevation

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Figure 5-2

View Looking West from Commonwealth Avenue

The proposed locations for parked cars are almost completely hidden from public view. The proposed 101 parking spaces are approximately split with half located in the basement parking garage and half located in a surface lot. The proposed surface lot, located behind the proposed building, is blocked from view from the new courtyard open space and existing neighboring properties, particularly when viewed from Commonwealth Avenue.

The restored officer's residence, Building 3, serves as the centerpiece in the new courtyard. Highly visible from Commonwealth Avenue, the restored and renovated Building 3 provides a reminder for residents and passers-by of the site's important history. Building 3 features an attractive bowed portico and prominent brick chimney that will be focal points of the new courtyard. The existing stepped brick retaining wall and wrought iron fence that surrounds the site along the north, south and Commonwealth Avenue frontage will also be retained, further reinforcing the connection to the site's history. The retained Building 3 and brick retaining walls add a depth and distinctiveness to the overall design that would be difficult to achieve with new construction alone.

The proposed new building reflects the scale, proportions and form of the surrounding residential context (see Figure 5-3). At six stories in height, the new building is in keeping with the five and six-story multi-family residential buildings that bracket the site, as well as the numerous four to six-story buildings that line Commonwealth Avenue nearby. The proposed building design is intended to be compatible with the existing Brighton Marine campus and other buildings in the surrounding neighborhood in terms of materials, massing and scale. The design also proposes elements that provide the new building with its own unique identity and personality. As such, the design integrates both old and new: the brick facades, with traditional details and spacing of windows, recall the existing buildings on the Brighton Marine campus and other buildings nearby, while the angular bays in metal and glass, capped with the strong angular cornice, express the present. The saw-tooth configuration of the bays focuses views for units towards Commonwealth Avenue and, for upper level units, the Boston skyline. The building cornice, following the profile of the saw-toothed bays, gives the building a dynamic appearance and a contemporary interpretation of traditional building cornices that are prevalent in the neighborhood.

The proposed building is quite visible and prominent when viewed from the corner of Warren Street and Commonwealth Avenue due to the bend in the Commonwealth Avenue and the adjacent Regency Building parking lot that fronts on Commonwealth Avenue, opening up a view corridor to the proposed building (see Figure 5-4). Owing to this visibility, the east end of the building is designed with highly articulated building forms to express the visible outside building corners. The angular bays proposed on the façade are expanded at the corners to wrap around the building with metal cladding and windows. An angular cornice caps the corner bays, providing an expressive image toward Commonwealth Avenue.

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Figure 5-3

Aerial Perspective

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Figure 5-4

View Looking South from Commonwealth Avenue

Chapter 6.0

Historic and Archaeological Resources

6.0 HISTORIC AND ARCHAEOLOGICAL RESOURCES

6.1 Historic Resources Within the Project Site

The Project site is an approximately 1.5-acre parcel of land within the Brighton Marine campus, also formerly known as the United States Public Health Service campus. Located at 77 Warren Avenue, the Project site encompasses five masonry buildings constructed between 1938 and 1940 as housing for United States Public Health Services Officers. The proposed Project is located within the Washington-Warren Streets Institution Area, an area included in the Inventory of Historic and Archaeological Assets of the Commonwealth (Inventory). Photographs of the existing conditions of the buildings within the Project site are included as Appendix E.

The Brighton Marine campus includes nine buildings included in the Inventory that were originally associated with the Brighton Marine Hospital Complex (later the United States Public Health Service campus). The Brighton Marine Hospital was first envisioned by the federal government in 1935 as a new location for hospital facilitates relocating from the Chelsea Naval Hospital. The hospital complex was designed by United States Department of the Treasury architect Louis A. Simon and was constructed between 1938 and 1940.

Brighton Marine and the U.S. Family Health Plan traces its roots back to 1798 with the signing of "An Act for the Relief of Sick and Disabled Seaman" by President John Adams. Recognizing the critical role private merchant ships, their captains and crews had on the country's early economy and the potential for injury and exposure to foreign disease, the Act created the Marine Hospital Service. The Act required seaman to pay twenty cents a month for possible future healthcare, creating the first "payroll" tax in the nation's history. The first Marine Hospital was located in former Army barracks on Castle Island in Boston Harbor in 1799. In 1804, Congress appropriated $15,000 for a new hospital which was constructed at the Charlestown Navy Yard. In 1825, following the Navy's need for the site, the Hospital relocated to temporary quarters in Charlestown. Two years later, a new hospital was constructed in Chelsea. By 1858, the Hospital outgrew that location and moved to a newly constructed facility, also in Chelsea. It remained there until 1940 when it relocated to Warren Street in Brighton.

Prior to the Civil War, the Marine Hospitals generally worked independently. By 1870, only eight of the 27 hospitals in the system were operational. In 1870, legislation was passed to reform the hospitals and place them under a single umbrella of the Marine Hospital Service based out of Washington, DC. It also created the position of the Supervising Surgeon (now the Surgeon General). By the late 19th century, the role of the hospitals expanded to public health matters including implementation of the National Quarantine Act following the Yellow Fever Epidemic of 1878. In 1891, with the passing of the Immigration Act, the Marine Hospitals were also responsible for the medical inspection of newly arriving immigrants. In 1902, the hospitals were renamed the Public Health and Marine Hospital Service. By 1912, the hospitals were known as the Public Health Service.

During the war years (WWI and WWII), the Public Health Service expanded dramatically. In addition to their roles fighting diseases such as the Spanish Influenza and leprosy, they were responsible for keeping military training camps free of disease. It also provided services to Native Americans, Alaskan Natives, and to federal prisons. In 1939, President Franklin D. Roosevelt reorganized the government, taking the Public Health Service out of the Treasury Department.

The basic functions of the Public Health Service continued until 1980 when the last eight Marine Hospitals were scheduled to close, including Brighton Marine. Colonel Robert E. Hawes became the champion of the Brighton Marine Hospital when he learned it would be closed. At the time, patients were told they would need go to Fort Devens (approximately 40 miles west of Boston) to seek health care, but many would be unable to travel that distance for care. Col. Hawes began organizing the community and gathered support from St. Elizabeth's Hospital and Congressman Thomas P. O'Neill. The efforts saved the Brighton Marine Hospital, now the Brighton Marine Health Center, by transferring the property to a non-profit in 1982. It continues to serve 14,655 Military Retirees and other eligible beneficiaries in Massachusetts and Rhode Island annually. The former residential buildings are leased to medical and social service tenants. Four of the five former officer's quarters are currently vacant.

Main Hospital Building: The E-shaped Main Hospital Building is situated at the center of the complex. Located atop a steeply sloping lawn, the seven story building fronts on Warren Street and is 25 bays long and 11 bays deep. Constructed of red brick and cast stone, the building features elements of the Art Deco and Art Modern styles. A paved driveway provides access up the sloped site to a parking lot on the west side of the building, and onto the driveway on the north side of the building which reconnects to Warren Street.

Staff Housing: Two, three-story red brick structures are located immediately south of the Main Hospital Building. The buildings are rectangular in shape, with the eastern building also containing a centrally located rear ell. The western building is connected to the Main Hospital Building by an overhead connector. Both buildings have hipped roofs and face a rectangular green space between the two structures. These buildings were originally utilized as nurses and staff residences.

Incinerator (Power Plant): Located at the far west end of the campus, the Incinerator building is a one-story red brick structure separated from the Main Hospital Building by a surface parking lot, a paved driveway connecting Warren Street to Hospital Road, a private driveway, and onto Commonwealth Avenue. The utilitarian building has a flat roof and large rectangular window and door openings. The building is utilized as a power plant providing heating to the Brighton Marine campus.

Officers Quarters: Located at the far eastern end of the campus are five former Officers Quarters. The collection of small, two-story Georgian Revival style buildings is separated from the Main Hospital Building and staff housing by a paved surface parking lot. Buildings 3, 4, and 5 are situated adjacent to one another and Buildings 6 and 7. The two sets of buildings are separated by a driveway known as Hospital Road. The buildings each have concrete walkways to the side entrances at each structure, and are separated from one another by green space or surface parking. Green space is also present on the north and south sides of the group. The two-story buildings all feature common bond laid red brick and rectangular punched window openings with red brick jack arch lintels and red brick sills on the secondary elevations and second floor. At the first floor, most window sash are set atop a raised wood panel situated on the rounded red brick watertable. Windows in Buildings 3, 4, 5 and 6 contain vinyl replacement sash. Building 7 retains original multi-light wood sash. The buildings all feature hipped roofs set atop a slightly projecting corbelled cornice with metal gutters and downspouts.

Building #3: Located at the southeast corner of the group, Building 3 has a four bay north (front) elevation featuring a bowed portico. Projecting from the main façade, the portico is flanked on each side by rectangular window openings containing six-over-six sash set within the original wood casings. Four rectangular window openings with six-over-six sash are evenly spaced on the second story. A concrete handicapped accessible ramp provides access to the entrance porch. A single leaf metal fire door is situated within the original door frame which features paneled and glazed sidelights and multi-light transoms. A one-story, wood frame enclosed porch is located off the first floor of the building's east elevation. The one-bay wide by three-bay deep porch contains triparte six-over-nine and two-over-three sash within each bay of the east elevation. The north and south elevations of the porch also contain triparte windows with six-over-nine and six-over-six sash. One sash on the south elevation has been replaced with a solid panel. The east elevation bays are separated by Doric pilasters, and the porch is finished with a wood parapet articulated with wood dentils. The second floor of the east elevation contains six-over-six sash separated by a central bay containing a projecting red brick chimney. The three-bay west elevation contains one typical and two small rectangular window openings, while the second floor contains two window openings. A one-story projecting ell, containing a single leaf entrance door, is situated at the south end of the elevation and projects off the building's south elevation. The south elevation of the building is three-bays wide with a central, multi-light bay window at the first floor, and a pair of six-over-six windows at the second floor. The one-story projecting ell features a single, small window opening and a metal flue extending above its roofline. Six-over-six sash are present at the first floor of the building's east end, and at the second floor of the building's west end. The second floor window at the east end has been converted to a fire egress with a small door accessing a metal fire escape providing access to the ground. A half-round window is situated at the center of the roof's south facing elevation.

Building #4: The U-shaped building features a four-bay center section with evenly spaced nine-over-nine and six-over-six sash on the first and second stories. Each end of the building contains a small, projecting Doric entrance porch providing access into the building from each side of the structure. The porches each contain three columns supporting a simple wood frieze with a projecting cornice and square dentils. Single leaf, metal entrance doors are located beneath each porch. The east and west elevations both contain a multi-light bay window at the first floor set on a brick foundation. The eight-bay south (rear) elevation contains two projecting, one-story ells. The rear ells are two bays wide and two bays deep and are set on a brick foundation with a rounded brick soldier course. The east and west elevations of the ells feature a metal egress door at the top of concrete steps, and the remainder of the elevations feature typical or small six-over-six or nine-over-nine sash. Pairs of six-over-six sash and two small double hung sash are located at the first floor between the ells. Eight window openings are located at the second floor, including two openings containing small fire egress doors accessing a central metal fire escape. Two half-round windows are situated on each side of the south-facing roof.

Building #5: The U-shaped building features a four-bay center section with evenly spaced nine-over-nine and six-over-six sash on the first and second stories. Each end of the building contains a small, projecting Doric entrance porch providing access into the building from each side of the structure. The porches each contain three columns supporting a simple wood frieze with a projecting cornice and square dentils. Single leaf, metal entrance doors are located beneath each porch. The west porch openings have been infilled with aluminum and glass storefront systems. The east and west elevations both contain a multi-light bay window at the first floor set on a brick foundation. The eight-bay south (rear) elevation contains two projecting, one-story ells. The rear ells are two bays wide and two bays deep, and are set on a brick foundation with a rounded brick soldier course. The east and west elevations of the ells feature a metal egress door at the top of concrete steps, and the remainder of the elevations feature typical or small six-over-six or nine-over-nine sash. Pairs of six-over-six sash and two small double hung sash are located at the first floor between the ells. Eight window openings are located at the second floor, including two openings containing small fire egress doors accessing a central metal fire escape. Two half-round windows are situated on each side of the south-facing roof.

Building #6: The building features a four-bay center section with evenly spaced nine-over-nine and six-over-six sash on the first and second stories. Each end of the building contains a small, projecting Doric entrance porch providing access into the building from each side of the structure. The porches each contain three columns supporting a simple wood frieze with a projecting cornice and square dentils. Single leaf, metal entrance doors are located beneath each porch. The east and west elevations both contain a multi-light bay window at the first floor set on a brick foundation. Due to the sloping site, the eight-bay north (rear) elevation has a tall, nearly full-height basement level with a partially below-grade doorway. A tri-parte window opening and single rectangular window openings are located at the basement level. Pairs of six-over-six sash and single double hung sash are located at the first floor, and eight window openings are located at the second floor, including two openings containing small fire egress doors accessing a central metal fire escape. Two half-round windows are situated on each side of the north-facing roof.

Building #7: The U-shaped building features a four-bay center section with evenly spaced nine-over-nine and six-over-six sash on the first and second stories. Each end of the building contains a small, projecting Doric entrance porch providing access into the building from each side of the structure. The porches each contain three columns supporting a simple wood frieze with a projecting cornice and square dentils. Single leaf, metal entrance doors are located beneath each porch. The east and west elevations both contain a multi-light bay window at the first floor set on a brick foundation. The eight-bay north (rear) elevation contains two projecting, one-story ells. The rear ells are two bays wide and two bays deep and are set on a brick foundation with a rounded brick soldier course. The east and west elevations of the ells feature a metal egress door at the top of concrete steps, and the remainder of the elevations feature typical or small six-over-six or nine-over-nine sash. Pairs of six-over-six sash and two small double hung sash are located at the first floor between the ells. Eight window openings are located at the second floor, including two openings containing small fire egress doors accessing a central metal fire escape. Two half-round windows are situated on each side of the south-facing roof.

6.2 Historic Resources Within the Vicinity of the Project Site

The Project site is located within and in the vicinity of several historic resources listed in the State Register of Historic Places or included in the Inventory. Table 6-1 identifies these resources and corresponds to resources depicted in Figure 6-1.

Table 6-1 Historic Resources in the Vicinity of the Project Site

Map No.	Resource Name	Address	Designation
A	Saint Gabriel's Monastery Roman Catholic Church	159 Washington Street	State Register/ Local Landmark
1	Allston Heights Area		MHC Inventory
2	Glenville – Commonwealth Avenues Area		MHC Inventory
3	Summit Avenue – Kelton Road Area		MHC Inventory
4	Washington-Warren Streets Institutional Area		MHC Inventory
5	19 Bellvista Street	19 Bellvista Street	MHC Inventory
6	11-15 Carol Avenue	11-15 Carol Avenue	MHC Inventory
7	1387-1395 Commonwealth Avenue	1387-1395 Commonwealth Avenue	MHC Inventory
8	1409-1427 Commonwealth Avenue	1409-1427 Commonwealth Avenue	MHC Inventory
9	14-16 Ridgemont Street	14-16 Ridgemont Street	MHC Inventory

Table 6-1 Historic Resources in the Vicinity of the Project Site (Continued)

Map No.	Resource Name	Address	Designation
10	41 Ridgemont Street	41 Ridgemont Street	MHC Inventory
11	Afcin Lobel Apartment Building	12-22 Bellvista Street	MHC Inventory
12	Brighton High School	25 Warren Street	MHC Inventory
13	Brighton High School (William Howard Taft Middle School)	20 Warren Street	MHC Inventory
14	Fannie Morrison Apartment Houses	1375-1383 Commonwealth Avenue	MHC Inventory
15	Gideon Davidson Apartment Building	1534-1546 Commonwealth Avenue	MHC Inventory
16	Henry W. Longfellow Apartment Building	5-6 Bellvista Street	MHC Inventory
17	Henry W. Longfellow Apartment House	11-15 Bellvista Street	MHC Inventory
18	Kennedy Memorial Hospital Administration Building	30 Warren Street	MHC Inventory
19	Riley G. Crosby Apartment Building	1464-1478 Commonwealth Avenue	MHC Inventory
20	Sunny Meade Apartments	1480-1486 Commonwealth Avenue	MHC Inventory
21	T.F. Frobisher House	309 Summit Avenue	MHC Inventory
22	The Emerson	1426 Commonwealth Avenue	MHC Inventory
23	Thomas Flynn House	156 Kelton Street	MHC Inventory
24	Thomas McDermott House	152 Kelton Street	MHC Inventory
25	Three Fields Apartments	1364-1384 Commonwealth Avenue	MHC Inventory
26	U.S. Public Health Service Administration Building	77 Warren Street	MHC Inventory

6.3 Archaeological Resources Within the Project Site

There are no known archaeological resources within the Project site. The Project site is located on a previously developed land, therefore, no impacts to archaeological resources are anticipated.

6.4 Potential Impacts to Historic Resources

6.4.1 Demolition of Historic Resources

The Project proposes to demolish four of the five buildings on the site including Buildings 4, 5, 6, and 7. The five buildings are located at the southeast corner of the Brighton Marine campus. The east elevations of Buildings 3 and 6 front Commonwealth Avenue. The

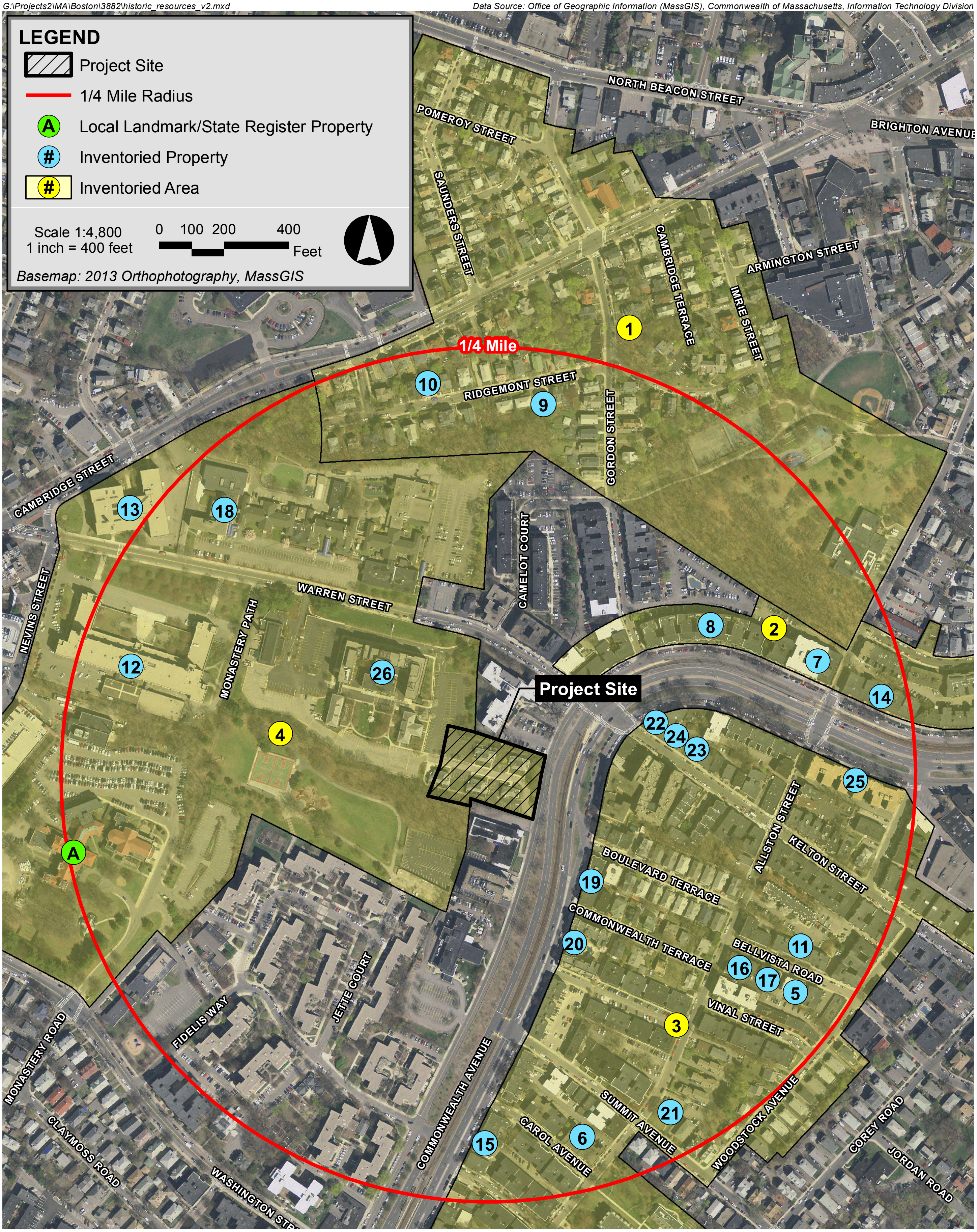

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Figure 6-1
Historic Resources

visibility of the overall group of buildings is diminished by the steep incline of Commonwealth Avenue starting at the intersection of Warren Street. The buildings are most visible when viewed from the Commonwealth Avenue Carriage Road which is immediately adjacent to the Project site.

The buildings are situated within the Brighton Marine campus, but are separated from the Main Hospital Building and two Staff Housing buildings by a surface parking lot. The demolition of the four buildings will not significantly alter the public's view of the overall Brighton Marine campus as it is largely understood and viewed by the public on Warren Street. As described in more detail, in Section 6.5.4, Building 3 was identified as the most logical building on the campus to retain.

6.4.2 Visual Impacts to Historic Resources

The proposed six-story residential building takes its architectural queues from the surrounding historic buildings along Commonwealth Avenue. It also takes into consideration the sloping site to minimize the visibility of the required on-site parking needed to make the Project viable. The L-shaped building is situated with its short end fronting Commonwealth Avenue allowing the preserved Building 3 to continue to read as a separate and distinct historic resource when viewed from along Commonwealth Avenue. Access to the Project's new interior parking is provided along the Commonwealth Avenue Carriage Road thereby reducing the vehicular driveways around the site. A two-lane driveway will be located behind (south) of Building 3 where surface parking presently exists. Vehicles may access the site from the existing curb cut location to the east of Building 3. The area between Building 3 and the new construction will serve as green space allowing the rehabilitated Building 3 to be the centerpiece of this new courtyard.

The new building is reflective of the nearby five and six story residential buildings, and has been designed to be compatible with surrounding historic resources. The design integrates both old and new with the use of brick on the facades and traditional details and spacing of windows. The new is represented in the building's angular bays in metal and glass, and its strong angular cornice. The saw-tooth configuration of the bays focuses views for units towards Commonwealth Avenue and, for upper level units, the Boston skyline. The building cornice, following the profile of the saw-toothed bays, gives the building a dynamic appearance and a contemporary interpretation of traditional building cornices that are prevalent in the neighborhood. The size, scale, massing, and articulation of the proposed new construction will be sympathetic to the historic Building 3 and the surrounding neighborhood of historic apartment buildings, while clearly reading as a new building. As a result, visual impacts to historic resources will be minimal.

The existing building will be rehabilitated including masonry repointing, a new roof, new historically appropriate windows and doors, and increased green space at the north side of the site. The existing building appearance will be greatly improved following the rehabilitation project.

6.4.3 Shadow Impacts to Historic Resources

Shadow impacts to historic resources within and in the vicinity of the Project site are minimal. At 9:00 a.m. on the vernal equinox, new shadow is largely limited to the surface parking lot west of the Project site. A narrow area of new shadow is cast on the Commonwealth Avenue Carriage Road at 3:00 p.m. during the same period. On the summer solstice, new shadow cast on historic resources is limited to the surface parking lot west of the Project site, new shadow on the Commonwealth Avenue Carriage Road at 3:00 p.m., and new shadow on Commonwealth Avenue, the Carriage Road and the north elevation of Building 3 at 6:00 p.m. On September 21 (the autumnal equinox), new shadow falls on the surface parking lot west of the Project site. By 12:00 p.m., minor shadow remains on the parking lot. At 3:00 p.m., new shadow is cast on the Commonwealth Avenue Carriage Road. By 6:00 p.m., the shadow extends across Commonwealth Avenue to rooftops of buildings in the Summit Avenue-Kelton Road Area; however, much of this area is already in shadow during this time period. At 9:00 a.m. on the winter solstice, new shadow is cast on the Main Hospital Building and the east Staff Housing building; however, during this period, much of the area is already in shadow. By 12:00 p.m., new shadow is limited to the parking lot west of the Project site, and by 3:00 p.m., new shadow is cast on the Commonwealth Avenue Carriage Road and a small portion of Warren Street. As shown in the shadow study included in Chapter 3, new shadow impacts to historic resources are fleeting and largely limited to surface parking within the Brighton Marine campus.

6.4.4 Wind Impacts to Historic Resources

An outdoor seating area and green space are proposed between the proposed new construction and the existing Building 3. The Project will shelter pedestrians from the prevailing northwest and northeast winds. The southwesterly winds, most frequent in the summer, will be channeled into the green space between the existing and proposed buildings. In addition, wind flow accelerations are also expected for the northeast and southwest winds around the southeast corner of the proposed building in the area between the new existing and new building. Although increased wind speeds are anticipated, as the building design progresses, the suitability of this space will be reviewed and measures will be taken, as necessary to ensure the space is suitable for its use, resulting in winds that will not adversely impact historic resources.

6.5 Alternatives Considered to Demolition of Historic Resources Within the Project Site

The mission of Brighton Marine is to serve the needs of veterans of the United States. In addition to the delivery of health care and social services, Brighton Marine is expanding its mission to provide much needed and sought after workforce housing for veterans and their families. The proposed Project at the Brighton Marine campus is intended to provide approximately 101 units of housing, all of which will have a veteran's preference for tenancy. The units are intended for single people and families; as such, the building includes approximately 48 one-bedroom units and 52 two-bedroom units. Due to the presence of existing uses on the Brighton Marine campus which requires parking, all parking for the residential Project must be contained on the Project site. The Project is will provide approximately 101 parking spaces.

The number of units proposed is directly correlated to the viability of the Project. In other words, the Project must provide a minimum number of residential units, associated support spaces, parking, and mechanical systems to make the Project financially viable. Alternatives to demolition of the existing buildings on the Project site were considered within the context of the need to provide a sufficient number of residential units to make the Project viable.

6.5.1 New Construction On Another Location on the Brighton Marine Campus

Consideration was given to locating the new residential building at another location on the Brighton Marine campus. To make the Project financially viable, the Project site must include approximately 1.5 acres of land. Other available locations on the campus are limited due to the presence of existing buildings. Existing surface parking lots are present at the southwest corner of the campus and between the Main Hospital Building and the Officers Quarters. These sites do not provide sufficient square footage for the size of the building footprint required to provide a sufficient number of residential units to make the project viable. The footprint of the building could be reduced in these locations; however, that would require the building to have additional stories, creating a structure that is out of character with the size and scale of the surrounding buildings including the Brighton Marine campus itself and its neighbors, the Brighton High School and St. Gabriel's Monastery. As a result of these issues, this option was not considered prudent or feasible.

Consideration was given to demolishing the Incinerator Building at the west end of the site and utilizing that site together with the existing parking lot. This option was determined to be infeasible, however, because the Incinerator Building provides heating and cooling to the entirety of the Brighton Marine campus. The construction of a new facility to service the complex would be necessary. This option would require the construction of a new building elsewhere on the campus which would further reduce the available parking that serves the Brighton Marine campus and its many medical and social service tenants. The cost of relocating and constructing an entirely new power plant to heat and cool the campus would be cost prohibitive. In addition, the reduction in available parking spaces would adversely impact the viability of existing uses within the complex. The funds available to construct the new residential building cannot support the construction of a new facility for the campus or replacement parking spaces. As a result of these issues, this option was not considered a prudent and feasible alternative.

6.5.2 Retention of All Existing Buildings and Construction of a Smaller Project on another Location on Brighton Marine Campus

Retention of the existing buildings would require the proposed Project to be located elsewhere on the Brighton Marine campus. As described in Section 6.5.1, the location of the proposed Project elsewhere on the campus is not a prudent and feasible alternative. Despite this problem, Brighton Marine did consider creating housing in the existing buildings. The square footage of the buildings varies, but all are approximately 2,650 square feet. Collectively, the buildings include approximately 13,250 square feet. Each building has a small footprint with two exterior entrances and two interior staircases, running east to west near the center of the floor plates, providing access to the second floors. A study of the existing building floor plates found the likely unit layout for each building is as follows:

Building	*Level*	*1 bedroom*	*2 bedroom*	
Building 3	Level 1	0	1	
	Level 2	0	1	
Building 4	Level 1	0	2	
	Level 2	2	0	
Building 5	Level 1	0	2	
	Level 2	2	0	
Building 6	Basement	2	0	
	Level 1	2	0	
	Level 2	2	0	
Building 7	Level 1	0	2	
	Level 2	2	0	
Total		12	8	20

The existing buildings can only accommodate 12 one-bedroom units and 8 two-bedroom units, for a total of 20 residential units. This would require the new construction to accommodate 81 units of housing. This reduction in the number of units in the proposed new construction does not, however, significantly reduce the size of the proposed new construction. Each floor of the proposed new building houses approximately 18-20 units. The relocation of 20 units into the existing buildings would only reduce the height of the building by one-story. If the building remains at six stories, the footprint of the proposed new construction would be reduced, but not in a significant capacity. In addition the costs associated with the mechanical systems required to operate the new building and the necessary 81 parking spaces within the new building does not significantly change. As a result of these conditions, retention of all buildings on the Project site was determined to not be a prudent or feasible alternative.

6.5.3 *Retention of Two or Three Existing Buildings and Construction of a Smaller Project on the Project Site*

The potential retention of two or three of the existing buildings on the Project site was also considered. In all instances (retention of Buildings 3, 4, and 5; 6 and 7; or 3 and 6), the retention of the buildings would result in five to twelve residential units within the existing buildings. This would require the new construction to accommodate 89 to 96 residential units, associated support spaces and necessary parking. As described in Section 6.5.2 above, the reduction in the number of units in the proposed new construction would not significantly reduce the square footage or building footprint as a result of the required square footage for common areas, support space and parking. As a result of these issues, the retention of two or three of the existing buildings on the site to minimize the number of buildings proposed for demolition was determined to not be a prudent or feasible alternative.

6.5.4 *New Construction and Retention of Building 3 (Proposed Project)*

After considering the options described above, consideration was given to retaining one of the five buildings within the Project site. Given the size, orientation and proximity of the Project site to Commonwealth Avenue and the neighboring buildings, an L-shaped building was identified as the most viable footprint for the proposed new construction. This shape will allow all residential units to have sufficient light and air, for the building to operate in a cost effective manner, and for access to parking located in the lower level of the building without passing through the Brighton Marine campus. Building 3 was identified as the most logical building on the campus to retain. This building is the most unique of the five buildings, and its proximity to Commonwealth Avenue provides the public with the most visible location on the site to enjoy the building from the sidewalk or roadway. The proposed L-shaped building has been sited to serve as a backdrop to the existing Building 3 when viewed from the public right-of-way. The new building will have a modern vocabulary, but will draw its characteristics from the nearby multi-family buildings at the Commonwealth Avenue and Warren Streets area. Building 3 will serve as a support facility for the new construction and will be rehabilitated in a manner consistent with the Secretary of the Interior's Standards for Rehabilitation including new historically appropriate windows and doors, masonry repointing, and retention and repair of the building's architectural features.

Chapter 7.0

Infrastructure

7.0 INFRASTRUCTURE SYSTEMS

7.1 Introduction

This section of the Expanded PNF outlines the existing utilities surrounding the Project site, the proposed 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 development of an approximately 111,650 sf, six-story residential building with a below-grade parking garage to accommodate approximately 50 vehicles, and the renovation of an existing building (Building 3). Four existing buildings will be removed for the new residential building and for the creation of additional parking spaces for those displaced because of the Project.

7.2 Wastewater

7.2.1 Sewer Infrastructure

An existing BWSC sanitary sewer main is located adjacent to the Project site in Commonwealth Avenue. There is a 10-inch sanitary sewer beneath Commonwealth Avenue flowing in a northerly direction. BWSC record plans and a recent site survey indicate existing sanitary sewer connections exiting Building 3 and Building 6 along the east face through 6-inch services, that tie into an 8-inch sewer main located north of the buildings. An existing sanitary sewer connection appears to exit Building 4 along the west face and a sewer connection appears to exit Building 5 along the east face, both through 6-inch services that tie into the 8-inch sewer line. The 8-inch sanitary line flows east and connects into the 10-inch sewer main beneath Commonwealth Avenue.

Sewage generated in the Project area is conveyed by the Commonwealth Avenue sewer main to the Massachusetts Water Resources Authority (MWRA) Deer Island Waste Water treatment Plant for treatment and disposal.

The existing Building 3 sewer service will be maintained as part of the Project with a new connection to the existing 8-inch sewer line, which will also be maintained. The proposed building will include a new connection to the 8-inch sewer line. The existing sewer system is illustrated in Figure 7-1.

7.2.2 Wastewater Generation

The Project's sewage generation rates were estimated using the proposed building program and the Massachusetts Division of Water Pollution Control Sewer System Extension and Connection Permit Program of 314 CMR 7.00. The typical sewage generation values for the proposed sources set forth in 314 CMR 7.00 are shown in Table 7-1. These typical generation values are conservative values for estimating the sewage flows from new construction and are used to evaluate new sewage flows or an increase in flows to existing connections generated by new projects. Table 7-1 describes the increased sewage generation in gallons per day (gpd) due to the Project. Note that because the existing buildings are mostly vacant, these calculations do not take into account the existing uses on the site.

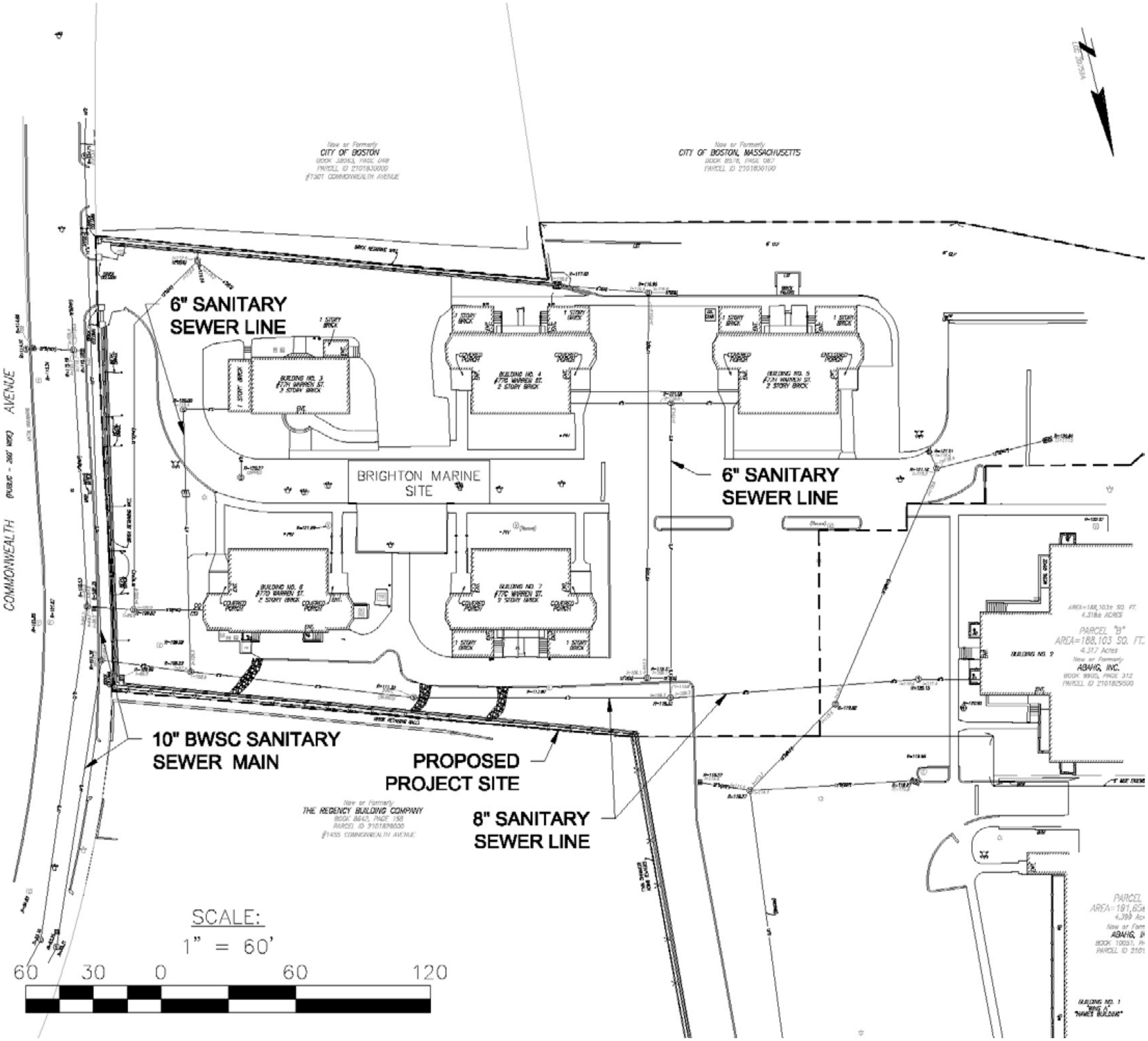
Table 7-1 Proposed Wastewater Generation

Use	Unit	314 CMR Value (gpd/unit)	Total Flow (gpd)
Residential	154 Bedroom Units	110 gpd/bedroom	16,940

7.2.3 Sewage Capacity and Impacts

An analysis was performed on the sanitary sewer line that the Project may utilize. Information on the sewer main in Commonwealth Avenue was obtained for the analysis. Pipe diameter and inverts were taken from BWSC record plans (Sewer System Map No. 22E) and a recent site survey. The flow capacity was analyzed using the Manning equation.

Results indicate that the 10-inch sewer main in Commonwealth Avenue has a capacity of 5.4 million gallons per day (mgd). Based on the peak flow estimate, the Project will not significantly burden the existing sewage system. Calculations are presented in Table 7-2.



BMHC – Veterans Mixed Income Housing Project Boston, MA

Figure 7-1

Existing Sewer System

Table 7-2 Sewer Hydraulic Capacity Analysis

Street	Size (inch)	Slope (ft/ft)	Manning's 'n'	Exist. Capacity (cfs)[1]	Exist. Capacity (mgd)[2]	Exist. Capacity (gpm)[3]
Commonwealth Avenue	10	0.086	0.013	8.35	5.40	3,749

Notes:
1. cfs = cubic feet per second
2. mgd = million gallons per day
3. gpm = gallons per minute

7.2.4 Proposed Conditions

The Proponent will coordinate with the BWSC on the design and capacity of the proposed connection to the sewer system and will submit a General Service Application. The Project is expected to generate an increase in wastewater flows of approximately 16,940 gpd, and would be required to obtain approval for the increase in sanitary flow from BWSC. The net sanitary flow is less than or equal to 100,000 gpd, therefore certification under 314 CMR 7.00 in the form of a MassDEP Sewer Compliance Certification will not be required.

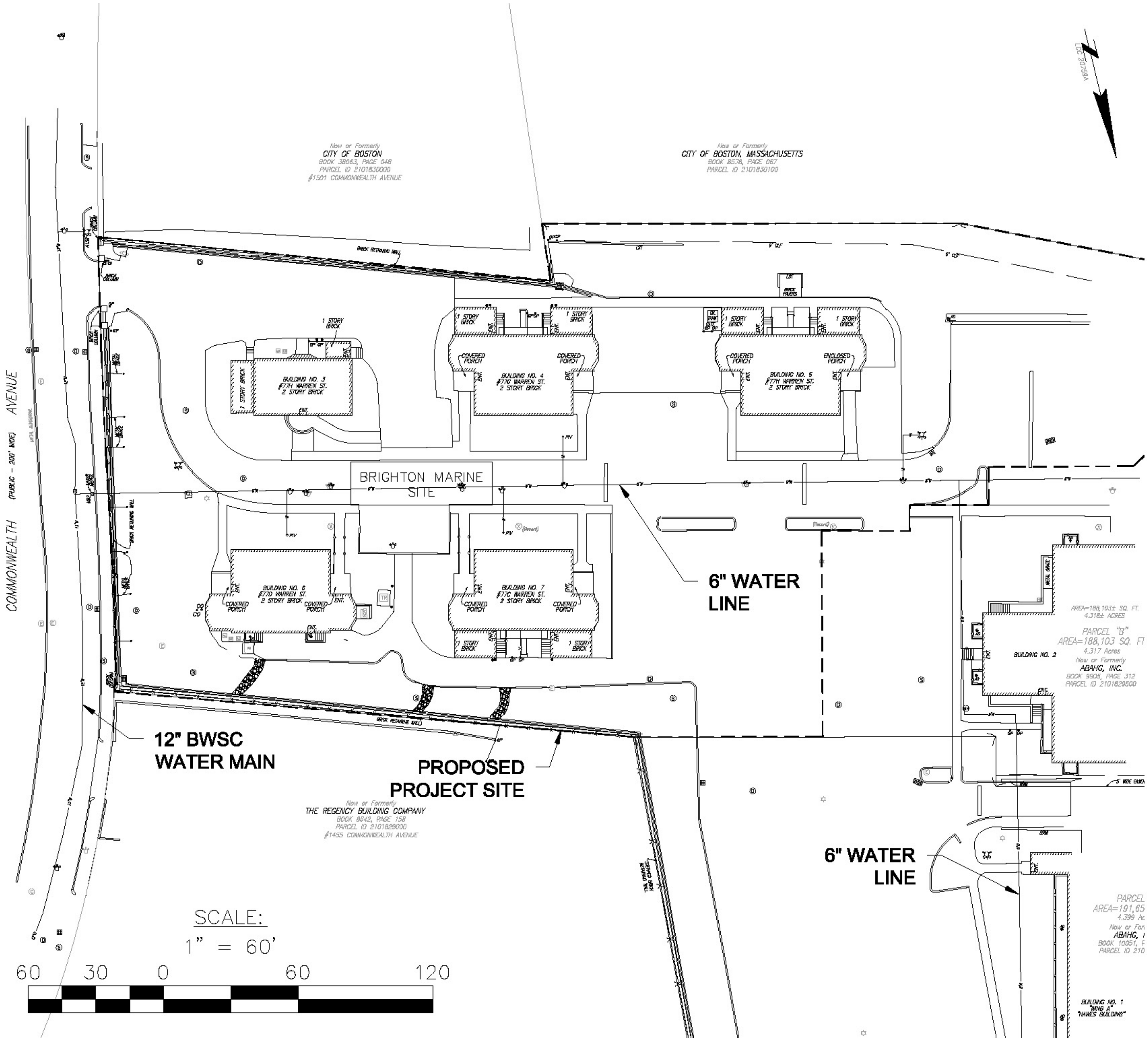
The sewer services for the Project will connect to the existing 8-inch sewer line onsite that connects to the existing 10-inch BWSC sanitary sewer main in Commonwealth Avenue.

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 proposed service connections, an assessment of Project demands and system capacity, and the establishment of service accounts.

7.3 Domestic Water and Fire Protection

7.3.1 Water Infrastructure

Water for the Project site will be provided by the existing BWSC system in Commonwealth Avenue. 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 is a 12-inch Southern High BWSC main beneath Commonwealth Avenue. A 6-inch water service extends from Commonwealth Avenue onsite, and appears to service three of the existing buildings, fire hydrants, as well as multiple buildings located west of the site. The water service appears to be a loop system that connects into Warren Street. The existing water system in the Project area is illustrated in Figure 7-2.



BMHC – Veterans Mixed Income Housing Project Boston, MA

Figure 7-2

Existing Water System

Nitsch Engineering

The existing 6-inch water line servicing the site from Commonwealth Avenue will be relocated to the south of the existing Building 3 and around the western portion of the proposed Project building, ultimately tying back into the 6-inch water line northwest of the site. New water connections will be provided to service the proposed Project building and Building 3.

Hydrant(s) may be installed onsite to meet fire protection requirements.

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 (110%) is applied to the estimated average daily wastewater flows which were calculated with 314 CMR 7.00 values to account for consumption, system losses and other usages, to estimate an average daily water demand. The Project is anticipated to require approximately 18,634 gpd. As noted above, the water for the Project will be supplied by the existing BWSC system in Commonwealth Avenue.

The Project will include features that attempt to reduce water consumption. For example, aeration fixtures and appliances will be chosen for water conservation qualities, and, in public areas, sensor operated faucets and toilets will be installed.

Existing post indicator valves (PIV's) to the buildings to be razed will be removed. A new PIV for the proposed building will be installed as part of the fire protection system.

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.

7.3.3 Existing Capacity and Impacts

The Proponent will request BWSC record flow test data containing actual flow and pressure for hydrants within the vicinity of the Project. If data is not available, the Proponent will request that hydrant flows be conducted by BWSC adjacent to the Project site.

7.3.4 Proposed Connections

Water service for the Project will connect to the existing BWSC water main in Commonwealth Avenue.

Domestic water service connections required by 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 connections will be reviewed as part of BWSC's Site Plan Review process. The review includes, but is not limited to, sizing of domestic water and fire protection services, calculation of meter sizing, backflow prevention design, and location of hydrants and siamese connections to conform to BWSC and Boston Fire Department requirements.

7.3.5 Proposed Impacts

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

7.4 Stormwater

7.4.1 Stormwater Infrastructure

The Project site currently consists of five existing buildings (Buildings 3-7) paved walkways, parking areas, and landscaped areas. The existing site's impervious cover makes up approximately 69% of the total site. Existing impervious and pervious areas are presented in Table 7-3.

The Project site is serviced by onsite closed drain lines and open culverts. Drainage ultimately flows to an existing 12-inch BWSC drain main in Commonwealth Avenue. According to BWSC record plans and site survey information, roof drainage from Building 6 is collected by a 6-inch PVC drain line that flows east to the existing 12-inch main. Roof drain connections are not shown for the remaining four buildings. Drainage within the northern portion of the site appears to flow in the northerly direction over ground to an existing concrete swale at the edge of the property. Runoff flows east through the swale and overflows to a catch basin, and ultimately Commonwealth Avenue. Drainage within the southern portion of the site appears to flow in the southerly direction over ground to an existing concrete swale at the southern edge of the property. Runoff flows east through the swale and overflows to a catch basin on the Project site prior to discharging to a 12-inch drain in Commonwealth Avenue.

7.4.2 Proposed Conditions

The proposed site will consist of the existing Building 3, the proposed Project building, paved walkways, parking areas, and landscaped areas. Four buildings are proposed to be demolished as part of the Project. The proposed site's impervious cover appears to make up approximately 74% of the total site, and is expected to increase impervious area onsite by approximately five percent, plus or minus, from the existing condition. Proposed impervious and pervious areas are presented in Table 7-3.

Table7-3 Existing vs. Proposed Impervious and Pervious Areas

	Impervious Area (SF)	Pervious Area (SF)	Impervious Area (%)	Total Area (SF)
Existing Site	46,419 ±	21,130 ±	68.7 ±	67,549 ±
Proposed Site	50,063 ±	17,486 ±	74.1 ±	67,549 ±

The proposed stormwater management system will include a groundwater recharge system. It is anticipated that the stormwater recharge system will work to passively infiltrate runoff into the ground with a gravity recharge system. The underground recharge system, and any required site closed drainage systems, will be designed so that there will be no increase in the peak rate of stormwater discharge from the Project site in the developed condition compared to the existing condition.

The Project will slightly increase the amount of impervious area at the site compared to the existing condition. The Project will maintain the existing peak rates and volumes of stormwater runoff from the site.

7.4.3 Water Quality Impact

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.

7.4.4 MassDEP Stormwater Management Policy Standards

In March 1997, MassDEP adopted a new 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 proposed design will comply with this Standard. There will be no untreated stormwater discharge. All discharges will be treated prior to connection to the BWSC system.

Standard #2: Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.

Compliance: The proposed design 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 should be 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 types. 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 proposed design will comply with this standard. Within the Project's limit of work, there will be mostly roof, landscaping, parking, and pedestrian 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 proposed design will comply with this standard. The Project is not associated with Higher Potential Pollutant Loads (per the Policy, Volume I, page 1-6). The Project complies with this standard.

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 proposed design 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 proposed design will comply with this Standard. The Project complies with the Stormwater Management Standards as applicable to the redevelopment.

Standard #8: Erosion and sediment controls must be implemented to prevent impacts during construction or land disturbance activities.

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 Protection Proposed During Construction

Existing public and private infrastructure located within nearby public rights-of-way will be protected during Project construction. The installation of proposed utility connections within public ways will be undertaken in accordance with BWSC, Boston Public Works Department, the Dig-Safe Program, and applicable utility company requirements. Specific methods for constructing proposed utilities where they are near to, or connect with, existing water, sewer, and drain facilities will be reviewed by the BWSC as part of its Site Plan Review process. All necessary permits will be obtained prior to the commencement of work.

The Proponent will continue to work and coordinate with the BWSC and the utility companies to ensure safe and coordinated utility operations in connection with the Project.

7.6 Conservation of Resources

The State Building Code requires the use of water-conserving fixtures. Water conservation measures such as low-flow toilets and restricted flow faucets will help reduce the domestic water demand on the existing distribution system. The installation of sensor-operated sinks with water conserving aerators and sensor-operated toilets in common area restrooms will be incorporated into the design plans for the Project.

7.7 Electrical Service

NSTAR owns the electrical system in the vicinity of the Project site. It is expected that adequate service is available in the existing electrical systems near the Project. The Proponent will work with NSTAR to confirm adequate system capacity as design is finalized.

7.8 Telecommunications Systems

The Proponent will select private telecommunications companies to provide telephone, cable, and data services. There are several potential candidates with substantial Boston networks capable of providing service. Upon selection of a provider or providers, the Proponent will coordinate service connection locations and obtain appropriate approvals.

7.9 Gas Systems

National Grid has gas service adjacent to the site. It is expected that there is adequate capacity in the gas supply system to meet the Project's demand.

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. Appendix F includes the Accessibility Checklist.

8.2 Massachusetts Environmental Policy Act (MEPA)

The Proponent does not expect that the Project will require review by the Massachusetts Environmental Policy Act (MEPA) Office of the Massachusetts Executive Office of Energy and Environmental Affairs. Although the Project is anticipated to receive state funding, current plans do not meet a MEPA review threshold.

8.3 Boston Civic Design Commission

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

8.4 Boston Landmarks Commission (Article 85)

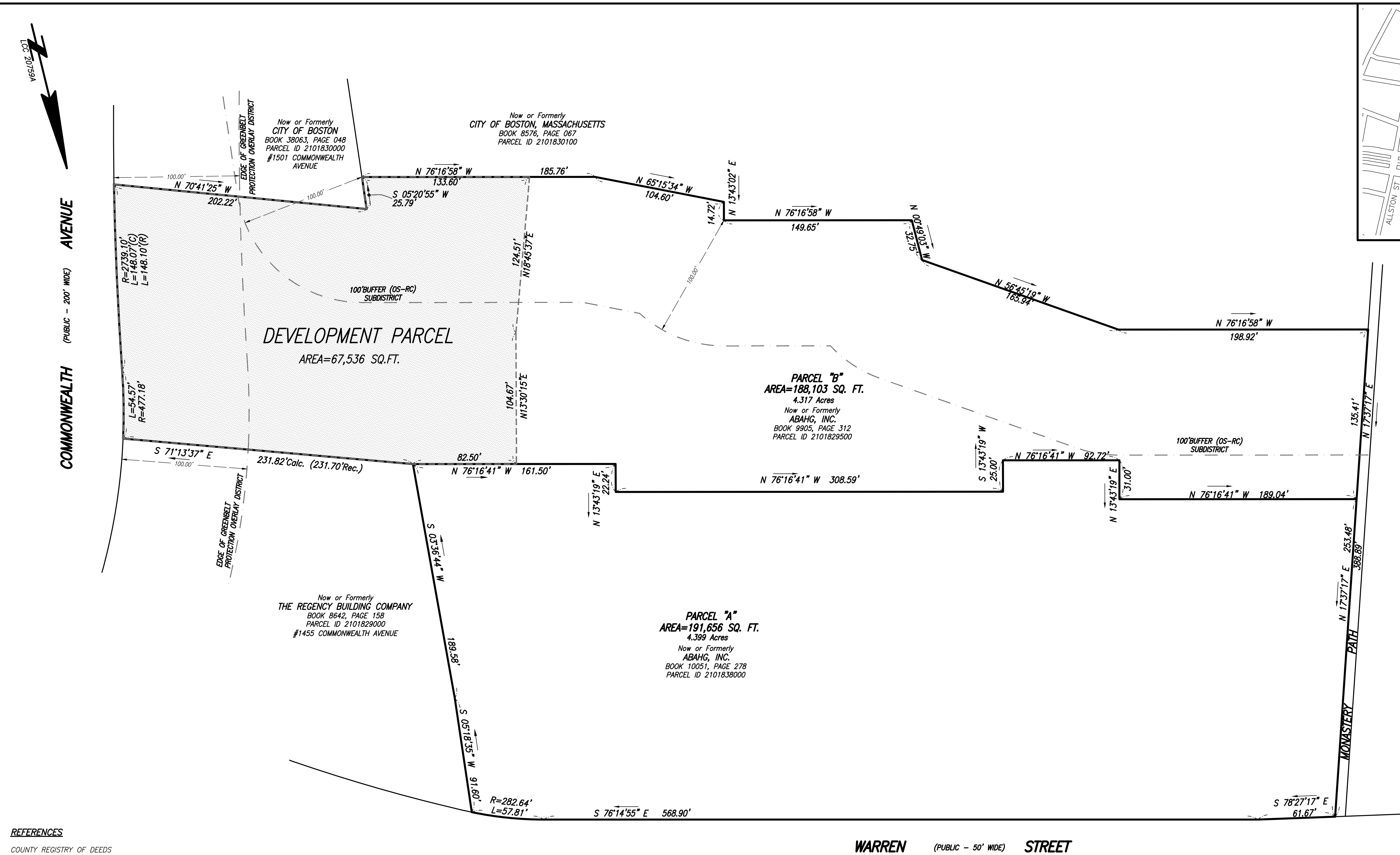
The demolition of four of the five existing buildings on the Project site is subject to review by the Boston Landmarks Commission (BLC) under Article 85 of the Boston Zoning Code as the buildings are over 50 years of age. An application for Article 85 will be submitted to the BLC for review.

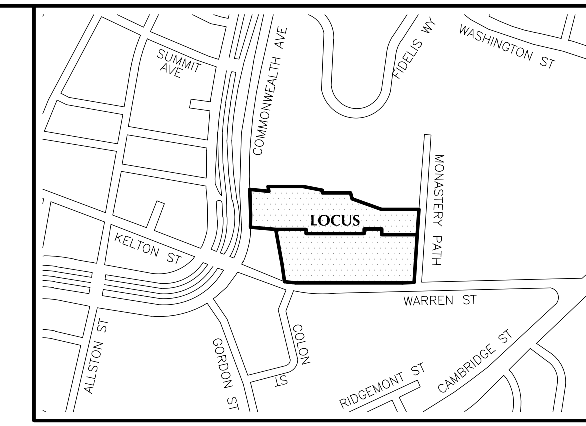
8.5 Section 106 of the National Historic Preservation Act and State Register Review

The Project is subject to review under Section 106 of the National Historic Preservation Act and State Register Review as the Project will utilize state and federal funding. A Massachusetts Historical Commission (MHC) Project Notification Form will be submitted to the MHC and lead federal and state agencies for review. A copy will also be provided to the BLC for review and comment in their role as the local historical commission.

Appendix A

Site Survey





VICINITY MAP NOT TO SCALE

LEGEND

- REC .... RECORD
- CALC .... CALCULATED
- SQ. FT. ...... SQUARE FEET
- R= .... RADIUS
- L= .... LENGTH
- .... PARCEL 3

REFERENCES

COUNTY REGISTRY OF DEEDS
BOOK 8576 PAGE 067
BOOK 8692 PAGE 158
BOOK 9905 PAGE 312
BOOK 10081 PAGE 278
BOOK 38063 PAGE 048

PLANS
BOOK 5198 PAGE 344
BOOK 5695 PAGE 095
BOOK 7741 PAGE 057
BOOK 8131 PAGE 096
BOOK 8855 PAGE 489
BOOK 9905 PAGE 311
BOOK 10797 PAGE 129

MASSACHUSETTS LAND COURT
LCC 20759A

CITY OF BOSTON ENGINEERING DEPARTMENT
FIELD BOOK 742 PAGE 72
FIELD BOOK 803 PAGES 12–13, 154
FIELD BOOK 806 PAGE 24, 45–47
FIELD BOOK 842 PAGES 75, 98–99
FIELD BOOK 873 PAGES 50–51
FIELD BOOK 1069 PAGE 39
FIELD BOOK 1273 PAGES 34–35

PLAN NO. K-666, L-3093, L-3094, L-5552, L-7549

DRAFT 2014-07-08

DAMIEN J. RAFFLE, PLS (MA# 49629) DATE
DJR@HARRYRFELDMAN.COM

NOTES:

1) THE PURPOSE OF THIS PLAN IS TO SHOW THE DEVELOPMENT PARCEL OVER PARCEL "B".

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BOSTON, (BRIGHTON DISTRICT) MASS.

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JUNE 11, 2014
PHONE: (617)357-9740
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40 0 20 40 80 160
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RESEARCH RDN	FIELD CHIEF NB	PROJ MGR DJR	APPROVED	SHEET NO. 1 OF 1
CALC RDN	CADD RDN/SCH	FIELD CHECKED	CRD FILE 14090	JOB NO. 14090

FILENAME: S:\PROJECTS\14000s\14090\DWG\14090-EXBT2.dwg

Appendix B

Transportation

TRANSPORTATION TECHNICAL APPENDIX

- TRAFFIC COUNTS
- TRIP GENERATION CALCULATIONS
- INTERSECTION CAPACITY ANALYSIS WORKSHEETS

TRAFFIC COUNTS

N/S: Commonwealth Avenue (Route 30) WB
E/W/NSW: Warren Street/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

PRECISION DATA INDUSTRIES, LLC
P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 112737 A1
Site Code : TBA
Start Date : 12/14/2011
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Commonwealth Avenue (Route 30) WB From North					MBTA Tracks From East					Commonwealth Avenue (Route 30) WB From South					Carriage Road From Southwest					Warren Street From West					Carriage Road From Northwest					
Start Time	Hard Right	Right	Bear Right	Thru	Left	Right	Bear Right	Thru	Bear Left	Left	Right	Thru	Bear Left	Left	Hard Left	Hard Right	Bear Right	Bear Left	Left	Hard Left	Hard Right	Right	Thru	Left	Hard Left	Hard Right	Right	Bear Right	Bear Left	Hard Left	Int. Total
07:00 AM	0	5	1	55	0	0	0	75	0	1	0	0	0	0	0	0	0	0	0	4	5	5	42	0	0	11	4	12	0	0	220
07:15 AM	0	9	0	65	0	0	0	95	1	2	0	0	0	0	0	0	0	0	0	9	1	11	52	0	0	20	8	12	0	0	285
07:30 AM	0	19	2	101	0	0	0	99	0	6	0	0	0	0	0	0	0	0	0	11	6	12	62	0	0	19	11	17	0	0	365
07:45 AM	0	11	1	82	0	0	0	115	0	5	0	0	0	0	0	0	0	0	0	8	7	11	61	0	0	15	8	16	1	0	341
Total	0	44	4	303	0	0	0	384	1	14	0	0	0	0	0	0	0	0	0	32	19	39	217	0	0	65	31	57	1	0	1211
08:00 AM	0	6	0	59	1	0	0	102	3	8	0	0	0	0	0	0	1	0	0	10	5	11	55	0	0	14	10	27	0	0	312
08:15 AM	0	9	1	44	1	0	0	103	3	7	0	0	0	0	0	0	1	0	0	8	5	7	58	0	0	5	8	17	0	0	277
08:30 AM	0	10	0	72	1	0	0	81	2	4	0	0	0	0	0	0	2	0	0	5	4	11	50	0	0	10	6	19	0	0	277
08:45 AM	0	6	1	52	0	0	0	71	1	7	0	0	0	0	0	0	1	0	0	10	1	8	57	0	0	9	15	13	0	0	252
Total	0	31	2	227	3	0	0	357	9	26	0	0	0	0	0	0	5	0	0	33	15	37	220	0	0	38	39	76	0	0	1118
Grand Total	0	75	6	530	3	0	0	741	10	40	0	0	0	0	0	0	5	0	0	65	34	76	437	0	0	103	70	133	1	0	2329
Apprch %	0	12.2	1	86.3	0.5	0	0	93.7	1.3	5.1	0	0	0	0	0	0	7.1	0	0	92.9	6.2	13.9	79.9	0	0	33.6	22.8	43.3	0.3	0	
Total %	0	3.2	0.3	22.8	0.1	0	0	31.8	0.4	1.7	0	0	0	0	0	0	0.2	0	0	2.8	1.5	3.3	18.8	0	0	4.4	3	5.7	0	0	
Cars	0	70	6	509	3	0	0	721	10	37	0	0	0	0	0	0	4	0	0	64	29	70	419	0	0	95	60	128	1	0	2226
% Cars	0	93.3	100	96	100	0	0	97.3	100	92.5	0	0	0	0	0	0	80	0	0	98.5	85.3	92.1	95.9	0	0	92.2	85.7	96.2	100	0	95.6
Heavy Vehicles	0	5	0	21	0	0	0	20	0	3	0	0	0	0	0	0	1	0	0	1	5	6	18	0	0	8	10	5	0	0	103
% Heavy Vehicles	0	6.7	0	4	0	0	0	2.7	0	7.5	0	0	0	0	0	0	20	0	0	1.5	14.7	7.9	4.1	0	0	7.8	14.3	3.8	0	0	4.4

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 07:15 AM

	Commonwealth Avenue (Route 30) WB From North						MBTA Tracks From East						Commonwealth Avenue (Route 30) WB From South						Carriage Road From Southwest						Warren Street From West						Carriage Road From Northwest						
Start Time	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Int. Total
07:15 AM	0	9	0	65	0	74	0	0	95	1	2	98	0	0	0	0	0	0	0	0	0	0	9	9	1	11	52	0	0	64	**20**	**8**	12	0	0	40	285
07:30 AM	0	**19**	**2**	**101**	0	**122**	0	0	99	0	6	105	0	0	0	0	0	0	0	0	0	0	**11**	**11**	6	**12**	**62**	**0**	**0**	**80**	19	**11**	17	0	0	47	**365**
07:45 AM	0	11	1	82	0	94	0	0	**115**	0	5	**120**	0	0	0	0	0	0	0	0	0	0	8	8	**7**	11	61	0	0	79	15	8	16	**1**	0	40	341
08:00 AM	0	6	0	59	**1**	66	0	0	102	**3**	**8**	113	0	0	0	0	0	0	0	**1**	0	0	10	11	5	11	55	0	0	71	14	10	**27**	**0**	**0**	**51**	312
Total Volume	0	45	3	307	1	356	0	0	411	4	21	436	0	0	0	0	0	0	0	1	0	0	38	39	19	45	230	0	0	294	68	37	72	1	0	178	1303
% App. Total	0	12.6	0.8	86.2	0.3		0	0	94.3	0.9	4.8		0	0	0	0	0		0	2.6	0	0	97.4		6.5	15.3	78.2	0	0		38.2	20.8	40.4	0.6	0		
PHF	.000	.592	.375	.760	.250	.730	.000	.000	.893	.333	.656	.908	.000	.000	.000	.000	.000	.000	.000	.250	.000	.000	.864	.886	.679	.938	.927	.000	.000	.919	.850	.841	.667	.250	.000	.873	.892
Cars	0	41	3	295	1	340	0	0	403	4	19	426	0	0	0	0	0	0	0	1	0	0	37	38	17	41	221	0	0	279	64	31	69	1	0	165	1248
% Cars	0	91.1	100	96.1	100	95.5	0	0	98.1	100	90.5	97.7	0	0	0	0	0	0	0	100	0	0	97.4	97.4	89.5	91.1	96.1	0	0	94.9	94.1	83.8	95.8	100	0	92.7	95.8
Heavy Vehicles	0	4	0	12	0	16	0	0	8	0	2	10	0	0	0	0	0	0	0	0	0	0	1	1	2	4	9	0	0	15	4	6	3	0	0	13	55
% Heavy Vehicles	0	8.9	0	3.9	0	4.5	0	0	1.9	0	9.5	2.3	0	0	0	0	0	0	0	0	0	0	2.6	2.6	10.5	8.9	3.9	0	0	5.1	5.9	16.2	4.2	0	0	7.3	4.2

PRECISION DATA INDUSTRIES, LLC
P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

N/S: Commonwealth Avenue (Route 30) WB
E/W/NSW: Warren Street/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

File Name : 112737 A1
Site Code : TBA
Start Date : 12/14/2011
Page No : 1

Groups Printed- Cars

	Commonwealth Avenue (Route 30) WB From North					MBTA Tracks From East					Commonwealth Avenue (Route 30) WB From South					Carriage Road From Southwest					Warren Street From West					Carriage Road From Northwest					
Start Time	Hard Right	Right	Bear Right	Thru	Left	Right	Bear Right	Thru	Bear Left	Left	Right	Thru	Bear Left	Left	Hard Left	Hard Right	Bear Right	Bear Left	Left	Hard Left	Hard Right	Right	Thru	Left	Hard Left	Hard Right	Right	Bear Right	Bear Left	Hard Left	Int. Total
07:00 AM	0	5	1	54	0	0	0	72	0	1	0	0	0	0	0	0	0	0	0	4	3	5	37	0	0	10	4	11	0	0	207
07:15 AM	0	7	0	61	0	0	0	92	1	2	0	0	0	0	0	0	0	0	0	9	0	10	48	0	0	19	6	12	0	0	267
07:30 AM	0	17	2	95	0	0	0	96	0	5	0	0	0	0	0	0	0	0	0	11	5	10	61	0	0	17	10	16	0	0	345
07:45 AM	0	11	1	80	0	0	0	114	0	4	0	0	0	0	0	0	0	0	0	8	7	10	57	0	0	14	5	15	1	0	327
Total	0	40	4	290	0	0	0	374	1	12	0	0	0	0	0	0	0	0	0	32	15	35	203	0	0	60	25	54	1	0	1146
08:00 AM	0	6	0	59	1	0	0	101	3	8	0	0	0	0	0	0	1	0	0	9	5	11	55	0	0	14	10	26	0	0	309
08:15 AM	0	8	1	41	1	0	0	98	3	7	0	0	0	0	0	0	1	0	0	8	4	7	57	0	0	4	8	16	0	0	264
08:30 AM	0	10	0	68	1	0	0	80	2	3	0	0	0	0	0	0	1	0	0	5	4	9	49	0	0	9	5	19	0	0	265
08:45 AM	0	6	1	51	0	0	0	68	1	7	0	0	0	0	0	0	1	0	0	10	1	8	55	0	0	8	12	13	0	0	242
Total	0	30	2	219	3	0	0	347	9	25	0	0	0	0	0	0	4	0	0	32	14	35	216	0	0	35	35	74	0	0	1080
Grand Total	0	70	6	509	3	0	0	721	10	37	0	0	0	0	0	0	4	0	0	64	29	70	419	0	0	95	60	128	1	0	2226
Apprch %	0	11.9	1	86.6	0.5	0	0	93.9	1.3	4.8	0	0	0	0	0	0	5.9	0	0	94.1	5.6	13.5	80.9	0	0	33.5	21.1	45.1	0.4	0	
Total %	0	3.1	0.3	22.9	0.1	0	0	32.4	0.4	1.7	0	0	0	0	0	0	0.2	0	0	2.9	1.3	3.1	18.8	0	0	4.3	2.7	5.8	0	0	

	Commonwealth Avenue (Route 30) WB From North						MBTA Tracks From East						Commonwealth Avenue (Route 30) WB From South						Carriage Road From Southwest						Warren Street From West						Carriage Road From Northwest						
Start Time	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																																					
Peak Hour for Entire Intersection Begins at 07:15 AM																																					
07:15 AM	0	7	0	61	0	68	0	0	92	1	2	95	0	0	0	0	0	0	0	0	0	0	9	9	0	10	48	0	0	58	**19**	**6**	12	0	0	37	267
07:30 AM	0	**17**	**2**	**95**	**0**	**114**	0	0	96	0	5	101	0	0	0	0	0	0	0	0	0	0	**11**	**11**	5	10	**61**	**0**	**0**	**76**	17	**10**	16	0	0	43	**345**
07:45 AM	0	11	1	80	0	92	0	0	**114**	0	4	**118**	0	0	0	0	0	0	0	0	0	0	8	8	**7**	10	57	0	0	74	14	5	15	**1**	0	35	327
08:00 AM	0	6	0	59	**1**	66	0	0	101	**3**	**8**	112	0	0	0	0	0	0	0	**1**	0	0	9	10	5	**11**	55	0	0	71	14	10	**26**	**0**	**0**	**50**	309
Total Volume	0	41	3	295	1	340	0	0	403	4	19	426	0	0	0	0	0	0	0	1	0	0	37	38	17	41	221	0	0	279	64	31	69	1	0	165	1248
% App. Total	0	12.1	0.9	86.8	0.3		0	0	94.6	0.9	4.5		0	0	0	0	0		0	2.6	0	0	97.4		6.1	14.7	79.2	0	0		38.8	18.8	41.8	0.6	0		
PHF	.000	.603	.375	.776	.250	.746	.000	.000	.884	.333	.594	.903	.000	.000	.000	.000	.000	.000	.000	.250	.000	.000	.841	.864	.607	.932	.906	.000	.000	.918	.842	.775	.663	.250	.000	.825	.904

PRECISION
DATA
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N/S: Commonwealth Avenue (Route 30) WB
E/W/NSW: Warren Street/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

File Name : 112737 A1
Site Code : TBA
Start Date : 12/14/2011
Page No : 1

Groups Printed- Heavy Vehicles

	Commonwealth Avenue (Route 30) WB From North					MBTA Tracks From East					Commonwealth Avenue (Route 30) WB From South					Carriage Road From Southwest					Warren Street From West					Carriage Road From Northwest					
Start Time	Hard Right	Right	Bear Right	Thru	Left	Right	Bear Right	Thru	Bear Left	Left	Right	Thru	Bear Left	Left	Hard Left	Hard Right	Bear Right	Bear Left	Left	Hard Left	Hard Right	Right	Thru	Left	Hard Left	Hard Right	Right	Bear Right	Bear Left	Hard Left	Int. Total
07:00 AM	0	0	0	1	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	2	0	5	0	0	1	0	1	0	0	13
07:15 AM	0	2	0	4	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	1	1	4	0	0	1	2	0	0	0	18
07:30 AM	0	2	0	6	0	0	0	3	0	1	0	0	0	0	0	0	0	0	0	0	1	2	1	0	0	2	1	1	0	0	20
07:45 AM	0	0	0	2	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	1	3	1	0	0	14
Total	0	4	0	13	0	0	0	10	0	2	0	0	0	0	0	0	0	0	0	0	4	4	14	0	0	5	6	3	0	0	65
08:00 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	3
08:15 AM	0	1	0	3	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	0	1	0	0	13
08:30 AM	0	0	0	4	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0	2	1	0	0	1	1	0	0	0	12
08:45 AM	0	0	0	1	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	3	0	0	0	10
Total	0	1	0	8	0	0	0	10	0	1	0	0	0	0	0	0	1	0	0	1	1	2	4	0	0	3	4	2	0	0	38
Grand Total	0	5	0	21	0	0	0	20	0	3	0	0	0	0	0	0	1	0	0	1	5	6	18	0	0	8	10	5	0	0	103
Apprch %	0	19.2	0	80.8	0	0	0	87	0	13	0	0	0	0	0	0	50	0	0	50	17.2	20.7	62.1	0	0	34.8	43.5	21.7	0	0	
Total %	0	4.9	0	20.4	0	0	0	19.4	0	2.9	0	0	0	0	0	0	1	0	0	1	4.9	5.8	17.5	0	0	7.8	9.7	4.9	0	0	

	Commonwealth Avenue (Route 30) WB From North						MBTA Tracks From East						Commonwealth Avenue (Route 30) WB From South						Carriage Road From Southwest						Warren Street From West						Carriage Road From Northwest						
Start Time	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																																					
Peak Hour for Entire Intersection Begins at 07:00 AM																																					
07:00 AM	0	0	0	1	0	1	0	0	**3**	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	**2**	0	**5**	0	0	**7**	1	0	**1**	0	0	2	13
07:15 AM	0	**2**	0	4	0	6	0	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	1	1	4	0	0	6	1	2	0	0	0	3	18
07:30 AM	0	2	0	**6**	0	**8**	0	0	3	0	**1**	**4**	0	0	0	0	0	0	0	0	0	0	0	0	1	**2**	1	0	0	4	**2**	1	1	0	0	4	**20**
07:45 AM	0	0	0	2	0	2	0	0	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	5	1	**3**	1	0	0	**5**	14
Total Volume	0	4	0	13	0	17	0	0	10	0	2	12	0	0	0	0	0	0	0	0	0	0	0	0	4	4	14	0	0	22	5	6	3	0	0	14	65
% App. Total		23.5	0	76.5	0		0	0	83.3	0	16.7		0	0	0	0	0		0	0	0	0	0		18.2	18.2	63.6	0	0		35.7	42.9	21.4	0	0		
PHF	.000	.500	.000	.542	.000	.531	.000	.000	.833	.000	.500	.750	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.500	.500	.700	.000	.000	.786	.625	.500	.750	.000	.000	.700	.813

N/S: Commonwealth Avenue (Route 30) WB
E/W/NSW: Warren Street/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

PRECISION DATA INDUSTRIES, LLC
P.O. Box 301 Berlin, MA 01503
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File Name : 112737 A1
Site Code : TBA
Start Date : 12/14/2011
Page No : 1

Groups Printed- Peds and Bicycles

	Commonwealth Avenue (Route 30) WB From North						MBTA Tracks From East						Commonwealth Avenue (Route 30) WB From South						Carriage Road From Southwest						Warren Street From West						Carriage Road From Northwest						
Start Time	Hard Right	Right	Bear Right	Thru	Left	Peds	Right	Bear Right	Thru	Bear Left	Left	Peds	Right	Thru	Bear Left	Left	Hard Left	Peds	Hard Right	Bear Right	Bear Left	Left	Hard Left	Peds	Hard Right	Right	Thru	Left	Hard Left	Peds	Hard Right	Right	Bear Right	Bear Left	Hard Left	Peds	Int. Total
07:00 AM	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	10	0	0	1	0	0	5	0	0	0	0	0	1	32
07:15 AM																																					
07:30 AM	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	30	0	0	0	0	0	31	4	0	1	0	0	5	0	0	0	0	0	22	101
07:45 AM																																					
Total	0	0	0	0	0	28	0	0	2	0	0	1	0	0	0	0	0	81	0	0	0	0	0	80	4	0	13	0	0	33	0	0	0	0	0	91	333
08:00 AM																																					
08:15 AM	0	0	0	0	0	13	0	0	1	0	0	0	0	0	0	0	0	35	0	0	0	0	0	37	0	0	0	0	0	20	0	0	0	0	0	16	122
08:30 AM																																					
08:45 AM	0	0	0	0	0	5	0	0	1	0	0	0	0	0	0	0	0	16	0	0	0	0	0	17	1	0	1	0	0	6	1	0	0	0	0	24	72
Total	0	1	0	1	1	43	0	0	2	0	0	3	0	0	0	0	0	111	0	0	0	0	0	120	1	0	4	0	0	53	2	1	0	1	0	86	430
Grand Total	0	1	0	1	1	71	0	0	4	0	0	4	0	0	0	0	0	192	0	0	0	0	0	200	5	0	17	0	0	86	2	1	0	1	0	177	763
Apprch %	0	1.4	0	1.4	1.4	95.9	0	0	50	0	0	50	0	0	0	0	0	100	0	0	0	0	0	100	4.6	0	15.7	0	0	79.6	1.1	0.6	0	0.6	0	97.8	
Total %	0	0.1	0	0.1	0.1	9.3	0	0	0.5	0	0	0.5	0	0	0	0	0	25.2	0	0	0	0	0	26.2	0.7	0	2.2	0	0	11.3	0.3	0.1	0	0.1	0	23.2	

	Commonwealth Avenue (Route 30) WB From North							MBTA Tracks From East							Commonwealth Avenue (Route 30) WB From South							Carriage Road From Southwest							Warren Street From West							Carriage Road From Northwest							
Start Time	Hard Right	Right	Bear Right	Thru	Left	Peds	App. Total	Right	Bear Right	Thru	Bear Left	Left	Peds	App. Total	Right	Thru	Bear Left	Left	Hard Left	Peds	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	Peds	App. Total	Hard Right	Right	Thru	Left	Hard Left	Peds	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																																											
Peak Hour for Entire Intersection Begins at 07:30 AM																																											
07:30 AM	0	0	0	0	0	8	8	0	0	0	0	0	0	0	0	0	0	0	0	30	30	0	0	0	0	0	31	31	4	0	1	0	0	5	10	0	0	0	0	0	22	22	101
07:45 AM	0	0	0	0	0	11	11	0	0	1	0	0	1	2	0	0	0	0	0	24	24	0	0	0	0	0	24	24	0	0	5	0	0	15	20	0	0	0	0	0	33	33	114
08:00 AM	0	1	0	0	1	15	17	0	0	0	0	0	2	2	0	0	0	0	0	35	35	0	0	0	0	0	38	38	0	0	1	0	0	17	18	0	0	0	1	0	36	37	147
08:15 AM	0	0	0	0	0	13	13	0	0	1	0	0	0	1	0	0	0	0	0	35	35	0	0	0	0	0	37	37	0	0	0	0	0	20	20	0	0	0	0	0	16	16	122
Total Volume	0	1	0	0	1	47	49	0	0	2	0	0	3	5	0	0	0	0	0	124	124	0	0	0	0	0	130	130	4	0	7	0	0	57	68	0	0	0	1	0	107	108	484
% App. Total	0	2	0	0	2	95.9		0	0	40	0	0	60		0	0	0	0	0	100		0	0	0	0	0	100		5.9	0	10.3	0	0	83.8		0	0	0	0.9	0	99.1		
PHF	.000	.250	.000	.000	.250	.783	.721	.000	.000	.500	.000	.000	.375	.625	.000	.000	.000	.000	.000	.886	.886	.000	.000	.000	.000	.000	.855	.855	.250	.000	.350	.000	.000	.713	.850	.000	.000	.000	.250	.000	.743	.730	.823

PRECISION
DATA
INDUSTRIES, LLC

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N/S: Commonwealth Avenue (Route 30) WB
E/W/NSW: Warren Street/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

File Name : 112737 A1
Site Code : TBA
Start Date : 12/14/2011
Page No : 1

Groups Printed- Trains

	Commonwealth Avenue (Route 30) WB From North					MBTA Tracks From East					Commonwealth Avenue (Route 30) WB From South					Carriage Road From Southwest					Warren Street From West					Carriage Road From Northwest					
Start Time	Hard Right	Right	Bear Right	Thru	Left	Right	Bear Right	Thru	Bear Left	Left	Right	Thru	Bear Left	Left	Hard Left	Hard Right	Bear Right	Bear Left	Left	Hard Left	Hard Right	Right	Thru	Left	Hard Left	Hard Right	Right	Bear Right	Bear Left	Hard Left	Int. Total
07:00 AM	0	0	0	1	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
07:15 AM	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
07:30 AM	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
07:45 AM	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Total	0	0	0	5	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14
08:00 AM	0	0	0	3	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
08:15 AM	0	0	0	2	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
08:30 AM	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
08:45 AM	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Total	0	0	0	8	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18
Grand Total	0	0	0	13	0	0	0	0	0	0	0	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32
Apprch %	0	0	0	100	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total %	0	0	0	40.6	0	0	0	0	0	0	0	59.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 08:00 AM

	Commonwealth Avenue (Route 30) WB From North						MBTA Tracks From East						Commonwealth Avenue (Route 30) WB From South						Carriage Road From Southwest						Warren Street From West						Carriage Road From Northwest						
Start Time	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Int. Total
08:00 AM	0	0	0	**3**	0	**3**	0	0	0	0	0	0	0	**3**	0	0	0	**3**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**6**
08:15 AM	0	0	0	2	0	2	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
08:30 AM	0	0	0	1	0	1	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
08:45 AM	0	0	0	2	0	2	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Total Volume	0	0	0	8	0	8	0	0	0	0	0	0	0	10	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18
% App. Total				100										100																							
PHF	.000	.000	.000	.667	.000	.667	.000	.000	.000	.000	.000	.000	.000	.833	.000	.000	.000	.833	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.750

N/S: Commonwealth Avenue (Route 30) WB
E/W/NSW: Warren Street/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

PRECISION DATA INDUSTRIES, LLC
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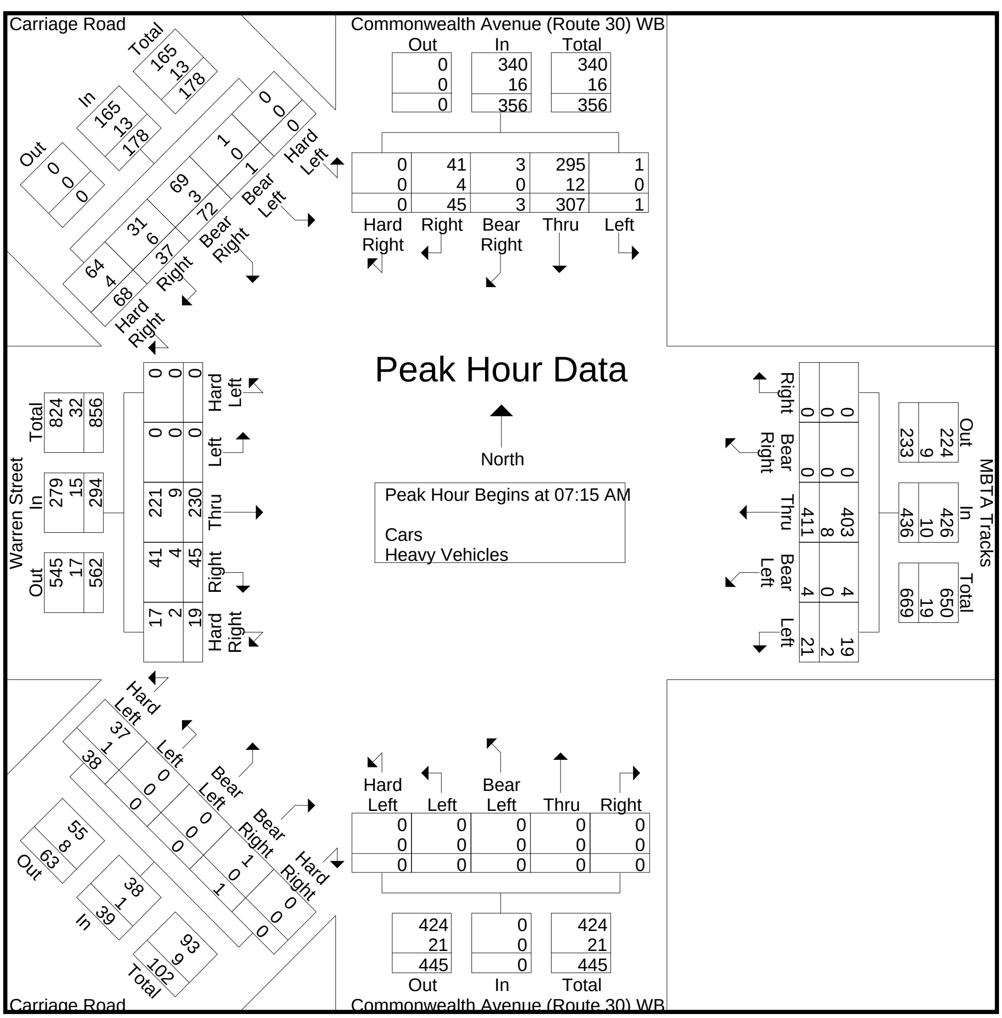
File Name : 112737 A1
Site Code : TBA
Start Date : 12/14/2011
Page No : 1

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 07:15 AM

	Commonwealth Avenue (Route 30) WB From North						MBTA Tracks From East						Commonwealth Avenue (Route 30) WB From South						Carriage Road From Southwest						Warren Street From West						Carriage Road From Northwest						
Start Time	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Int. Total
07:15 AM	0	9	0	65	0	74	0	0	95	1	2	98	0	0	0	0	0	0	0	0	0	0	9	9	1	11	52	0	0	64	20	8	12	0	0	40	285
07:30 AM	0	19	2	101	0	122	0	0	99	0	6	105	0	0	0	0	0	0	0	0	0	0	11	11	6	12	62	0	0	80	19	11	17	0	0	47	365
07:45 AM	0	11	1	82	0	94	0	0	115	0	5	120	0	0	0	0	0	0	0	0	0	0	8	8	7	11	61	0	0	79	15	8	16	1	0	40	341
08:00 AM	0	6	0	59	1	66	0	0	102	3	8	113	0	0	0	0	0	0	0	1	0	0	10	11	5	11	55	0	0	71	14	10	27	0	0	51	312
Total Volume	0	45	3	307	1	356	0	0	411	4	21	436	0	0	0	0	0	0	0	1	0	0	38	39	19	45	230	0	0	294	68	37	72	1	0	178	1303
% App. Total	0	12.6	0.8	86.2	0.3		0	0	94.3	0.9	4.8		0	0	0	0	0		0	2.6	0	0	97.4		6.5	15.3	78.2	0	0		38.2	20.8	40.4	0.6	0		
PHF	.000	.592	.375	.760	.250	.730	.000	.000	.893	.333	.656	.908	.000	.000	.000	.000	.000	.000	.000	.250	.000	.000	.864	.886	.679	.938	.927	.000	.000	.919	.850	.841	.667	.250	.000	.873	.892
Cars	0	41	3	295	1	340	0	0	403	4	19	426	0	0	0	0	0	0	0	1	0	0	37	38	17	41	221	0	0	279	64	31	69	1	0	165	1248
% Cars	0	91.1	100	96.1	100	95.5	0	0	98.1	100	90.5	97.7	0	0	0	0	0	0	0	100	0	0	97.4	97.4	89.5	91.1	96.1	0	0	94.9	94.1	83.8	95.8	100	0	92.7	95.8
Heavy Vehicles	0	4	0	12	0	16	0	0	8	0	2	10	0	0	0	0	0	0	0	0	0	0	1	1	2	4	9	0	0	15	4	6	3	0	0	13	55
% Heavy Vehicles	0	8.9	0	3.9	0	4.5	0	0	1.9	0	9.5	2.3	0	0	0	0	0	0	0	0	0	0	2.6	2.6	10.5	8.9	3.9	0	0	5.1	5.9	16.2	4.2	0	0	7.3	4.2



PRECISION
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N/S: Commonwealth Avenue (Route 30) EB
E/W/NSE: Kelton Street/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

File Name : 112737 A2
Site Code : TBA
Start Date : 12/14/2011

Groups Printed- Cars - Heavy Vehicles

	Commonwealth Avenue (Route 30) EB From North					Carriage Road From Northeast					Kelton Street From East					Carriage Road From Southeast					Commonwealth Avenue (Route 30) EB From South					MBTA Tracks From West					
Start Time	Right	Thru	Bear Left	Left	Hard Left	Hard Right	Bear Right	Bear Left	Left	Hard Left	Hard Right	Right	Thru	Left	Hard Left	Hard Right	Right	Bear Right	Bear Left	Hard Left	Hard Right	Right	Bear Right	Thru	Left	Right	Bear Right	Thru	Bear Left	Left	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	1	34	0	0	0	0	0	0	0	0	3	0	78	49	0	0	28	1	10	204
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	1	44	0	0	1	1	0	0	0	0	6	2	99	59	0	0	41	0	11	265
07:30 AM	0	0	0	0	0	0	0	0	0	0	1	1	48	0	0	3	4	0	0	0	0	0	0	132	56	0	0	55	0	7	307
07:45 AM	0	0	0	0	0	0	0	0	0	0	2	3	58	0	0	4	8	1	0	0	0	16	2	163	64	0	0	52	0	10	383
Total	0	0	0	0	0	0	0	0	0	0	3	6	184	0	0	8	13	1	0	0	0	25	4	472	228	0	0	176	1	38	1159
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	22	51	0	0	1	6	0	0	0	0	3	0	142	56	0	0	41	0	14	336
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	4	51	0	0	2	7	0	0	0	0	3	1	161	63	0	0	49	1	9	351
08:30 AM	0	0	0	0	0	0	0	0	0	0	2	16	41	0	0	2	1	0	0	0	0	2	1	165	42	0	0	39	0	11	322
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	11	46	0	0	3	6	0	0	0	0	2	1	175	42	0	0	46	1	11	344
Total	0	0	0	0	0	0	0	0	0	0	2	53	189	0	0	8	20	0	0	0	0	10	3	643	203	0	0	175	2	45	1353
Grand Total	0	0	0	0	0	0	0	0	0	0	5	59	373	0	0	16	33	1	0	0	0	35	7	1115	431	0	0	351	3	83	2512
Apprch %	0	0	0	0	0	0	0	0	0	0	1.1	13.5	85.4	0	0	32	66	2	0	0	0	2.2	0.4	70.2	27.1	0	0	80.3	0.7	19	
Total %	0	0	0	0	0	0	0	0	0	0	0.2	2.3	14.8	0	0	0.6	1.3	0	0	0	0	1.4	0.3	44.4	17.2	0	0	14	0.1	3.3	
Cars	0	0	0	0	0	0	0	0	0	0	3	56	362	0	0	15	33	1	0	0	0	34	6	1095	420	0	0	340	3	76	2444
% Cars	0	0	0	0	0	0	0	0	0	0	60	94.9	97.1	0	0	93.8	100	100	0	0	0	97.1	85.7	98.2	97.4	0	0	96.9	100	91.6	97.3
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	2	3	11	0	0	1	0	0	0	0	0	1	1	20	11	0	0	11	0	7	68
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	40	5.1	2.9	0	0	6.2	0	0	0	0	0	2.9	14.3	1.8	2.6	0	0	3.1	0	8.4	2.7

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 07:45 AM

	Commonwealth Avenue (Route 30) EB From North						Carriage Road From Northeast						Kelton Street From East						Carriage Road From Southeast						Commonwealth Avenue (Route 30) EB From South						MBTA Tracks From West						
Start Time	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Int. Total
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	2	3	58	0	0	63	4	8	1	0	0	13	0	16	2	163	64	245	0	0	52	0	10	62	383
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	22	51	0	0	73	1	6	0	0	0	7	0	3	0	142	56	201	0	0	41	0	14	55	336
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	4	51	0	0	55	2	7	0	0	0	9	0	3	1	161	63	228	0	0	49	1	9	59	351
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	2	16	41	0	0	59	2	1	0	0	0	3	0	2	1	165	42	210	0	0	39	0	11	50	322
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	4	45	201	0	0	250	9	22	1	0	0	32	0	24	4	631	225	884	0	0	181	1	44	226	1392
% App. Total	0	0	0	0	0		0	0	0	0	0		1.6	18	80.4	0	0		28.1	68.8	3.1	0	0		0	2.7	0.5	71.4	25.5		0	0	80.1	0.4	19.5		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.500	.511	.866	.000	.000	.856	.563	.688	.250	.000	.000	.615	.000	.375	.500	.956	.879	.902	.000	.000	.870	.250	.786	.911	.909
Cars	0	0	0	0	0	0	0	0	0	0	0	0	2	43	197	0	0	242	9	22	1	0	0	32	0	23	4	617	221	865	0	0	176	1	43	220	1359
% Cars	0	0	0	0	0	0	0	0	0	0	0	0	50.0	95.6	98.0	0	0	96.8	100	100	100	0	0	100	0	95.8	100	97.8	98.2	97.9	0	0	97.2	100	97.7	97.3	97.6
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	2	2	4	0	0	8	0	0	0	0	0	0	0	1	0	14	4	19	0	0	5	0	1	6	33
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	50.0	4.4	2.0	0	0	3.2	0	0	0	0	0	0	0	4.2	0	2.2	1.8	2.1	0	0	2.8	0	2.3	2.7	2.4

N/S: Commonwealth Avenue (Route 30) EB
E/W/NSE: Kelton Street/Carriage Road
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File Name : 112737 A2
Site Code : TBA
Start Date : 12/14/2011

Groups Printed- Cars

	Commonwealth Avenue (Route 30) EB From North					Carriage Road From Northeast					Kelton Street From East					Carriage Road From Southeast					Commonwealth Avenue (Route 30) EB From South					MBTA Tracks From West					
Start Time	Right	Thru	Bear Left	Left	Hard Left	Hard Right	Bear Right	Bear Left	Left	Hard Left	Hard Right	Right	Thru	Left	Hard Left	Hard Right	Right	Bear Right	Bear Left	Hard Left	Hard Right	Right	Bear Right	Thru	Left	Right	Bear Right	Thru	Bear Left	Left	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	1	34	0	0	0	0	0	0	0	0	3	0	76	46	0	0	25	1	8	194
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	1	43	0	0	0	1	0	0	0	0	6	2	98	57	0	0	39	0	9	256
07:30 AM	0	0	0	0	0	0	0	0	0	0	1	1	44	0	0	3	4	0	0	0	0	0	0	129	55	0	0	54	0	7	298
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	3	57	0	0	4	8	1	0	0	0	15	2	160	64	0	0	49	0	9	372
Total	0	0	0	0	0	0	0	0	0	0	1	6	178	0	0	7	13	1	0	0	0	24	4	463	222	0	0	167	1	33	1120
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	21	51	0	0	1	6	0	0	0	0	3	0	140	55	0	0	41	0	14	332
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	3	50	0	0	2	7	0	0	0	0	3	1	157	60	0	0	48	1	9	341
08:30 AM	0	0	0	0	0	0	0	0	0	0	2	16	39	0	0	2	1	0	0	0	0	2	1	160	42	0	0	38	0	11	314
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	10	44	0	0	3	6	0	0	0	0	2	0	175	41	0	0	46	1	9	337
Total	0	0	0	0	0	0	0	0	0	0	2	50	184	0	0	8	20	0	0	0	0	10	2	632	198	0	0	173	2	43	1324
Grand Total	0	0	0	0	0	0	0	0	0	0	3	56	362	0	0	15	33	1	0	0	0	34	6	1095	420	0	0	340	3	76	2444
Apprch %	0	0	0	0	0	0	0	0	0	0	0.7	13.3	86	0	0	30.6	67.3	2	0	0	0	2.2	0.4	70.4	27	0	0	81.1	0.7	18.1	
Total %	0	0	0	0	0	0	0	0	0	0	0.1	2.3	14.8	0	0	0.6	1.4	0	0	0	0	1.4	0.2	44.8	17.2	0	0	13.9	0.1	3.1	

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 07:45 AM

	Commonwealth Avenue (Route 30) EB From North						Carriage Road From Northeast						Kelton Street From East						Carriage Road From Southeast						Commonwealth Avenue (Route 30) EB From South						MBTA Tracks From West						
Start Time	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Int. Total
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	3	57	0	0	60	4	8	1	0	0	13	0	15	2	160	64	241	0	0	49	0	9	58	372
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	21	51	0	0	72	1	6	0	0	0	7	0	3	0	140	55	198	0	0	41	0	14	55	332
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	3	50	0	0	53	2	7	0	0	0	9	0	3	1	157	60	221	0	0	48	1	9	58	341
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	2	16	39	0	0	57	2	1	0	0	0	3	0	2	1	160	42	205	0	0	38	0	11	49	314
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	2	43	197	0	0	242	9	22	1	0	0	32	0	23	4	617	221	865	0	0	176	1	43	220	1359
% App. Total	0	0	0	0	0		0	0	0	0	0		0.8	17.8	81.4	0	0		28.1	68.8	3.1	0	0		0	2.7	0.5	71.3	25.5		0	0	80	0.5	19.5		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.512	.864	.000	.000	.840	.563	.688	.250	.000	.000	.615	.000	.383	.500	.964	.863	.897	.000	.000	.898	.250	.768	.948	.913

PRECISION DATA INDUSTRIES, LLC

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N/S: Commonwealth Avenue (Route 30) EB
E/W/NSE: Kelton Street/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

File Name : 112737 A2
Site Code : TBA
Start Date : 12/14/2011
Page No : 1

Groups Printed- Heavy Vehicles

	Commonwealth Avenue (Route 30) EB From North					Carriage Road From Northeast					Kelton Street From East					Carriage Road From Southeast					Commonwealth Avenue (Route 30) EB From South					MBTA Tracks From West					
Start Time	Right	Thru	Bear Left	Left	Hard Left	Hard Right	Bear Right	Bear Left	Left	Hard Left	Hard Right	Right	Thru	Left	Hard Left	Hard Right	Right	Bear Right	Bear Left	Hard Left	Hard Right	Right	Bear Right	Thru	Left	Right	Bear Right	Thru	Bear Left	Left	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	0	0	3	0	2	10
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	2	0	0	2	0	2	9
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	3	1	0	0	1	0	0	9
07:45 AM	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	1	0	3	0	0	0	3	0	1	11
Total	0	0	0	0	0	0	0	0	0	0	2	0	6	0	0	1	0	0	0	0	0	1	0	9	6	0	0	9	0	5	39
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	4
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	4	3	0	0	1	0	0	10
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	5	0	0	0	1	0	0	8
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	2	7
Total	0	0	0	0	0	0	0	0	0	0	0	3	5	0	0	0	0	0	0	0	0	0	1	11	5	0	0	2	0	2	29
Grand Total	0	0	0	0	0	0	0	0	0	0	2	3	11	0	0	1	0	0	0	0	0	1	1	20	11	0	0	11	0	7	68
Apprch %	0	0	0	0	0	0	0	0	0	0	12.5	18.8	68.8	0	0	100	0	0	0	0	0	3	3	60.6	33.3	0	0	61.1	0	38.9	
Total %	0	0	0	0	0	0	0	0	0	0	2.9	4.4	16.2	0	0	1.5	0	0	0	0	0	1.5	1.5	29.4	16.2	0	0	16.2	0	10.3	

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 07:00 AM

	Commonwealth Avenue (Route 30) EB From North						Carriage Road From Northeast						Kelton Street From East						Carriage Road From Southeast						Commonwealth Avenue (Route 30) EB From South						MBTA Tracks From West						
Start Time	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Int. Total
07:00 AM	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	2	**3**	**5**	0	0	**3**	0	**2**	**5**	10
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	**1**	0	0	0	0	**1**	0	0	0	1	2	3	0	0	2	0	2	4	9
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**4**	0	0	**4**	0	0	0	0	0	0	0	0	0	**3**	1	4	0	0	1	0	0	1	9
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	**2**	0	1	0	0	3	0	0	0	0	0	0	0	**1**	0	3	0	4	0	0	3	0	1	4	**11**
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	2	0	6	0	0	8	1	0	0	0	0	1	0	1	0	9	6	16	0	0	9	0	5	14	39
% App. Total	0	0	0	0	0		0	0	0	0	0		25	0	75	0	0		100	0	0	0	0		0	6.2	0	56.2	37.5		0	0	64.3	0	35.7		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.000	.375	.000	.000	.500	.250	.000	.000	.000	.000	.250	.000	.250	.000	.750	.500	.800	.000	.000	.750	.000	.625	.700	.886

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N/S: Commonwealth Avenue (Route 30) EB
E/W/NSE: Kelton Street/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

File Name : 112737 A2
Site Code : TBA
Start Date : 12/14/2011
Page No : 1

Groups Printed- Peds and Bicycles

	Commonwealth Avenue (Route 30) EB From North						Carriage Road From Northeast						Kelton Street From East						Carriage Road From Southeast						Commonwealth Avenue (Route 30) EB From South						MBTA Tracks From West						
Start Time	Right	Thru	Bear Left	Left	Hard Left	Peds	Hard Right	Bear Right	Bear Left	Left	Hard Left	Peds	Hard Right	Right	Thru	Left	Hard Left	Peds	Hard Right	Right	Bear Right	Bear Left	Hard Left	Peds	Hard Right	Right	Bear Right	Thru	Left	Peds	Right	Bear Right	Thru	Bear Left	Left	Peds	Int. Total
07:00 AM	0	0	0	0	0	5	0	0	0	0	0	5	0	0	2	0	0	8	0	0	0	0	0	14	0	0	0	0	0	14	0	0	1	0	0	0	49
07:15 AM																																					
07:30 AM	0	0	0	0	0	8	0	0	0	0	0	6	0	0	1	0	0	3	0	0	0	0	0	8	0	0	0	0	0	9	0	0	1	0	0	0	36
07:45 AM	0	0	0	0	0	7	0	0	0	0	0	8	0	0	0	0	0	11	0	0	0	0	0	13	0	0	0	1	0	13	0	0	5	0	0	0	58
Total	0	0	0	0	0	26	0	0	0	0	0	25	0	0	4	0	0	26	0	0	0	0	0	40	0	0	0	1	0	41	0	0	13	1	0	0	177
08:00 AM																																					
08:15 AM	0	0	0	0	0	12	0	0	0	0	0	11	0	0	1	0	0	7	0	4	0	0	0	14	0	0	0	0	0	15	0	0	1	0	0	0	65
08:30 AM																																					
08:45 AM	0	0	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	2	0	1	0	0	0	10	0	1	0	0	1	11	0	0	0	1	0	0	37
Total	0	0	0	0	0	41	0	0	0	0	0	40	0	0	2	0	0	23	0	9	0	0	0	56	0	1	0	1	1	56	0	0	4	4	0	0	238
Grand Total	0	0	0	0	0	67	0	0	0	0	0	65	0	0	6	0	0	49	0	9	0	0	0	96	0	1	0	2	1	97	0	0	17	5	0	0	415
Apprch %	0	0	0	0	0	100	0	0	0	0	0	100	0	0	10.9	0	0	89.1	0	8.6	0	0	0	91.4	0	1	0	2	1	96	0	0	77.3	22.7	0	0	
Total %	0	0	0	0	0	16.1	0	0	0	0	0	15.7	0	0	1.4	0	0	11.8	0	2.2	0	0	0	23.1	0	0.2	0	0.5	0.2	23.4	0	0	4.1	1.2	0	0	

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 07:45 AM

	Commonwealth Avenue (Route 30) EB From North							Carriage Road From Northeast							Kelton Street From East							Carriage Road From Southeast							Commonwealth Avenue (Route 30) EB From South							MBTA Tracks From West							
Start Time	Right	Thru	Bear Left	Left	Hard Left	Peds	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	Peds	App. Total	Hard Right	Right	Thru	Left	Hard Left	Peds	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	Peds	App. Total	Hard Right	Right	Bear Right	Thru	Left	Peds	App. Total	Right	Bear Right	Thru	Bear Left	Left	Peds	App. Total	Int. Total
07:45 AM	0	0	0	0	0	7	7	0	0	0	0	0	8	8	0	0	0	0	0	**11**	**11**	0	0	0	0	0	13	13	0	0	0	**1**	0	13	14	0	0	**5**	0	0	0	**5**	58
08:00 AM	0	0	0	0	0	**14**	**14**	0	0	0	0	0	**14**	**14**	0	0	**1**	0	0	6	7	0	1	0	0	0	**20**	**21**	0	0	0	1	0	**18**	**19**	0	0	1	1	0	0	2	**77**
08:15 AM	0	0	0	0	0	12	12	0	0	0	0	0	11	11	0	0	1	0	0	7	8	0	**4**	0	0	0	14	18	0	0	0	0	0	15	15	0	0	1	0	0	0	1	65
08:30 AM	0	0	0	0	0	10	10	0	0	0	0	0	10	10	0	0	0	0	0	8	8	0	3	0	0	0	12	15	0	0	0	0	0	12	12	0	0	2	**2**	0	0	4	59
Total Volume	0	0	0	0	0	43	43	0	0	0	0	0	43	43	0	0	2	0	0	32	34	0	8	0	0	0	59	67	0	0	0	2	0	58	60	0	0	9	3	0	0	12	259
% App. Total	0	0	0	0	0	100		0	0	0	0	0	100		0	0	5.9	0	0	94.1		0	11.9	0	0	0	88.1		0	0	0	3.3	0	96.7		0	0	75	25	0	0		
PHF	.000	.000	.000	.000	.000	.768	.768	.000	.000	.000	.000	.000	.768	.768	.000	.000	.500	.000	.000	.727	.773	.000	.500	.000	.000	.000	.738	.798	.000	.000	.000	.500	.000	.806	.789	.000	.000	.450	.375	.000	.000	.600	.841

N/S: Commonwealth Avenue (Route 30) EB
E/W/NSE: Kelton Street/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

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File Name : 112737 A2
Site Code : TBA
Start Date : 12/14/2011
Page No : 1

Groups Printed- Trains

	Commonwealth Avenue (Route 30) EB From North					Carriage Road From Northeast					Kelton Street From East					Carriage Road From Southeast					Commonwealth Avenue (Route 30) EB From South					MBTA Tracks From West					
Start Time	Right	Thru	Bear Left	Left	Hard Left	Hard Right	Bear Right	Bear Left	Left	Hard Left	Hard Right	Right	Thru	Left	Hard Left	Hard Right	Right	Bear Right	Bear Left	Hard Left	Hard Right	Right	Bear Right	Thru	Left	Right	Bear Right	Thru	Bear Left	Left	Int. Total
07:00 AM	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
07:15 AM	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
07:30 AM	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
07:45 AM	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
Total	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
08:00 AM	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
08:15 AM	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
08:30 AM	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
08:45 AM	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
Total	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
Grand Total	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
Apprch %	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	
Total %																															

	Commonwealth Avenue (Route 30) EB From North						Carriage Road From Northeast						Kelton Street From East						Carriage Road From Southeast						Commonwealth Avenue (Route 30) EB From South						MBTA Tracks From West						
Start Time	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																																					
Peak Hour for Entire Intersection Begins at 07:00 AM																																					
07:00 AM	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	0	0	0	0	0
07:15 AM	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	0	0	0	0	0
07:30 AM	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	0	0	0	0	0
07:45 AM	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	0	0	0	0	0
Total Volume	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	0	0	0	0	0
% App. Total	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		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

N/S: Commonwealth Avenue (Route 30) EB
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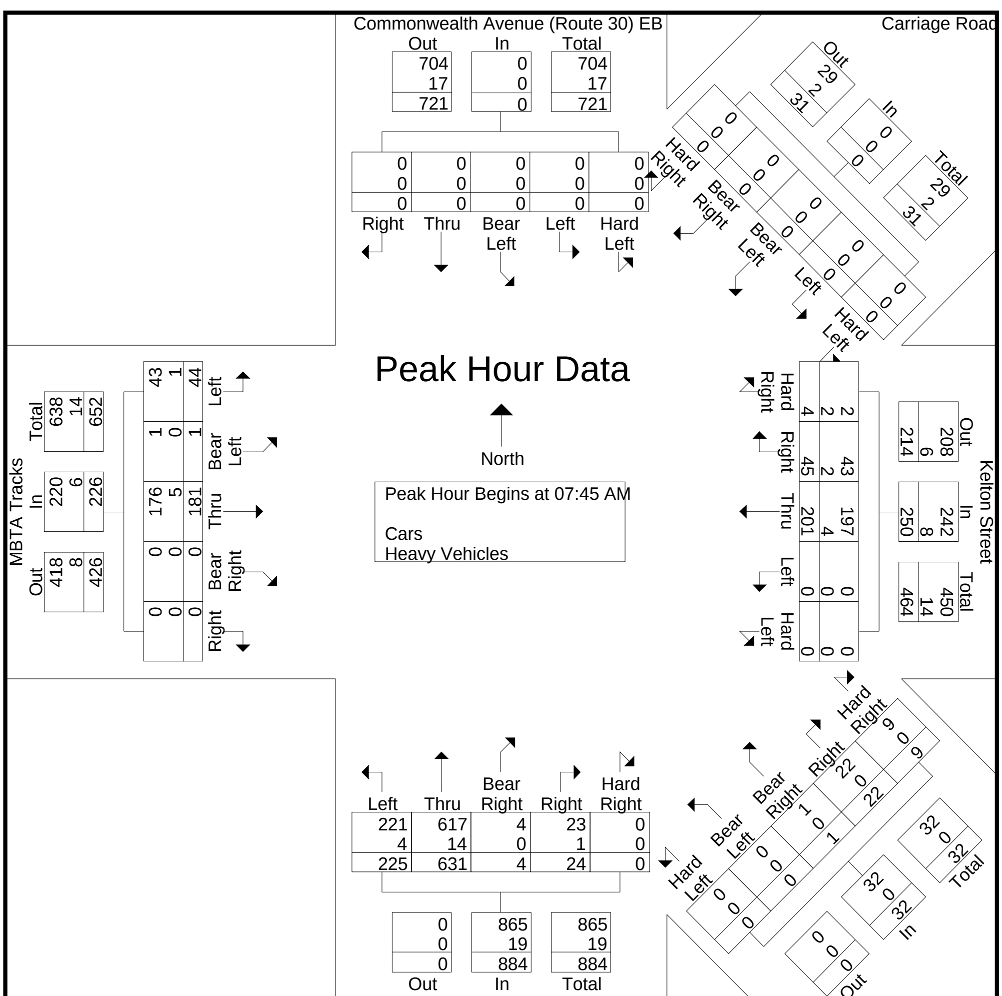
	Commonwealth Avenue (Route 30) EB From North						Carriage Road From Northeast						Kelton Street From East						Carriage Road From Southeast						Commonwealth Avenue (Route 30) EB From South						MBTA Tracks From West						
Start Time	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																																					
Peak Hour for Entire Intersection Begins at 07:45 AM																																					
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	2	3	58	0	0	63	4	8	1	0	0	13	0	16	2	163	64	245	0	0	52	0	10	62	383
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	22	51	0	0	73	1	6	0	0	0	7	0	3	0	142	56	201	0	0	41	0	14	55	336
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	4	51	0	0	55	2	7	0	0	0	9	0	3	1	161	63	228	0	0	49	1	9	59	351
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	2	16	41	0	0	59	2	1	0	0	0	3	0	2	1	165	42	210	0	0	39	0	11	50	322
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	4	45	201	0	0	250	9	22	1	0	0	32	0	24	4	631	225	884	0	0	181	1	44	226	1392
% App. Total	0	0	0	0	0		0	0	0	0	0		1.6	18	80.4	0	0		28.1	68.8	3.1	0	0		0	2.7	0.5	71.4	25.5		0	0	80.1	0.4	19.5		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.500	.511	.866	.000	.000	.856	.563	.688	.250	.000	.000	.615	.000	.375	.500	.956	.879	.902	.000	.000	.870	.250	.786	.911	.909
Cars	0	0	0	0	0	0	0	0	0	0	0	0	2	43	197	0	0	242	9	22	1	0	0	32	0	23	4	617	221	865	0	0	176	1	43	220	1359
% Cars	0	0	0	0	0	0	0	0	0	0	0	0	50.0	95.6	98.0	0	0	96.8	100	100	100	0	0	100	0	95.8	100	97.8	98.2	97.9	0	0	97.2	100	97.7	97.3	97.6
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	2	2	4	0	0	8	0	0	0	0	0	0	0	1	0	14	4	19	0	0	5	0	1	6	33
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	50.0	4.4	2.0	0	0	3.2	0	0	0	0	0	0	0	4.2	0	2.2	1.8	2.1	0	0	2.8	0	2.3	2.7	2.4



PRECISION DATA INDUSTRIES, LLC
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N/S: Commonwealth Avenue (Route 30) WB
E/W/NSW: Warren Street/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

File Name : 112737 AA1
Site Code : TBA
Start Date : 12/14/2011

Groups Printed- Cars - Heavy Vehicles

	Commonwealth Avenue (Route 30) WB From North					MBTA Tracks From East					Commonwealth Avenue (Route 30) WB From South					Carriage Road From Southwest					Warren Street From West					Carriage Road From Northwest					
Start Time	Hard Right	Right	Bear Right	Thru	Left	Right	Bear Right	Thru	Bear Left	Left	Right	Thru	Bear Left	Left	Hard Left	Hard Right	Bear Right	Bear Left	Left	Hard Left	Hard Right	Right	Thru	Left	Hard Left	Hard Right	Right	Bear Right	Bear Left	Hard Left	Int. Total
04:00 PM	0	17	1	95	3	0	0	62	1	11	0	0	0	0	0	0	0	0	0	8	2	22	64	0	0	12	16	10	0	0	324
04:15 PM	0	7	1	93	1	0	0	47	2	10	0	0	0	0	0	0	1	0	0	7	2	22	39	0	0	5	8	25	0	0	270
04:30 PM	0	17	0	121	1	0	0	60	1	4	0	0	0	0	0	0	0	0	0	10	5	15	70	0	0	7	11	24	0	0	346
04:45 PM	0	5	1	114	1	0	0	67	1	6	0	0	0	0	0	0	1	0	0	10	2	17	45	0	0	12	2	24	0	0	308
Total	0	46	3	423	6	0	0	236	5	31	0	0	0	0	0	0	2	0	0	35	11	76	218	0	0	36	37	83	0	0	1248
05:00 PM	0	11	0	134	2	0	0	64	1	13	0	0	0	0	0	0	0	0	0	3	3	32	61	0	0	10	8	29	0	0	371
05:15 PM	0	10	0	158	3	0	0	71	4	8	0	0	0	0	0	0	0	0	0	3	2	23	71	0	0	12	10	42	0	0	417
05:30 PM	0	2	0	120	1	0	0	65	0	12	0	0	0	0	0	0	0	0	0	3	5	16	87	0	0	15	6	32	0	0	364
05:45 PM	0	9	2	132	2	0	0	59	0	4	0	0	0	0	0	0	0	0	0	1	1	11	59	0	0	10	12	21	0	0	323
Total	0	32	2	544	8	0	0	259	5	37	0	0	0	0	0	0	0	0	0	10	11	82	278	0	0	47	36	124	0	0	1475
Grand Total	0	78	5	967	14	0	0	495	10	68	0	0	0	0	0	0	2	0	0	45	22	158	496	0	0	83	73	207	0	0	2723
Apprch %	0	7.3	0.5	90.9	1.3	0	0	86.4	1.7	11.9	0	0	0	0	0	0	4.3	0	0	95.7	3.3	23.4	73.4	0	0	22.9	20.1	57	0	0	
Total %	0	2.9	0.2	35.5	0.5	0	0	18.2	0.4	2.5	0	0	0	0	0	0	0.1	0	0	1.7	0.8	5.8	18.2	0	0	3	2.7	7.6	0	0	
Cars	0	76	5	959	14	0	0	483	10	65	0	0	0	0	0	0	2	0	0	45	21	157	493	0	0	80	64	206	0	0	2680
% Cars	0	97.4	100	99.2	100	0	0	97.6	100	95.6	0	0	0	0	0	0	100	0	0	100	95.5	99.4	99.4	0	0	96.4	87.7	99.5	0	0	98.4
Heavy Vehicles	0	2	0	8	0	0	0	12	0	3	0	0	0	0	0	0	0	0	0	0	1	1	3	0	0	3	9	1	0	0	43
% Heavy Vehicles	0	2.6	0	0.8	0	0	0	2.4	0	4.4	0	0	0	0	0	0	0	0	0	0	4.5	0.6	0.6	0	0	3.6	12.3	0.5	0	0	1.6

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 05:00 PM

	Commonwealth Avenue (Route 30) WB From North						MBTA Tracks From East						Commonwealth Avenue (Route 30) WB From South						Carriage Road From Southwest						Warren Street From West						Carriage Road From Northwest						
Start Time	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Int. Total
05:00 PM	0	11	0	134	2	147	0	0	64	1	13	78	0	0	0	0	0	0	0	0	0	0	3	3	3	32	61	0	0	96	10	8	29	0	0	47	371
05:15 PM	0	10	0	158	3	171	0	0	71	4	8	83	0	0	0	0	0	0	0	0	0	0	3	3	2	23	71	0	0	96	12	10	42	0	0	64	417
05:30 PM	0	2	0	120	1	123	0	0	65	0	12	77	0	0	0	0	0	0	0	0	0	0	3	3	5	16	87	0	0	108	15	6	32	0	0	53	364
05:45 PM	0	9	2	132	2	145	0	0	59	0	4	63	0	0	0	0	0	0	0	0	0	0	1	1	1	11	59	0	0	71	10	12	21	0	0	43	323
Total Volume	0	32	2	544	8	586	0	0	259	5	37	301	0	0	0	0	0	0	0	0	0	0	10	10	11	82	278	0	0	371	47	36	124	0	0	207	1475
% App. Total	0	5.5	0.3	92.8	1.4		0	0	86	1.7	12.3		0	0	0	0	0		0	0	0	0	100		3	22.1	74.9	0	0		22.7	17.4	59.9	0	0		
PHF	.000	.727	.250	.861	.667	.857	.000	.000	.912	.313	.712	.907	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.833	.833	.550	.641	.799	.000	.000	.859	.783	.750	.738	.000	.000	.809	.884
Cars	0	31	2	540	8	581	0	0	254	5	35	294	0	0	0	0	0	0	0	0	0	0	10	10	11	81	278	0	0	370	45	31	123	0	0	199	1454
% Cars	0	96.9	100	99.3	100	99.1	0	0	98.1	100	94.6	97.7	0	0	0	0	0	0	0	0	0	0	100	100	100	98.8	100	0	0	99.7	95.7	86.1	99.2	0	0	96.1	98.6
Heavy Vehicles	0	1	0	4	0	5	0	0	5	0	2	7	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2	5	1	0	0	8	21
% Heavy Vehicles	0	3.1	0	0.7	0	0.9	0	0	1.9	0	5.4	2.3	0	0	0	0	0	0	0	0	0	0	0	0	0	1.2	0	0	0	0.3	4.3	13.9	0.8	0	0	3.9	1.4

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E/W/NSW: Warren Street/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

File Name : 112737 AA1
Site Code : TBA
Start Date : 12/14/2011
Page No : 1

Groups Printed- Cars

	Commonwealth Avenue (Route 30) WB From North					MBTA Tracks From East					Commonwealth Avenue (Route 30) WB From South				
Start Time	Hard Right	Right	Bear Right	Thru	Left	Right	Bear Right	Thru	Bear Left	Left	Right	Thru	Bear Left	Left	Hard Left
04:00 PM	0	17	1	94	3	0	0	60	1	11	0	0	0	0	0
04:15 PM	0	7	1	93	1	0	0	45	2	9	0	0	0	0	0
04:30 PM	0	16	0	118	1	0	0	59	1	4	0	0	0	0	0
04:45 PM	0	5	1	114	1	0	0	65	1	6	0	0	0	0	0
Total	0	45	3	419	6	0	0	229	5	30	0	0	0	0	0
05:00 PM	0	10	0	133	2	0	0	59	1	12	0	0	0	0	0
05:15 PM	0	10	0	156	3	0	0	71	4	8	0	0	0	0	0
05:30 PM	0	2	0	120	1	0	0	65	0	11	0	0	0	0	0
05:45 PM	0	9	2	131	2	0	0	59	0	4	0	0	0	0	0
Total	0	31	2	540	8	0	0	254	5	35	0	0	0	0	0
Grand Total	0	76	5	959	14	0	0	483	10	65	0	0	0	0	0
Apprch %	0	7.2	0.5	91	1.3	0	0	86.6	1.8	11.6	0	0	0	0	0
Total %	0	2.8	0.2	35.8	0.5	0	0	18	0.4	2.4	0	0	0	0	0

	Carriage Road From Southwest					Warren Street From West					Carriage Road From Northwest					
Start Time	Hard Right	Bear Right	Bear Left	Left	Hard Left	Hard Right	Right	Thru	Left	Hard Left	Hard Right	Right	Bear Right	Bear Left	Hard Left	Int. Total
04:00 PM	0	0	0	0	8	1	22	62	0	0	11	14	10	0	0	315
04:15 PM	0	1	0	0	7	2	22	39	0	0	5	6	25	0	0	265
04:30 PM	0	0	0	0	10	5	15	70	0	0	7	11	24	0	0	341
04:45 PM	0	1	0	0	10	2	17	44	0	0	12	2	24	0	0	305
Total	0	2	0	0	35	10	76	215	0	0	35	33	83	0	0	1226
05:00 PM	0	0	0	0	3	3	31	61	0	0	9	6	28	0	0	358
05:15 PM	0	0	0	0	3	2	23	71	0	0	11	8	42	0	0	412
05:30 PM	0	0	0	0	3	5	16	87	0	0	15	6	32	0	0	363
05:45 PM	0	0	0	0	1	1	11	59	0	0	10	11	21	0	0	321
Total	0	0	0	0	10	11	81	278	0	0	45	31	123	0	0	1454
Grand Total	0	2	0	0	45	21	157	493	0	0	80	64	206	0	0	2680
Apprch %	0	4.3	0	0	95.7	3.1	23.4	73.5	0	0	22.9	18.3	58.9	0	0	
Total %	0	0.1	0	0	1.7	0.8	5.9	18.4	0	0	3	2.4	7.7	0	0	

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 05:00 PM

	Commonwealth Avenue (Route 30) WB From North						MBTA Tracks From East						Commonwealth Avenue (Route 30) WB From South					
Start Time	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Right	Thru	Bear Left	Left	Hard Left	App. Total
05:00 PM	0	10	0	133	2	145	0	0	59	1	12	72	0	0	0	0	0	0
05:15 PM	0	10	0	156	3	169	0	0	71	4	8	83	0	0	0	0	0	0
05:30 PM	0	2	0	120	1	123	0	0	65	0	11	76	0	0	0	0	0	0
05:45 PM	0	9	2	131	2	144	0	0	59	0	4	63	0	0	0	0	0	0
Total Volume	0	31	2	540	8	581	0	0	254	5	35	294	0	0	0	0	0	0
% App. Total	0	5.3	0.3	92.9	1.4		0	0	86.4	1.7	11.9		0	0	0	0	0	
PHF	.000	.775	.250	.865	.667	.859	.000	.000	.894	.313	.729	.886	.000	.000	.000	.000	.000	.000

	Carriage Road From Southwest						Warren Street From West						Carriage Road From Northwest						
Start Time	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Int. Total
05:00 PM	0	0	0	0	3	3	3	31	61	0	0	95	9	6	28	0	0	43	358
05:15 PM	0	0	0	0	3	3	2	23	71	0	0	96	11	8	42	0	0	61	412
05:30 PM	0	0	0	0	3	3	5	16	87	0	0	108	15	6	32	0	0	53	363
05:45 PM	0	0	0	0	1	1	1	11	59	0	0	71	10	11	21	0	0	42	321
Total Volume	0	0	0	0	10	10	11	81	278	0	0	370	45	31	123	0	0	199	1454
% App. Total	0	0	0	0	100		3	21.9	75.1	0	0		22.6	15.6	61.8	0	0		
PHF	.000	.000	.000	.000	.833	.833	.550	.653	.799	.000	.000	.856	.750	.705	.732	.000	.000	.816	.882

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Client: HSH/ J. SanClemente

File Name : 112737 AA1
Site Code : TBA
Start Date : 12/14/2011
Page No : 1

Groups Printed- Heavy Vehicles

	Commonwealth Avenue (Route 30) WB From North					MBTA Tracks From East					Commonwealth Avenue (Route 30) WB From South					Carriage Road From Southwest					Warren Street From West					Carriage Road From Northwest					
Start Time	Hard Right	Right	Bear Right	Thru	Left	Right	Bear Right	Thru	Bear Left	Left	Right	Thru	Bear Left	Left	Hard Left	Hard Right	Bear Right	Bear Left	Left	Hard Left	Hard Right	Right	Thru	Left	Hard Left	Hard Right	Right	Bear Right	Bear Left	Hard Left	Int. Total
04:00 PM	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0	1	2	0	0	0	9
04:15 PM	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	5
04:30 PM	0	1	0	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
04:45 PM	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	3
Total	0	1	0	4	0	0	0	7	0	1	0	0	0	0	0	0	0	0	0	0	1	0	3	0	0	1	4	0	0	0	22
05:00 PM	0	1	0	1	0	0	0	5	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2	1	0	0	13
05:15 PM	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	5
05:30 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
05:45 PM	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2
Total	0	1	0	4	0	0	0	5	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	5	1	0	0	21
Grand Total	0	2	0	8	0	0	0	12	0	3	0	0	0	0	0	0	0	0	0	0	1	1	3	0	0	3	9	1	0	0	43
Apprch %	0	20	0	80	0	0	0	80	0	20	0	0	0	0	0	0	0	0	0	0	20	20	60	0	0	23.1	69.2	7.7	0	0	
Total %	0	4.7	0	18.6	0	0	0	27.9	0	7	0	0	0	0	0	0	0	0	0	0	2.3	2.3	7	0	0	7	20.9	2.3	0	0	

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 04:15 PM

	Commonwealth Avenue (Route 30) WB From North						MBTA Tracks From East						Commonwealth Avenue (Route 30) WB From South						Carriage Road From Southwest						Warren Street From West						Carriage Road From Northwest						
Start Time	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Int. Total
04:15 PM	0	0	0	0	0	0	0	0	2	0	**1**	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**2**	0	0	0	2	5
04:30 PM	0	**1**	0	**3**	0	**4**	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
04:45 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	0	0	**1**	0	0	0	0	0	0	3
05:00 PM	0	1	0	1	0	2	0	0	**5**	0	1	**6**	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	0	0	0	1	**1**	2	**1**	0	0	**4**	**13**
Total Volume	0	2	0	4	0	6	0	0	10	0	2	12	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2	1	4	1	0	0	6	26
% App. Total		33.3	0	66.7	0		0	0	83.3	0	16.7		0	0	0	0	0		0	0	0	0	0		0	50	50	0	0		16.7	66.7	16.7	0	0		
PHF	.000	.500	.000	.333	.000	.375	.000	.000	.500	.000	.500	.500	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.250	.000	.000	.500	.250	.500	.250	.000	.000	.375	.500

N/S: Commonwealth Avenue (Route 30) WB
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Start Date : 12/14/2011

Groups Printed- Peds and Bicycles

	Commonwealth Avenue (Route 30) WB From North						MBTA Tracks From East						Commonwealth Avenue (Route 30) WB From South						Carriage Road From Southwest						Warren Street From West						Carriage Road From Northwest						
Start Time	Hard Right	Right	Bear Right	Thru	Left	Peds	Right	Bear Right	Thru	Bear Left	Left	Peds	Right	Thru	Bear Left	Left	Hard Left	Peds	Hard Right	Bear Right	Bear Left	Left	Hard Left	Peds	Hard Right	Right	Thru	Left	Hard Left	Peds	Hard Right	Right	Bear Right	Bear Left	Hard Left	Peds	Int. Total
04:00 PM	0	0	0	0	0	10	0	0	0	0	0	1	0	0	0	0	0	28	0	0	0	0	0	22	0	0	1	0	0	10	0	0	0	0	0	31	103
04:15 PM																																					
04:30 PM	0	0	4	1	0	2	0	0	1	0	0	0	0	0	0	0	0	27	0	0	0	0	0	28	0	1	0	0	0	17	0	1	0	0	0	7	89
04:45 PM																																					
Total	0	0	4	1	0	28	0	0	3	0	0	1	0	0	0	0	0	75	0	0	0	0	0	77	0	1	6	0	0	44	0	1	0	0	0	73	314
05:00 PM																																					
05:15 PM	0	0	0	0	0	17	0	0	3	0	0	1	0	0	0	0	0	50	0	0	0	0	0	50	4	0	3	0	0	46	0	0	0	0	0	38	212
05:30 PM																																					
05:45 PM	0	0	0	0	1	10	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0	12	2	0	2	0	0	13	0	0	0	0	0	27	81
Total	0	0	0	0	1	76	0	0	6	0	0	1	0	0	0	0	0	134	0	0	0	0	0	139	6	0	8	0	0	99	0	0	0	0	0	137	607
Grand Total	0	0	4	1	1	104	0	0	9	0	0	2	0	0	0	0	0	209	0	0	0	0	0	216	6	1	14	0	0	143	0	1	0	0	0	210	921
Apprch %	0	0	3.6	0.9	0.9	94.5	0	0	81.8	0	0	18.2	0	0	0	0	0	100	0	0	0	0	0	100	3.7	0.6	8.5	0	0	87.2	0	0.5	0	0	0	99.5	
Total %	0	0	0.4	0.1	0.1	11.3	0	0	1	0	0	0.2	0	0	0	0	0	22.7	0	0	0	0	0	23.5	0.7	0.1	1.5	0	0	15.5	0	0.1	0	0	0	22.8	

	Commonwealth Avenue (Route 30) WB From North							MBTA Tracks From East							Commonwealth Avenue (Route 30) WB From South							Carriage Road From Southwest							Warren Street From West							Carriage Road From Northwest							
Start Time	Hard Right	Right	Bear Right	Thru	Left	Peds	App. Total	Right	Bear Right	Thru	Bear Left	Left	Peds	App. Total	Right	Thru	Bear Left	Left	Hard Left	Peds	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	Peds	App. Total	Hard Right	Right	Thru	Left	Hard Left	Peds	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																																											
Peak Hour for Entire Intersection Begins at 05:00 PM																																											
05:00 PM	0	0	0	0	0	29	29	0	0	1	0	0	0	1	0	0	0	0	0	40	40	0	0	0	0	0	45	45	0	0	1	0	0	19	20	0	0	0	0	0	40	40	175
05:15 PM	0	0	0	0	0	17	17	0	0	3	0	0	1	4	0	0	0	0	0	50	50	0	0	0	0	0	50	50	4	0	3	0	0	46	53	0	0	0	0	0	38	38	212
05:30 PM	0	0	0	0	0	20	20	0	0	2	0	0	0	2	0	0	0	0	0	30	30	0	0	0	0	0	32	32	0	0	2	0	0	21	23	0	0	0	0	0	32	32	139
05:45 PM	0	0	0	0	1	10	11	0	0	0	0	0	0	0	0	0	0	0	0	14	14	0	0	0	0	0	12	12	2	0	2	0	0	13	17	0	0	0	0	0	27	27	81
Total Volume	0	0	0	0	1	76	77	0	0	6	0	0	1	7	0	0	0	0	0	134	134	0	0	0	0	0	139	139	6	0	8	0	0	99	113	0	0	0	0	0	137	137	607
% App. Total	0	0	0	0	1.3	98.7		0	0	85.7	0	0	14.3		0	0	0	0	0	100		0	0	0	0	0	100		5.3	0	7.1	0	0	87.6		0	0	0	0	0	100		
PHF	.000	.000	.000	.000	.250	.655	.664	.000	.000	.500	.000	.000	.250	.438	.000	.000	.000	.000	.000	.670	.670	.000	.000	.000	.000	.000	.695	.695	.375	.000	.667	.000	.000	.538	.533	.000	.000	.000	.000	.000	.856	.856	.716

PRECISION DATA INDUSTRIES, LLC

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N/S: Commonwealth Avenue (Route 30) WB
E/W/NSW: Warren Street/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

File Name : 112737 AA1
Site Code : TBA
Start Date : 12/14/2011

Groups Printed- Trains

	Commonwealth Avenue (Route 30) WB From North					MBTA Tracks From East					Commonwealth Avenue (Route 30) WB From South					Carriage Road From Southwest					Warren Street From West					Carriage Road From Northwest					
Start Time	Hard Right	Right	Bear Right	Thru	Left	Right	Bear Right	Thru	Bear Left	Left	Right	Thru	Bear Left	Left	Hard Left	Hard Right	Bear Right	Bear Left	Left	Hard Left	Hard Right	Right	Thru	Left	Hard Left	Hard Right	Right	Bear Right	Bear Left	Hard Left	Int. Total
04:00 PM	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
04:15 PM	0	0	0	3	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
04:30 PM	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
04:45 PM	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Total	0	0	0	9	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18
05:00 PM	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
05:15 PM	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
05:30 PM	0	0	0	2	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
05:45 PM	0	0	0	3	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Total	0	0	0	9	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18
Grand Total	0	0	0	18	0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36
Apprch %	0	0	0	100	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total %	0	0	0	50	0	0	0	0	0	0	0	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 04:00 PM

	Commonwealth Avenue (Route 30) WB From North						MBTA Tracks From East						Commonwealth Avenue (Route 30) WB From South						Carriage Road From Southwest						Warren Street From West						Carriage Road From Northwest						
Start Time	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Int. Total
04:00 PM	0	0	0	2	0	2	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
04:15 PM	0	0	0	**3**	0	**3**	0	0	0	0	0	0	0	**3**	0	0	0	**3**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**6**
04:30 PM	0	0	0	2	0	2	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
04:45 PM	0	0	0	2	0	2	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Total Volume	0	0	0	9	0	9	0	0	0	0	0	0	0	9	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18
% App. Total	0	0	0	100	0		0	0	0	0	0		0	100	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		
PHF	.000	.000	.000	.750	.000	.750	.000	.000	.000	.000	.000	.000	.000	.750	.000	.000	.000	.750	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.750

N/S: Commonwealth Avenue (Route 30) WB
E/W/NSW: Warren Street/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

PRECISION DATA INDUSTRIES, LLC
P.O. Box 301 Berlin, MA 01503
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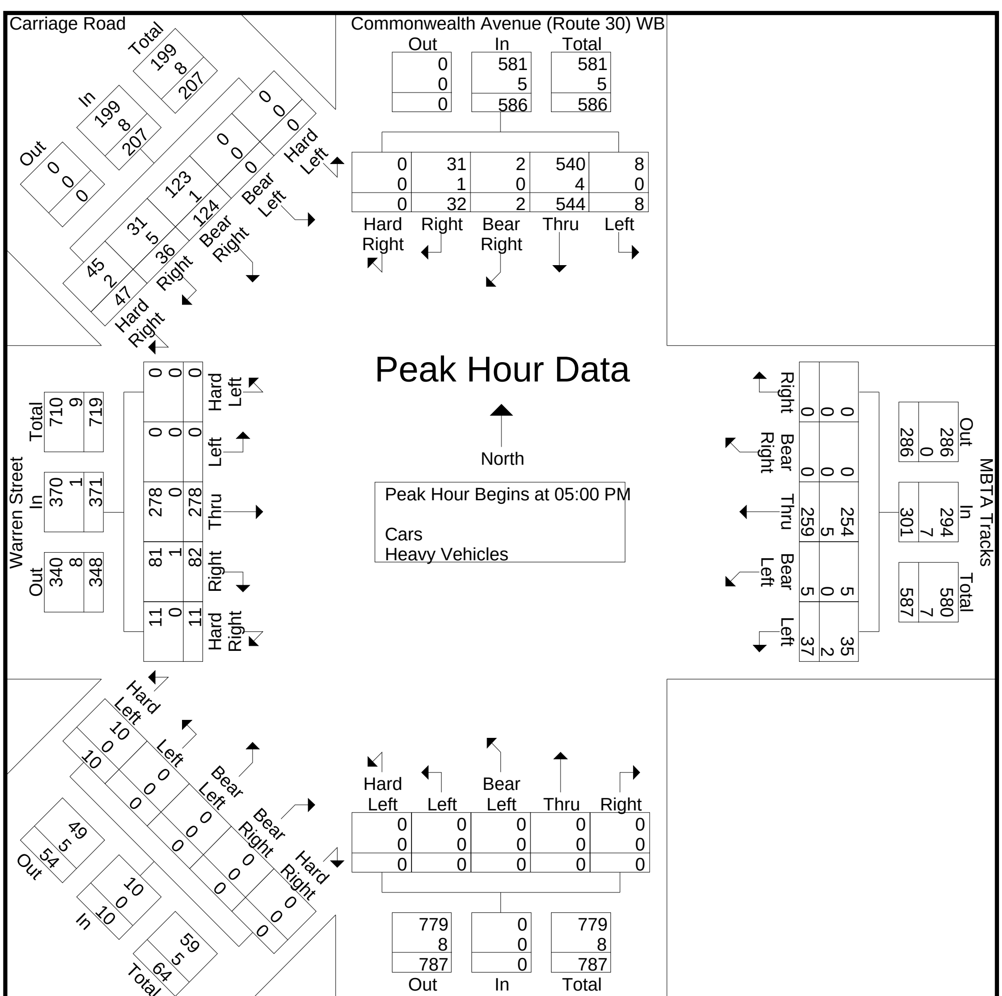
File Name : 112737 AA1
Site Code : TBA
Start Date : 12/14/2011
Page No : 1

	Commonwealth Avenue (Route 30) WB From North						MBTA Tracks From East					
Start Time	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1												
Peak Hour for Entire Intersection Begins at 05:00 PM												
05:00 PM	0	11	0	134	2	147	0	0	64	1	13	78
05:15 PM	0	10	0	158	3	171	0	0	71	4	8	83
05:30 PM	0	2	0	120	1	123	0	0	65	0	12	77
05:45 PM	0	9	2	132	2	145	0	0	59	0	4	63
Total Volume	0	32	2	544	8	586	0	0	259	5	37	301
% App. Total	0	5.5	0.3	92.8	1.4		0	0	86	1.7	12.3	
PHF	.000	.727	.250	.861	.667	.857	.000	.000	.912	.313	.712	.907
Cars	0	31	2	540	8	581	0	0	254	5	35	294
% Cars	0	96.9	100	99.3	100	99.1	0	0	98.1	100	94.6	97.7
Heavy Vehicles	0	1	0	4	0	5	0	0	5	0	2	7
% Heavy Vehicles	0	3.1	0	0.7	0	0.9	0	0	1.9	0	5.4	2.3

	Commonwealth Avenue (Route 30) WB From South						Carriage Road From Southwest					
Start Time	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total
05:00 PM	0	0	0	0	0	0	0	0	0	0	3	3
05:15 PM	0	0	0	0	0	0	0	0	0	0	3	3
05:30 PM	0	0	0	0	0	0	0	0	0	0	3	3
05:45 PM	0	0	0	0	0	0	0	0	0	0	1	1
Total Volume	0	0	0	0	0	0	0	0	0	0	10	10
% App. Total	0	0	0	0	0		0	0	0	0	100	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.833	.833
Cars	0	0	0	0	0	0	0	0	0	0	10	10
% Cars	0	0	0	0	0	0	0	0	0	0	100	100
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0

	Warren Street From West						Carriage Road From Northwest						
Start Time	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Int. Total
05:00 PM	3	32	61	0	0	96	10	8	29	0	0	47	371
05:15 PM	2	23	71	0	0	96	12	10	42	0	0	64	417
05:30 PM	5	16	87	0	0	108	15	6	32	0	0	53	364
05:45 PM	1	11	59	0	0	71	10	12	21	0	0	43	323
Total Volume	11	82	278	0	0	371	47	36	124	0	0	207	1475
% App. Total	3	22.1	74.9	0	0		22.7	17.4	59.9	0	0		
PHF	.550	.641	.799	.000	.000	.859	.783	.750	.738	.000	.000	.809	.884
Cars	11	81	278	0	0	370	45	31	123	0	0	199	1454
% Cars	100	98.8	100	0	0	99.7	95.7	86.1	99.2	0	0	96.1	98.6
Heavy Vehicles	0	1	0	0	0	1	2	5	1	0	0	8	21
% Heavy Vehicles	0	1.2	0	0	0	0.3	4.3	13.9	0.8	0	0	3.9	1.4



PRECISION
DATA
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N/S: Commonwealth Avenue (Route 30) EB
E/W/NSE: Kelton Street/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

File Name : 112737 AA2
Site Code : TBA
Start Date : 12/14/2011
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Commonwealth Avenue (Route 30) EB From North					Carriage Road From Northeast					Kelton Street From East					Carriage Road From Southeast					Commonwealth Avenue (Route 30) EB From South					MBTA Tracks From West					
Start Time	Right	Thru	Bear Left	Left	Hard Left	Hard Right	Bear Right	Bear Right	Left	Hard Left	Hard Right	Right	Thru	Left	Hard Left	Hard Right	Right	Bear Right	Bear Left	Hard Left	Hard Right	Right	Bear Right	Thru	Left	Right	Bear Right	Thru	Bear Left	Left	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0	2	2	45	0	0	2	2	0	1	0	0	4	2	57	25	0	0	59	1	6	208
04:15 PM	0	0	0	0	0	0	0	0	0	0	2	0	40	0	0	0	1	0	0	0	0	2	2	91	17	0	0	33	1	8	197
04:30 PM	0	0	0	0	0	0	0	0	0	0	1	0	50	0	0	1	7	0	0	0	0	4	1	106	24	0	0	65	0	7	266
04:45 PM	0	0	0	0	0	0	0	0	0	0	2	1	49	0	0	3	5	0	0	0	0	1	1	92	30	0	0	40	0	6	230
Total	0	0	0	0	0	0	0	0	0	0	7	3	184	0	0	6	15	0	1	0	0	11	6	346	96	0	0	197	2	27	901
05:00 PM	0	0	0	0	0	0	0	0	0	0	3	1	55	0	0	2	2	0	0	0	0	1	1	83	30	0	0	54	0	8	240
05:15 PM	0	0	0	0	0	0	0	0	0	0	5	3	62	0	0	2	1	0	0	0	0	0	2	80	21	0	0	67	1	7	251
05:30 PM	0	0	0	0	0	0	0	0	0	0	4	0	46	0	0	4	2	0	0	0	0	7	2	92	28	0	0	75	1	9	270
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	1	42	0	0	1	5	0	0	0	0	6	3	97	20	0	0	56	0	6	237
Total	0	0	0	0	0	0	0	0	0	0	12	5	205	0	0	9	10	0	0	0	0	14	8	352	99	0	0	252	2	30	998
Grand Total	0	0	0	0	0	0	0	0	0	0	19	8	389	0	0	15	25	0	1	0	0	25	14	698	195	0	0	449	4	57	1899
Apprch %	0	0	0	0	0	0	0	0	0	0	4.6	1.9	93.5	0	0	36.6	61	0	2.4	0	0	2.7	1.5	74.9	20.9	0	0	88	0.8	11.2	
Total %	0	0	0	0	0	0	0	0	0	0	1	0.4	20.5	0	0	0.8	1.3	0	0.1	0	0	1.3	0.7	36.8	10.3	0	0	23.6	0.2	3	
Cars	0	0	0	0	0	0	0	0	0	0	17	7	379	0	0	15	25	0	1	0	0	25	14	694	190	0	0	446	4	57	1874
% Cars	0	0	0	0	0	0	0	0	0	0	89.5	87.5	97.4	0	0	100	100	0	100	0	0	100	100	99.4	97.4	0	0	99.3	100	100	98.7
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	2	1	10	0	0	0	0	0	0	0	0	0	0	4	5	0	0	3	0	0	25
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	10.5	12.5	2.6	0	0	0	0	0	0	0	0	0	0	0.6	2.6	0	0	0.7	0	0	1.3

	Commonwealth Avenue (Route 30) EB From North						Carriage Road From Northeast						Kelton Street From East						Carriage Road From Southeast						Commonwealth Avenue (Route 30) EB From South						MBTA Tracks From West						
Start Time	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																																					
Peak Hour for Entire Intersection Begins at 05:00 PM																																					
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	3	1	55	0	0	59	2	2	0	0	0	4	0	1	1	83	**30**	115	0	0	54	0	8	62	240
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	**5**	**3**	**62**	**0**	**0**	**70**	2	1	0	0	0	3	0	0	2	80	21	103	0	0	67	**1**	7	75	251
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	4	0	46	0	0	50	**4**	2	0	0	0	**6**	0	**7**	2	92	28	**129**	0	0	**75**	**1**	**9**	**85**	**270**
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	42	0	0	43	1	**5**	0	0	0	6	0	6	**3**	**97**	20	126	0	0	56	0	6	62	237
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	12	5	205	0	0	222	9	10	0	0	0	19	0	14	8	352	99	473	0	0	252	2	30	284	998
% App. Total	0	0	0	0	0		0	0	0	0	0		5.4	2.3	92.3	0	0		47.4	52.6	0	0	0		0	3	1.7	74.4	20.9		0	0	88.7	0.7	10.6		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.600	.417	.827	.000	.000	.793	.563	.500	.000	.000	.000	.792	.000	.500	.667	.907	.825	.917	.000	.000	.840	.500	.833	.835	.924
Cars	0	0	0	0	0	0	0	0	0	0	0	0	11	5	200	0	0	216	9	10	0	0	0	19	0	14	8	349	97	468	0	0	252	2	30	284	987
% Cars	0	0	0	0	0	0	0	0	0	0	0	0	91.7	100	97.6	0	0	97.3	100	100	0	0	0	100	0	100	100	99.1	98.0	98.9	0	0	100	100	100	100	98.9
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	1	0	5	0	0	6	0	0	0	0	0	0	0	0	0	3	2	5	0	0	0	0	0	0	11
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	8.3	0	2.4	0	0	2.7	0	0	0	0	0	0	0	0	0	0.9	2.0	1.1	0	0	0	0	0	0	1.1

N/S: Commonwealth Avenue (Route 30) EB
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File Name : 112737 AA2
Site Code : TBA
Start Date : 12/14/2011

Groups Printed- Cars

	Commonwealth Avenue (Route 30) EB From North					Carriage Road From Northeast					Kelton Street From East					Carriage Road From Southeast					Commonwealth Avenue (Route 30) EB From South					MBTA Tracks From West					
Start Time	Right	Thru	Bear Left	Left	Hard Left	Hard Right	Bear Right	Bear Left	Left	Hard Left	Hard Right	Right	Thru	Left	Hard Left	Hard Right	Right	Bear Right	Bear Left	Hard Left	Hard Right	Right	Bear Right	Thru	Left	Right	Bear Right	Thru	Bear Left	Left	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0	1	1	43	0	0	2	2	0	1	0	0	4	2	56	24	0	0	57	1	6	200
04:15 PM	0	0	0	0	0	0	0	0	0	0	2	0	39	0	0	0	1	0	0	0	0	2	2	91	15	0	0	33	1	8	194
04:30 PM	0	0	0	0	0	0	0	0	0	0	1	0	49	0	0	1	7	0	0	0	0	4	1	106	24	0	0	65	0	7	265
04:45 PM	0	0	0	0	0	0	0	0	0	0	2	1	48	0	0	3	5	0	0	0	0	1	1	92	30	0	0	39	0	6	228
Total	0	0	0	0	0	0	0	0	0	0	6	2	179	0	0	6	15	0	1	0	0	11	6	345	93	0	0	194	2	27	887
05:00 PM	0	0	0	0	0	0	0	0	0	0	2	1	51	0	0	2	2	0	0	0	0	1	1	83	28	0	0	54	0	8	233
05:15 PM	0	0	0	0	0	0	0	0	0	0	5	3	62	0	0	2	1	0	0	0	0	0	2	79	21	0	0	67	1	7	250
05:30 PM	0	0	0	0	0	0	0	0	0	0	4	0	45	0	0	4	2	0	0	0	0	7	2	91	28	0	0	75	1	9	268
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	1	42	0	0	1	5	0	0	0	0	6	3	96	20	0	0	56	0	6	236
Total	0	0	0	0	0	0	0	0	0	0	11	5	200	0	0	9	10	0	0	0	0	14	8	349	97	0	0	252	2	30	987
Grand Total	0	0	0	0	0	0	0	0	0	0	17	7	379	0	0	15	25	0	1	0	0	25	14	694	190	0	0	446	4	57	1874
Apprch %	0	0	0	0	0	0	0	0	0	0	4.2	1.7	94	0	0	36.6	61	0	2.4	0	0	2.7	1.5	75.2	20.6	0	0	88	0.8	11.2	
Total %	0	0	0	0	0	0	0	0	0	0	0.9	0.4	20.2	0	0	0.8	1.3	0	0.1	0	0	1.3	0.7	37	10.1	0	0	23.8	0.2	3	

	Commonwealth Avenue (Route 30) EB From North						Carriage Road From Northeast						Kelton Street From East						Carriage Road From Southeast						Commonwealth Avenue (Route 30) EB From South						MBTA Tracks From West						
Start Time	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																																					
Peak Hour for Entire Intersection Begins at 05:00 PM																																					
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	2	1	51	0	0	54	2	2	0	0	0	4	0	1	1	83	28	113	0	0	54	0	8	62	233
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	5	3	62	0	0	70	2	1	0	0	0	3	0	0	2	79	21	102	0	0	67	1	7	75	250
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	4	0	45	0	0	49	4	2	0	0	0	6	0	7	2	91	28	128	0	0	75	1	9	85	268
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	42	0	0	43	1	5	0	0	0	6	0	6	3	96	20	125	0	0	56	0	6	62	236
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	11	5	200	0	0	216	9	10	0	0	0	19	0	14	8	349	97	468	0	0	252	2	30	284	987
% App. Total	0	0	0	0	0		0	0	0	0	0		5.1	2.3	92.6	0	0		47.4	52.6	0	0	0		0	3	1.7	74.6	20.7		0	0	88.7	0.7	10.6		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.550	.417	.806	.000	.000	.771	.563	.500	.000	.000	.000	.792	.000	.500	.667	.909	.866	.914	.000	.000	.840	.500	.833	.835	.921

N/S: Commonwealth Avenue (Route 30) EB
E/W/NSE: Kelton Street/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

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File Name : 112737 AA2
Site Code : TBA
Start Date : 12/14/2011
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Groups Printed- Heavy Vehicles

	Commonwealth Avenue (Route 30) EB From North					Carriage Road From Northeast					Kelton Street From East					Carriage Road From Southeast					Commonwealth Avenue (Route 30) EB From South					MBTA Tracks From West					
Start Time	Right	Thru	Bear Left	Left	Hard Left	Hard Right	Bear Right	Bear Left	Left	Hard Left	Hard Right	Right	Thru	Left	Hard Left	Hard Right	Right	Bear Right	Bear Left	Hard Left	Hard Right	Right	Bear Right	Thru	Left	Right	Bear Right	Thru	Bear Left	Left	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2	0	0	8
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	3
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2
Total	0	0	0	0	0	0	0	0	0	0	1	1	5	0	0	0	0	0	0	0	0	0	0	1	3	0	0	3	0	0	14
05:00 PM	0	0	0	0	0	0	0	0	0	0	1	0	4	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	7
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Total	0	0	0	0	0	0	0	0	0	0	1	0	5	0	0	0	0	0	0	0	0	0	0	3	2	0	0	0	0	0	11
Grand Total	0	0	0	0	0	0	0	0	0	0	2	1	10	0	0	0	0	0	0	0	0	0	0	4	5	0	0	3	0	0	25
Apprch %	0	0	0	0	0	0	0	0	0	0	15.4	7.7	76.9	0	0	0	0	0	0	0	0	0	0	44.4	55.6	0	0	100	0	0	
Total %	0	0	0	0	0	0	0	0	0	0	8	4	40	0	0	0	0	0	0	0	0	0	0	16	20	0	0	12	0	0	

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 04:00 PM

	Commonwealth Avenue (Route 30) EB From North						Carriage Road From Northeast						Kelton Street From East						Carriage Road From Southeast						Commonwealth Avenue (Route 30) EB From South						MBTA Tracks From West						
Start Time	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	**1**	**1**	**2**	0	0	**4**	0	0	0	0	0	0	0	0	0	**1**	1	**2**	0	0	**2**	0	0	**2**	**8**
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	**2**	2	0	0	0	0	0	0	3
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	1	1	5	0	0	7	0	0	0	0	0	0	0	0	0	1	3	4	0	0	3	0	0	3	14
% App. Total	0	0	0	0	0		0	0	0	0	0		14.3	14.3	71.4	0	0		0	0	0	0	0		0	0	0	25	75		0	0	100	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.250	.625	.000	.000	.438	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.375	.500	.000	.000	.375	.000	.000	.375	.438

N/S: Commonwealth Avenue (Route 30) EB
E/W/NSE: Kelton Street/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

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File Name : 112737 AA2
Site Code : TBA
Start Date : 12/14/2011
Page No : 1

Groups Printed- Peds and Bicycles

	Commonwealth Avenue (Route 30) EB From North						Carriage Road From Northeast						Kelton Street From East						Carriage Road From Southeast						Commonwealth Avenue (Route 30) EB From South						MBTA Tracks From West						
Start Time	Right	Thru	Bear Left	Left	Hard Left	Peds	Hard Right	Bear Right	Bear Left	Left	Hard Left	Peds	Hard Right	Right	Thru	Left	Hard Left	Peds	Hard Right	Right	Bear Right	Bear Left	Hard Left	Peds	Hard Right	Right	Bear Right	Thru	Left	Peds	Right	Bear Right	Thru	Bear Left	Left	Peds	Int. Total
04:00 PM	0	0	0	0	0	16	0	0	0	0	0	15	0	0	0	0	0	13	0	0	0	0	0	4	0	0	0	1	0	4	0	0	1	0	0	0	54
04:15 PM																																					
04:30 PM	0	0	0	0	0	10	0	0	0	0	0	10	0	0	2	0	0	16	0	1	0	0	0	8	0	0	0	0	0	8	0	0	3	0	0	0	58
04:45 PM																																					
Total	0	0	0	0	0	53	0	0	0	0	0	52	0	0	5	0	0	56	0	4	0	0	0	27	0	0	0	1	0	27	0	0	5	1	0	0	231
05:00 PM																																					
05:15 PM	0	0	0	0	0	15	0	0	0	0	0	15	0	0	4	0	0	30	0	0	0	0	0	14	0	0	0	2	0	13	0	0	3	0	0	0	96
05:30 PM																																					
05:45 PM	0	0	0	0	0	21	0	0	0	0	0	24	0	0	0	0	0	24	0	0	0	0	0	7	0	0	0	0	0	6	0	0	2	1	0	0	85
Total	0	0	0	0	0	80	0	0	0	0	0	85	0	0	7	0	0	86	0	2	0	0	0	43	0	0	0	5	0	41	0	0	8	1	0	0	358
Grand Total	0	0	0	0	0	133	0	0	0	0	0	137	0	0	12	0	0	142	0	6	0	0	0	70	0	0	0	6	0	68	0	0	13	2	0	0	589
Apprch %	0	0	0	0	0	100	0	0	0	0	0	100	0	0	7.8	0	0	92.2	0	7.9	0	0	0	92.1	0	0	0	8.1	0	91.9	0	0	86.7	13.3	0	0	
Total %	0	0	0	0	0	22.6	0	0	0	0	0	23.3	0	0	2	0	0	24.1	0	1	0	0	0	11.9	0	0	0	1	0	11.5	0	0	2.2	0.3	0	0	

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 05:00 PM

	Commonwealth Avenue (Route 30) EB From North							Carriage Road From Northeast							Kelton Street From East							Carriage Road From Southeast							Commonwealth Avenue (Route 30) EB From South							MBTA Tracks From West							
Start Time	Right	Thru	Bear Left	Left	Hard Left	Peds	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	Peds	App. Total	Hard Right	Right	Thru	Left	Hard Left	Peds	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	Peds	App. Total	Hard Right	Right	Bear Right	Thru	Left	Peds	App. Total	Right	Bear Right	Thru	Bear Left	Left	Peds	App. Total	Int. Total
05:00 PM	0	0	0	0	0	**27**	**27**	0	0	0	0	0	**28**	**28**	0	0	1	0	0	13	14	0	**1**	0	0	0	**15**	**16**	0	0	0	0	0	**16**	**16**	0	0	2	0	0	0	2	**103**
05:15 PM	0	0	0	0	0	15	15	0	0	0	0	0	15	15	0	0	**4**	0	0	**30**	**34**	0	0	0	0	0	14	14	0	0	0	2	0	13	15	0	0	**3**	0	0	0	**3**	96
05:30 PM	0	0	0	0	0	17	17	0	0	0	0	0	18	18	0	0	2	0	0	19	21	0	1	0	0	0	7	8	0	0	0	**3**	0	6	9	0	0	1	0	0	0	1	74
05:45 PM	0	0	0	0	0	21	21	0	0	0	0	0	24	24	0	0	0	0	0	24	24	0	0	0	0	0	7	7	0	0	0	0	0	6	6	0	0	2	**1**	0	0	3	85
Total Volume	0	0	0	0	0	80	80	0	0	0	0	0	85	85	0	0	7	0	0	86	93	0	2	0	0	0	43	45	0	0	0	5	0	41	46	0	0	8	1	0	0	9	358
% App. Total	0	0	0	0	0	100		0	0	0	0	0	100		0	0	7.5	0	0	92.5		0	4.4	0	0	0	95.6		0	0	0	10.9	0	89.1		0	0	88.9	11.1	0	0		
PHF	.000	.000	.000	.000	.000	.741	.741	.000	.000	.000	.000	.000	.759	.759	.000	.000	.438	.000	.000	.717	.684	.000	.500	.000	.000	.000	.717	.703	.000	.000	.000	.417	.000	.641	.719	.000	.000	.667	.250	.000	.000	.750	.869

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N/S: Commonwealth Avenue (Route 30) EB
E/W/NSE: Kelton Street/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

File Name : 112737 AA2
Site Code : TBA
Start Date : 12/14/2011
Page No : 1

Groups Printed- Trains

	Commonwealth Avenue (Route 30) EB From North					Carriage Road From Northeast					Kelton Street From East					Carriage Road From Southeast					Commonwealth Avenue (Route 30) EB From South					MBTA Tracks From West					
Start Time	Right	Thru	Bear Left	Left	Hard Left	Hard Right	Bear Right	Bear Left	Left	Hard Left	Hard Right	Right	Thru	Left	Hard Left	Hard Right	Right	Bear Right	Bear Left	Hard Left	Hard Right	Right	Bear Right	Thru	Left	Right	Bear Right	Thru	Bear Left	Left	Int. Total
04:00 PM	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
04:15 PM	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
04:30 PM	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
04:45 PM	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
Total	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
05:00 PM	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
05:15 PM	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
05:30 PM	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
05:45 PM	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
Total	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
Grand Total	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
Apprch %	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	
Total %																															

	Commonwealth Avenue (Route 30) EB From North						Carriage Road From Northeast						Kelton Street From East						Carriage Road From Southeast						Commonwealth Avenue (Route 30) EB From South						MBTA Tracks From West						
Start Time	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																																					
Peak Hour for Entire Intersection Begins at 04:00 PM																																					
04:00 PM	0	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	0	0	0	0
04:15 PM	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	0	0	0	0	0
04:30 PM	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	0	0	0	0	0
04:45 PM	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	0	0	0	0	0
Total Volume	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	0	0	0	0	0
% App. Total	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		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

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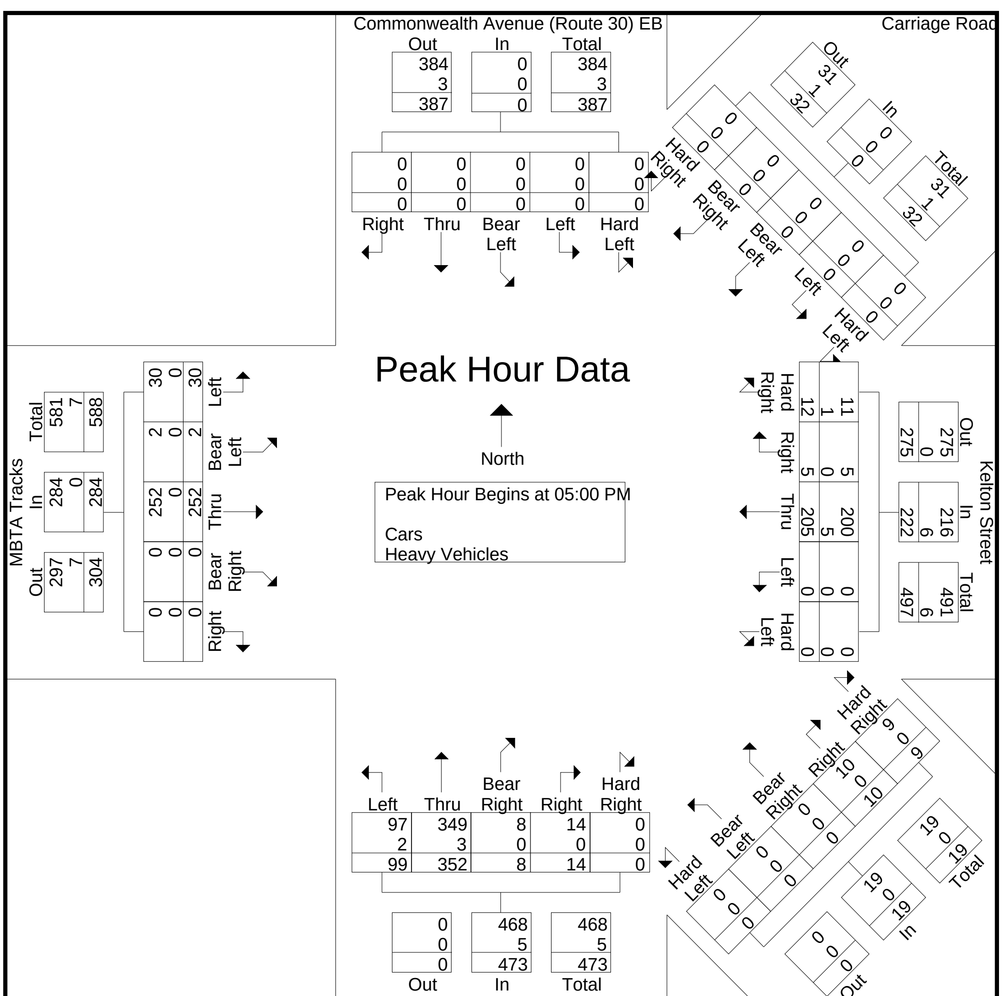
Page No : 1

	Commonwealth Avenue (Route 30) EB From North						Carriage Road From Northeast						Kelton Street From East						Carriage Road From Southeast						Commonwealth Avenue (Route 30) EB From South						MBTA Tracks From West						
Start Time	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																																					
Peak Hour for Entire Intersection Begins at 05:00 PM																																					
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	3	1	55	0	0	59	2	2	0	0	0	4	0	1	1	83	**30**	115	0	0	54	0	8	62	240
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	**5**	**3**	**62**	**0**	**0**	**70**	2	1	0	0	0	3	0	0	2	80	21	103	0	0	67	**1**	7	75	251
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	4	0	46	0	0	50	**4**	2	0	0	0	**6**	0	**7**	2	92	28	**129**	0	0	**75**	**1**	**9**	**85**	**270**
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	42	0	0	43	1	**5**	0	0	0	6	0	6	**3**	**97**	20	126	0	0	56	0	6	62	237
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	12	5	205	0	0	222	9	10	0	0	0	19	0	14	8	352	99	473	0	0	252	2	30	284	998
% App. Total	0	0	0	0	0		0	0	0	0	0		5.4	2.3	92.3	0	0		47.4	52.6	0	0	0		0	3	1.7	74.4	20.9		0	0	88.7	0.7	10.6		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.600	.417	.827	.000	.000	.793	.563	.500	.000	.000	.000	.792	.000	.500	.667	.907	.825	.917	.000	.000	.840	.500	.833	.835	.924
Cars	0	0	0	0	0	0	0	0	0	0	0	0	11	5	200	0	0	216	9	10	0	0	0	19	0	14	8	349	97	468	0	0	252	2	30	284	987
% Cars	0	0	0	0	0	0	0	0	0	0	0	0	91.7	100	97.6	0	0	97.3	100	100	0	0	0	100	0	100	100	99.1	98.0	98.9	0	0	100	100	100	100	98.9
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	1	0	5	0	0	6	0	0	0	0	0	0	0	0	0	3	2	5	0	0	0	0	0	0	11
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	8.3	0	2.4	0	0	2.7	0	0	0	0	0	0	0	0	0	0.9	2.0	1.1	0	0	0	0	0	0	1.1



PRECISION DATA INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

N/S: Commonwealth Avenue (Route 30) WB
E/W/NSW: Washington St/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

File Name : 112737 B1
Site Code : TBA
Start Date : 12/14/2011

Groups Printed- Cars - Heavy Vehicles

	Commonwealth Avenue (Route 30) WB From North					MBTA Tracks From East					Commonwealth Avenue (Route 30) WB From South					Carriage Road From Southwest					Washington Street From West					Carriage Road From Northwest					
Start Time	Hard Right	Right	Bear Right	Thru	Left	Right	Bear Right	Thru	Bear Left	Left	Right	Thru	Bear Left	Left	Hard Left	Hard Right	Bear Right	Bear Left	Left	Hard Left	Hard Right	Right	Thru	Left	Hard Left	Hard Right	Right	Bear Right	Bear Left	Hard Left	Int. Total
07:00 AM	0	3	0	60	20	0	0	50	0	3	0	0	0	0	0	2	3	0	0	0	1	8	74	1	0	0	0	0	0	0	225
07:15 AM	0	0	0	62	20	0	1	60	4	7	0	0	0	0	0	7	1	1	0	0	4	4	102	0	0	0	0	0	0	0	273
07:30 AM	0	0	0	104	37	0	0	92	1	11	0	0	0	0	0	19	2	1	0	0	1	3	97	0	0	0	0	0	0	0	368
07:45 AM	0	0	0	95	31	0	6	95	1	10	0	0	0	0	0	15	4	2	0	0	3	9	103	1	0	0	0	0	0	0	375
Total	0	3	0	321	108	0	7	297	6	31	0	0	0	0	0	43	10	4	0	0	9	24	376	2	0	0	0	0	0	0	1241
08:00 AM	0	3	0	92	23	0	3	77	2	15	0	0	0	0	0	7	4	1	0	0	2	7	117	0	0	0	0	0	0	0	353
08:15 AM	0	1	0	90	23	0	5	73	1	18	0	0	0	0	0	7	3	0	0	0	1	4	98	0	0	0	0	0	0	0	324
08:30 AM	0	0	0	87	19	0	3	85	0	7	0	0	0	0	0	5	2	1	0	0	2	4	96	1	0	0	0	0	0	0	312
08:45 AM	0	0	0	83	17	0	3	79	0	9	0	0	0	0	0	16	4	0	0	0	4	8	102	0	0	0	0	0	0	0	325
Total	0	4	0	352	82	0	14	314	3	49	0	0	0	0	0	35	13	2	0	0	9	23	413	1	0	0	0	0	0	0	1314
Grand Total	0	7	0	673	190	0	21	611	9	80	0	0	0	0	0	78	23	6	0	0	18	47	789	3	0	0	0	0	0	0	2555
Apprch %	0	0.8	0	77.4	21.8	0	2.9	84.7	1.2	11.1	0	0	0	0	0	72.9	21.5	5.6	0	0	2.1	5.5	92.1	0.4	0	0	0	0	0	0	
Total %	0	0.3	0	26.3	7.4	0	0.8	23.9	0.4	3.1	0	0	0	0	0	3.1	0.9	0.2	0	0	0.7	1.8	30.9	0.1	0	0	0	0	0	0	
Cars	0	5	0	644	174	0	21	568	9	75	0	0	0	0	0	78	22	1	0	0	16	46	753	3	0	0	0	0	0	0	2415
% Cars	0	71.4	0	95.7	91.6	0	100	93	100	93.8	0	0	0	0	0	100	95.7	16.7	0	0	88.9	97.9	95.4	100	0	0	0	0	0	0	94.5
Heavy Vehicles	0	2	0	29	16	0	0	43	0	5	0	0	0	0	0	0	1	5	0	0	2	1	36	0	0	0	0	0	0	0	140
% Heavy Vehicles	0	28.6	0	4.3	8.4	0	0	7	0	6.2	0	0	0	0	0	0	4.3	83.3	0	0	11.1	2.1	4.6	0	0	0	0	0	0	0	5.5

	Commonwealth Avenue (Route 30) WB From North						MBTA Tracks From East						Commonwealth Avenue (Route 30) WB From South						Carriage Road From Southwest						Washington Street From West						Carriage Road From Northwest						
Start Time	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																																					
Peak Hour for Entire Intersection Begins at 07:30 AM																																					
07:30 AM	0	0	0	104	37	141	0	0	92	1	11	104	0	0	0	0	0	0	19	2	1	0	0	22	1	3	97	0	0	101	0	0	0	0	0	0	368
07:45 AM	0	0	0	95	31	126	0	6	95	1	10	112	0	0	0	0	0	0	15	4	2	0	0	21	3	9	103	1	0	116	0	0	0	0	0	0	375
08:00 AM	0	3	0	92	23	118	0	3	77	2	15	97	0	0	0	0	0	0	7	4	1	0	0	12	2	7	117	0	0	126	0	0	0	0	0	0	353
08:15 AM	0	1	0	90	23	114	0	5	73	1	18	97	0	0	0	0	0	0	7	3	0	0	0	10	1	4	98	0	0	103	0	0	0	0	0	0	324
Total Volume	0	4	0	381	114	499	0	14	337	5	54	410	0	0	0	0	0	0	48	13	4	0	0	65	7	23	415	1	0	446	0	0	0	0	0	0	1420
% App. Total	0	0.8	0	76.4	22.8		0	3.4	82.2	1.2	13.2		0	0	0	0	0		73.8	20	6.2	0	0		1.6	5.2	93	0.2	0		0	0	0	0	0		
PHF	.000	.333	.000	.916	.770	.885	.000	.583	.887	.625	.750	.915	.000	.000	.000	.000	.000	.000	.632	.813	.500	.000	.000	.739	.583	.639	.887	.250	.000	.885	.000	.000	.000	.000	.000	.000	.947
Cars	0	2	0	362	103	467	0	14	313	5	49	381	0	0	0	0	0	0	48	13	1	0	0	62	5	22	398	1	0	426	0	0	0	0	0	0	1336
% Cars	0	50.0	0	95.0	90.4	93.6	0	100	92.9	100	90.7	92.9	0	0	0	0	0	0	100	100	25.0	0	0	95.4	71.4	95.7	95.9	100	0	95.5	0	0	0	0	0	0	94.1
Heavy Vehicles	0	2	0	19	11	32	0	0	24	0	5	29	0	0	0	0	0	0	0	0	3	0	0	3	2	1	17	0	0	20	0	0	0	0	0	0	84
% Heavy Vehicles	0	50.0	0	5.0	9.6	6.4	0	0	7.1	0	9.3	7.1	0	0	0	0	0	0	0	0	75.0	0	0	4.6	28.6	4.3	4.1	0	0	4.5	0	0	0	0	0	0	5.9

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City, State: Brighton, MA
Client: HSH/ J. SanClemente

File Name : 112737 B1
Site Code : TBA
Start Date : 12/14/2011

Groups Printed- Cars

	Commonwealth Avenue (Route 30) WB From North					MBTA Tracks From East					Commonwealth Avenue (Route 30) WB From South					Carriage Road From Southwest					Washington Street From West					Carriage Road From Northwest					
Start Time	Hard Right	Right	Bear Right	Thru	Left	Right	Bear Right	Thru	Bear Left	Left	Right	Thru	Bear Left	Left	Hard Left	Hard Right	Bear Right	Bear Left	Left	Hard Left	Hard Right	Right	Thru	Left	Hard Left	Hard Right	Right	Bear Right	Bear Left	Hard Left	Int. Total
07:00 AM	0	3	0	57	19	0	0	47	0	3	0	0	0	0	0	2	2	0	0	0	1	8	72	1	0	0	0	0	0	0	215
07:15 AM	0	0	0	61	17	0	1	55	4	7	0	0	0	0	0	7	1	0	0	0	4	4	96	0	0	0	0	0	0	0	257
07:30 AM	0	0	0	96	32	0	0	86	1	11	0	0	0	0	0	19	2	1	0	0	1	3	95	0	0	0	0	0	0	0	347
07:45 AM	0	0	0	92	29	0	6	91	1	10	0	0	0	0	0	15	4	0	0	0	1	8	99	1	0	0	0	0	0	0	357
Total	0	3	0	306	97	0	7	279	6	31	0	0	0	0	0	43	9	1	0	0	7	23	362	2	0	0	0	0	0	0	1176
08:00 AM	0	2	0	91	21	0	3	70	2	11	0	0	0	0	0	7	4	0	0	0	2	7	111	0	0	0	0	0	0	0	331
08:15 AM	0	0	0	83	21	0	5	66	1	17	0	0	0	0	0	7	3	0	0	0	1	4	93	0	0	0	0	0	0	0	301
08:30 AM	0	0	0	84	18	0	3	82	0	7	0	0	0	0	0	5	2	0	0	0	2	4	91	1	0	0	0	0	0	0	299
08:45 AM	0	0	0	80	17	0	3	71	0	9	0	0	0	0	0	16	4	0	0	0	4	8	96	0	0	0	0	0	0	0	308
Total	0	2	0	338	77	0	14	289	3	44	0	0	0	0	0	35	13	0	0	0	9	23	391	1	0	0	0	0	0	0	1239
Grand Total	0	5	0	644	174	0	21	568	9	75	0	0	0	0	0	78	22	1	0	0	16	46	753	3	0	0	0	0	0	0	2415
Apprch %	0	0.6	0	78.3	21.1	0	3.1	84.4	1.3	11.1	0	0	0	0	0	77.2	21.8	1	0	0	2	5.6	92.1	0.4	0	0	0	0	0	0	
Total %	0	0.2	0	26.7	7.2	0	0.9	23.5	0.4	3.1	0	0	0	0	0	3.2	0.9	0	0	0	0.7	1.9	31.2	0.1	0	0	0	0	0	0	

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 07:30 AM

	Commonwealth Avenue (Route 30) WB From North						MBTA Tracks From East						Commonwealth Avenue (Route 30) WB From South						Carriage Road From Southwest						Washington Street From West						Carriage Road From Northwest						
Start Time	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Int. Total
07:30 AM	0	0	0	**96**	**32**	**128**	0	0	86	1	11	98	0	0	0	0	0	0	**19**	**2**	**1**	0	0	**22**	1	3	95	0	0	99	0	0	0	0	0	0	347
07:45 AM	0	0	0	92	29	121	0	**6**	**91**	**1**	10	**108**	0	0	0	0	0	0	15	**4**	0	0	0	19	1	**8**	99	**1**	0	109	0	0	0	0	0	0	**357**
08:00 AM	0	**2**	0	91	21	114	0	3	70	**2**	11	86	0	0	0	0	0	0	7	4	0	0	0	11	**2**	7	**111**	0	0	**120**	0	0	0	0	0	0	331
08:15 AM	0	0	0	83	21	104	0	5	66	1	**17**	**89**	**0**	**0**	**0**	**0**	**0**	**0**	**7**	**3**	**0**	**0**	**0**	**10**	**1**	**4**	93	0	0	98	0	0	0	0	0	0	301
Total Volume	0	2	0	362	103	467	0	14	313	5	49	381	0	0	0	0	0	0	48	13	1	0	0	62	5	22	398	1	0	426	0	0	0	0	0	0	1336
% App. Total	0	0.4	0	77.5	22.1		0	3.7	82.2	1.3	12.9		0	0	0	0	0		77.4	21	1.6	0	0		1.2	5.2	93.4	0.2	0		0	0	0	0	0		
PHF	.000	.250	.000	.943	.805	.912	.000	.583	.860	.625	.721	.882	.000	.000	.000	.000	.000	.000	.632	.813	.250	.000	.000	.705	.625	.688	.896	.250	.000	.888	.000	.000	.000	.000	.000	.000	.936

N/S: Commonwealth Avenue (Route 30) WB
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Groups Printed- Heavy Vehicles

	Commonwealth Avenue (Route 30) WB From North					MBTA Tracks From East					Commonwealth Avenue (Route 30) WB From South					Carriage Road From Southwest					Washington Street From West					Carriage Road From Northwest					
Start Time	Hard Right	Right	Bear Right	Thru	Left	Right	Bear Right	Thru	Bear Left	Left	Right	Thru	Bear Left	Left	Hard Left	Hard Right	Bear Right	Bear Left	Left	Hard Left	Hard Right	Right	Thru	Left	Hard Left	Hard Right	Right	Bear Right	Bear Left	Hard Left	Int. Total
07:00 AM	0	0	0	3	1	0	0	3	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	10
07:15 AM	0	0	0	1	3	0	0	5	0	0	0	0	0	0	0	0	0	1	0	0	0	0	6	0	0	0	0	0	0	0	16
07:30 AM	0	0	0	8	5	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	21
07:45 AM	0	0	0	3	2	0	0	4	0	0	0	0	0	0	0	0	0	2	0	0	2	1	4	0	0	0	0	0	0	0	18
Total	0	0	0	15	11	0	0	18	0	0	0	0	0	0	0	0	1	3	0	0	2	1	14	0	0	0	0	0	0	0	65
08:00 AM	0	1	0	1	2	0	0	7	0	4	0	0	0	0	0	0	0	1	0	0	0	0	6	0	0	0	0	0	0	0	22
08:15 AM	0	1	0	7	2	0	0	7	0	1	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	23
08:30 AM	0	0	0	3	1	0	0	3	0	0	0	0	0	0	0	0	0	1	0	0	0	0	5	0	0	0	0	0	0	0	13
08:45 AM	0	0	0	3	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	17
Total	0	2	0	14	5	0	0	25	0	5	0	0	0	0	0	0	0	2	0	0	0	0	22	0	0	0	0	0	0	0	75
Grand Total	0	2	0	29	16	0	0	43	0	5	0	0	0	0	0	0	1	5	0	0	2	1	36	0	0	0	0	0	0	0	140
Apprch %	0	4.3	0	61.7	34	0	0	89.6	0	10.4	0	0	0	0	0	0	16.7	83.3	0	0	5.1	2.6	92.3	0	0	0	0	0	0	0	
Total %	0	1.4	0	20.7	11.4	0	0	30.7	0	3.6	0	0	0	0	0	0	0.7	3.6	0	0	1.4	0.7	25.7	0	0	0	0	0	0	0	

	Commonwealth Avenue (Route 30) WB From North						MBTA Tracks From East						Commonwealth Avenue (Route 30) WB From South						Carriage Road From Southwest						Washington Street From West						Carriage Road From Northwest						
Start Time	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																																					
Peak Hour for Entire Intersection Begins at 07:30 AM																																					
07:30 AM	0	0	0	**8**	**5**	**13**	0	0	6	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	21
07:45 AM	0	0	0	3	2	5	0	0	4	0	0	4	0	0	0	0	0	0	0	0	**2**	0	0	**2**	**2**	**1**	4	0	0	**7**	0	0	0	0	0	0	18
08:00 AM	0	**1**	0	1	2	4	0	0	**7**	0	**4**	**11**	0	0	0	0	0	0	0	0	1	0	0	1	0	0	**6**	0	0	6	0	0	0	0	0	0	22
08:15 AM	0	1	0	7	2	10	0	0	7	0	1	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	**23**
Total Volume	0	2	0	19	11	32	0	0	24	0	5	29	0	0	0	0	0	0	0	0	3	0	0	3	2	1	17	0	0	20	0	0	0	0	0	0	84
% App. Total		6.2		59.4	34.4		0	0	82.8	0	17.2		0	0	0	0	0		0	0	100				10	5	85	0	0		0	0	0	0	0		
PHF	.000	.500	.000	.594	.550	.615	.000	.000	.857	.000	.313	.659	.000	.000	.000	.000	.000	.000	.000	.000	.375	.000	.000	.375	.250	.250	.708	.000	.000	.714	.000	.000	.000	.000	.000	.000	.913

PRECISION
D A T A
INDUSTRIES, LLC
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N/S: Commonwealth Avenue (Route 30) WB
E/W/NSW: Washington St/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

File Name : 112737 B1
Site Code : TBA
Start Date : 12/14/2011
Page No : 1

Groups Printed- Peds and Bicycles

	Commonwealth Avenue (Route 30) WB From North						MBTA Tracks From East						Commonwealth Avenue (Route 30) WB From South						Carriage Road From Southwest						Washington Street From West						Carriage Road From Northwest						
Start Time	Hard Right	Right	Bear Right	Thru	Left	Peds	Right	Bear Right	Thru	Bear Left	Left	Peds	Right	Thru	Bear Left	Left	Hard Left	Peds	Hard Right	Bear Right	Bear Left	Left	Hard Left	Peds	Hard Right	Right	Thru	Left	Hard Left	Peds	Hard Right	Right	Bear Right	Bear Left	Hard Left	Peds	Int. Total
07:00 AM	0	0	0	0	0	15	0	0	1	0	0	5	0	0	0	0	0	5	0	0	0	0	0	5	0	2	0	0	0	18	0	0	0	0	0	15	66
07:15 AM																																					
07:30 AM	0	0	0	0	0	43	0	0	3	0	0	11	0	0	0	0	0	28	0	0	0	0	0	28	0	0	0	0	0	15	0	0	0	0	0	43	171
07:45 AM																																					
Total	0	0	0	0	0	124	0	0	8	0	0	31	0	0	0	0	0	59	0	0	0	0	0	59	0	2	4	0	0	87	0	0	0	0	0	124	498
08:00 AM																																					
08:15 AM	0	0	0	0	0	56	0	0	0	0	0	8	0	0	0	0	0	18	0	0	0	0	0	18	0	0	3	0	0	13	0	0	0	0	0	56	172
08:30 AM																																					
08:45 AM	0	0	0	1	0	35	0	0	2	0	0	4	0	0	0	0	0	15	0	0	0	0	0	15	0	0	2	0	0	4	0	0	0	0	0	35	113
Total	0	0	0	1	0	168																														168	618
Grand Total	0	0	0	1	0	292	0	0	12	0	0	68	0	0	0	0	0	147	0	0	0	0	0	147	0	2	11	0	1	143	0	0	0	0	0	292	1116
Apprch %	0	0	0	0.3	0	99.7	0	0	15	0	0	85	0	0	0	0	0	100	0	0	0	0	0	100	0	1.3	7	0	0.6	91.1	0	0	0	0	0	100	
Total %	0	0	0	0.1	0	26.2	0	0	1.1	0	0	6.1	0	0	0	0	0	13.2	0	0	0	0	0	13.2	0	0.2	1	0	0.1	12.8	0	0	0	0	0	26.2	

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 07:30 AM

	Commonwealth Avenue (Route 30) WB From North							MBTA Tracks From East							Commonwealth Avenue (Route 30) WB From South							Carriage Road From Southwest							Washington Street From West							Carriage Road From Northwest							
Start Time	Hard Right	Right	Bear Right	Thru	Left	Peds	App. Total	Right	Bear Right	Thru	Bear Left	Left	Peds	App. Total	Right	Thru	Bear Left	Left	Hard Left	Peds	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	Peds	App. Total	Hard Right	Right	Thru	Left	Hard Left	Peds	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	Peds	App. Total	Int. Total
07:30 AM	0	0	0	0	0	43	43	0	0	**3**	0	0	**11**	**14**	0	0	0	0	0	28	28	0	0	0	0	0	28	28	0	0	0	0	0	15	15	0	0	0	0	0	43	43	171
07:45 AM	0	0	0	0	0	41	41	0	0	1	0	0	3	4	0	0	0	0	0	14	14	0	0	0	0	0	14	14	0	0	2	0	0	19	**21**	0	0	0	0	0	41	41	135
08:00 AM	0	0	0	0	0	41	41	0	0	1	0	0	10	11	0	0	0	0	0	**30**	**30**	0	0	0	0	0	**30**	**30**	0	0	1	0	0	**20**	21	0	0	0	0	0	41	41	**174**
08:15 AM	0	0	0	0	0	**56**	**56**	0	0	0	0	0	8	8	0	0	0	0	0	18	18	0	0	0	0	0	18	18	0	0	**3**	0	0	13	16	0	0	0	0	0	**56**	**56**	172
Total Volume	0	0	0	0	0	181	181	0	0	5	0	0	32	37	0	0	0	0	0	90	90	0	0	0	0	0	90	90	0	0	6	0	0	67	73	0	0	0	0	0	181	181	652
% App. Total	0	0	0	0	0	100		0	0	13.5	0	0	86.5		0	0	0	0	0	100		0	0	0	0	0	100		0	0	8.2	0	0	91.8		0	0	0	0	0	100		
PHF	.000	.000	.000	.000	.000	.808	.808	.000	.000	.417	.000	.000	.727	.661	.000	.000	.000	.000	.000	.750	.750	.000	.000	.000	.000	.000	.750	.750	.000	.000	.500	.000	.000	.838	.869	.000	.000	.000	.000	.000	.808	.808	.937

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N/S: Commonwealth Avenue (Route 30) WB
E/W/NSW: Washington St/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

File Name : 112737 B1
Site Code : TBA
Start Date : 12/14/2011

Groups Printed- Trains

	Commonwealth Avenue (Route 30) WB From North					MBTA Tracks From East					Commonwealth Avenue (Route 30) WB From South					Carriage Road From Southwest					Washington Street From West					Carriage Road From Northwest					
Start Time	Hard Right	Right	Bear Right	Thru	Left	Right	Bear Right	Thru	Bear Left	Left	Right	Thru	Bear Left	Left	Hard Left	Hard Right	Bear Right	Bear Left	Left	Hard Left	Hard Right	Right	Thru	Left	Hard Left	Hard Right	Right	Bear Right	Bear Left	Hard Left	Int. Total
07:00 AM	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
07:15 AM	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
07:30 AM	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
07:45 AM	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
Total	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
08:00 AM	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
08:15 AM	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
08:30 AM	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
08:45 AM	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
Total	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
Grand Total	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
Apprch %	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	
Total %																															

	Commonwealth Avenue (Route 30) WB From North						MBTA Tracks From East						Commonwealth Avenue (Route 30) WB From South						Carriage Road From Southwest						Washington Street From West						Carriage Road From Northwest						
Start Time	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																																					
Peak Hour for Entire Intersection Begins at 07:00 AM																																					
07:00 AM	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	0	0	0	0	0
07:15 AM	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	0	0	0	0	0
07:30 AM	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	0	0	0	0	0
07:45 AM	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	0	0	0	0	0
Total Volume	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	0	0	0	0	0
% App. Total	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		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

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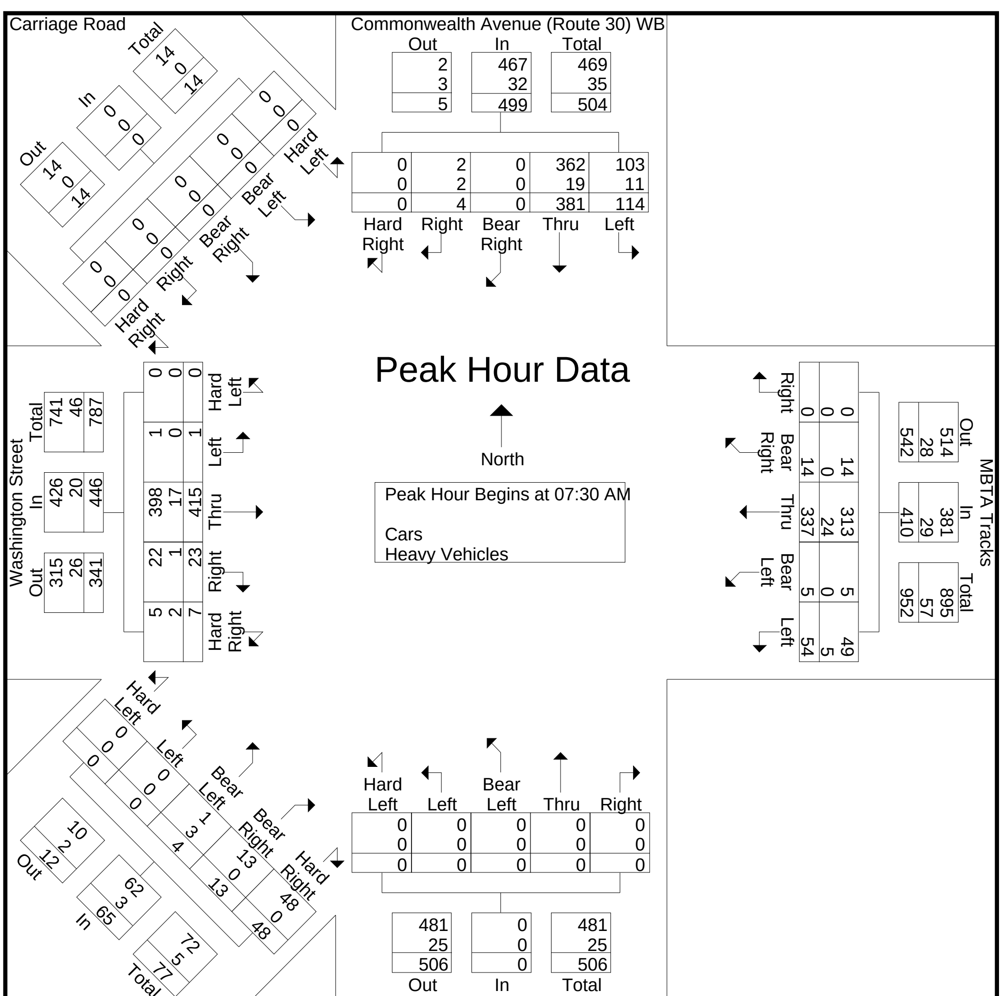
N/S: Commonwealth Avenue (Route 30) WB
E/W/NSW: Washington St/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

File Name : 112737 B1
Site Code : TBA
Start Date : 12/14/2011
Page No : 1

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 07:30 AM

	Commonwealth Avenue (Route 30) WB From North						MBTA Tracks From East						Commonwealth Avenue (Route 30) WB From South					
Start Time	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Right	Thru	Bear Left	Left	Hard Left	App. Total
07:30 AM	0	0	0	**104**	**37**	**141**	0	0	92	1	11	104	0	0	0	0	0	0
07:45 AM	0	0	0	95	31	126	0	**6**	**95**	**1**	10	**112**	0	0	0	0	0	0
08:00 AM	0	**3**	0	92	23	118	0	3	77	**2**	15	97	0	0	0	0	0	0
08:15 AM	0	1	0	90	23	114	0	5	73	1	**18**	**97**	**0**	**0**	**0**	**0**	**0**	**0**
Total Volume	0	4	0	381	114	499	0	14	337	5	54	410	0	0	0	0	0	0
% App. Total	0	0.8	0	76.4	22.8		0	3.4	82.2	1.2	13.2		0	0	0	0	0	
PHF	.000	.333	.000	.916	.770	.885	.000	.583	.887	.625	.750	.915	.000	.000	.000	.000	.000	.000
Cars	0	2	0	362	103	467	0	14	313	5	49	381	0	0	0	0	0	0
% Cars	0	50.0	0	95.0	90.4	93.6	0	100	92.9	100	90.7	92.9	0	0	0	0	0	0
Heavy Vehicles	0	2	0	19	11	32	0	0	24	0	5	29	0	0	0	0	0	0
% Heavy Vehicles	0	50.0	0	5.0	9.6	6.4	0	0	7.1	0	9.3	7.1	0	0	0	0	0	0

	Carriage Road From Southwest						Washington Street From West						Carriage Road From Northwest						
Start Time	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Int. Total
07:30 AM	**19**	**2**	**1**	**0**	**0**	**22**	1	3	97	0	0	101	0	0	0	0	0	0	368
07:45 AM	15	**4**	**2**	0	0	21	**3**	**9**	103	**1**	0	116	0	0	0	0	0	0	**375**
08:00 AM	7	4	1	0	0	12	2	7	**117**	0	0	**126**	0	0	0	0	0	0	353
08:15 AM	**7**	**3**	**0**	**0**	**0**	**10**	**1**	**4**	98	0	0	103	0	0	0	0	0	0	324
Total Volume	48	13	4	0	0	65	7	23	415	1	0	446	0	0	0	0	0	0	1420
% App. Total	73.8	20	6.2	0	0		1.6	5.2	93	0.2	0		0	0	0	0	0		
PHF	.632	.813	.500	.000	.000	.739	.583	.639	.887	.250	.000	.885	.000	.000	.000	.000	.000	.000	.947
Cars	48	13	1	0	0	62	5	22	398	1	0	426	0	0	0	0	0	0	1336
% Cars	100	100	25.0	0	0	95.4	71.4	95.7	95.9	100	0	95.5	0	0	0	0	0	0	94.1
Heavy Vehicles	0	0	3	0	0	3	2	1	17	0	0	20	0	0	0	0	0	0	84
% Heavy Vehicles	0	0	75.0	0	0	4.6	28.6	4.3	4.1	0	0	4.5	0	0	0	0	0	0	5.9



PRECISION
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N/S: Commonwealth Avenue (Route 30) EB
E/W/NSE: Washington Street/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

File Name : 112737 B2
Site Code : TBA
Start Date : 12/14/2011

Groups Printed- Cars - Heavy Vehicles

	Commonwealth Avenue (Route 30) EB From North					Carriage Road From Northeast					Washington Street From East					Carriage Road From Southeast					Commonwealth Avenue (Route 30) EB From South					MBTA Tracks From West					
Start Time	Right	Thru	Bear Left	Left	Hard Left	Hard Right	Bear Right	Bear Left	Left	Hard Left	Hard Right	Right	Thru	Left	Hard Left	Hard Right	Right	Bear Right	Bear Left	Hard Left	Hard Right	Right	Bear Right	Thru	Left	Right	Bear Right	Thru	Bear Left	Left	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	2	6	52	0	0	7	3	0	0	0	0	2	0	86	0	0	0	80	3	13	254
07:15 AM	0	0	0	0	0	0	0	0	0	0	4	8	70	0	0	1	1	0	0	0	0	8	0	118	0	0	0	108	3	9	330
07:30 AM	0	0	0	0	0	0	0	0	0	0	4	13	100	0	0	8	5	0	0	0	0	4	1	150	0	0	0	110	2	23	420
07:45 AM	0	0	0	0	0	0	0	0	0	0	6	16	106	0	0	13	5	0	0	0	0	1	1	202	1	0	0	112	2	21	486
Total	0	0	0	0	0	0	0	0	0	0	16	43	328	0	0	29	14	0	0	0	0	15	2	556	1	0	0	410	10	66	1490
08:00 AM	0	0	0	0	0	0	0	0	0	0	5	12	95	0	0	15	9	0	0	0	0	5	0	184	0	0	0	115	1	26	467
08:15 AM	0	0	0	0	0	0	0	0	0	0	2	14	95	0	0	22	12	1	0	0	0	1	0	177	0	0	0	101	5	19	449
08:30 AM	0	0	0	0	0	0	0	0	0	0	5	10	93	0	0	18	6	1	0	0	0	4	2	186	0	0	0	93	1	20	439
08:45 AM	0	0	0	0	0	0	0	0	0	0	3	17	92	0	0	21	11	0	0	0	0	5	1	166	0	0	0	98	0	19	433
Total	0	0	0	0	0	0	0	0	0	0	15	53	375	0	0	76	38	2	0	0	0	15	3	713	0	0	0	407	7	84	1788
Grand Total	0	0	0	0	0	0	0	0	0	0	31	96	703	0	0	105	52	2	0	0	0	30	5	1269	1	0	0	817	17	150	3278
Apprch %	0	0	0	0	0	0	0	0	0	0	3.7	11.6	84.7	0	0	66	32.7	1.3	0	0	0	2.3	0.4	97.2	0.1	0	0	83	1.7	15.2	
Total %	0	0	0	0	0	0	0	0	0	0	0.9	2.9	21.4	0	0	3.2	1.6	0.1	0	0	0	0.9	0.2	38.7	0	0	0	24.9	0.5	4.6	
Cars	0	0	0	0	0	0	0	0	0	0	31	91	654	0	0	104	51	2	0	0	0	27	5	1247	1	0	0	769	16	144	3142
% Cars	0	0	0	0	0	0	0	0	0	0	100	94.8	93	0	0	99	98.1	100	0	0	0	90	100	98.3	100	0	0	94.1	94.1	96	95.9
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	5	49	0	0	1	1	0	0	0	0	3	0	22	0	0	0	48	1	6	136
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	5.2	7	0	0	1	1.9	0	0	0	0	10	0	1.7	0	0	0	5.9	5.9	4	4.1

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 07:45 AM

	Commonwealth Avenue (Route 30) EB From North						Carriage Road From Northeast						Washington Street From East						Carriage Road From Southeast						Commonwealth Avenue (Route 30) EB From South						MBTA Tracks From West						
Start Time	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Int. Total
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	**6**	**16**	**106**	0	0	**128**	13	5	0	0	0	18	0	1	1	**202**	**1**	**205**	0	0	112	**2**	21	135	**486**
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	5	12	95	0	0	112	15	9	0	0	0	24	0	**5**	0	184	0	189	0	0	**115**	1	**26**	**142**	467
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	2	14	95	0	0	111	**22**	**12**	**1**	0	0	**35**	0	1	0	177	0	178	0	0	101	**5**	19	125	449
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	5	10	93	0	0	108	18	6	1	0	0	25	0	4	**2**	186	0	192	0	0	93	1	20	114	439
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	18	52	389	0	0	459	68	32	2	0	0	102	0	11	3	749	1	764	0	0	421	9	86	516	1841
% App. Total	0	0	0	0	0		0	0	0	0	0		3.9	11.3	84.7	0	0		66.7	31.4	2	0	0		0	1.4	0.4	98	0.1		0	0	81.6	1.7	16.7		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.750	.813	.917	.000	.000	.896	.773	.667	.500	.000	.000	.729	.000	.550	.375	.927	.250	.932	.000	.000	.915	.450	.827	.908	.947
Cars	0	0	0	0	0	0	0	0	0	0	0	0	18	49	363	0	0	430	68	32	2	0	0	102	0	11	3	737	1	752	0	0	396	9	83	488	1772
% Cars	0	0	0	0	0	0	0	0	0	0	0	0	100	94.2	93.3	0	0	93.7	100	100	100	0	0	100	0	100	100	98.4	100	98.4	0	0	94.1	100	96.5	94.6	96.3
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	3	26	0	0	29	0	0	0	0	0	0	0	0	0	12	0	12	0	0	25	0	3	28	69
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	5.8	6.7	0	0	6.3	0	0	0	0	0	0	0	0	0	1.6	0	1.6	0	0	5.9	0	3.5	5.4	3.7

PRECISION DATA INDUSTRIES, LLC

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N/S: Commonwealth Avenue (Route 30) EB
E/W/NSE: Washington Street/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

File Name : 112737 B2
Site Code : TBA
Start Date : 12/14/2011

Groups Printed- Cars

	Commonwealth Avenue (Route 30) EB From North					Carriage Road From Northeast					Washington Street From East					Carriage Road From Southeast					Commonwealth Avenue (Route 30) EB From South					MBTA Tracks From West					
Start Time	Right	Thru	Bear Left	Left	Hard Left	Hard Right	Bear Right	Bear Left	Left	Hard Left	Hard Right	Right	Thru	Left	Hard Left	Hard Right	Right	Bear Right	Bear Left	Hard Left	Hard Right	Right	Bear Right	Thru	Left	Right	Bear Right	Thru	Bear Left	Left	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	2	5	49	0	0	6	2	0	0	0	0	1	0	85	0	0	0	78	3	12	243
07:15 AM	0	0	0	0	0	0	0	0	0	0	4	7	64	0	0	1	1	0	0	0	0	7	0	116	0	0	0	101	3	8	312
07:30 AM	0	0	0	0	0	0	0	0	0	0	4	13	94	0	0	8	5	0	0	0	0	3	1	145	0	0	0	102	1	23	399
07:45 AM	0	0	0	0	0	0	0	0	0	0	6	15	102	0	0	13	5	0	0	0	0	1	1	199	1	0	0	107	2	20	472
Total	0	0	0	0	0	0	0	0	0	0	16	40	309	0	0	28	13	0	0	0	0	12	2	545	1	0	0	388	9	63	1426
08:00 AM	0	0	0	0	0	0	0	0	0	0	5	11	85	0	0	15	9	0	0	0	0	5	0	182	0	0	0	108	1	24	445
08:15 AM	0	0	0	0	0	0	0	0	0	0	2	13	86	0	0	22	12	1	0	0	0	1	0	172	0	0	0	94	5	19	427
08:30 AM	0	0	0	0	0	0	0	0	0	0	5	10	90	0	0	18	6	1	0	0	0	4	2	184	0	0	0	87	1	20	428
08:45 AM	0	0	0	0	0	0	0	0	0	0	3	17	84	0	0	21	11	0	0	0	0	5	1	164	0	0	0	92	0	18	416
Total	0	0	0	0	0	0	0	0	0	0	15	51	345	0	0	76	38	2	0	0	0	15	3	702	0	0	0	381	7	81	1716
Grand Total	0	0	0	0	0	0	0	0	0	0	31	91	654	0	0	104	51	2	0	0	0	27	5	1247	1	0	0	769	16	144	3142
Apprch %	0	0	0	0	0	0	0	0	0	0	4	11.7	84.3	0	0	66.2	32.5	1.3	0	0	0	2.1	0.4	97.4	0.1	0	0	82.8	1.7	15.5	
Total %	0	0	0	0	0	0	0	0	0	0	1	2.9	20.8	0	0	3.3	1.6	0.1	0	0	0	0.9	0.2	39.7	0	0	0	24.5	0.5	4.6	

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 07:45 AM

	Commonwealth Avenue (Route 30) EB From North						Carriage Road From Northeast						Washington Street From East						Carriage Road From Southeast						Commonwealth Avenue (Route 30) EB From South						MBTA Tracks From West						
Start Time	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Int. Total
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	6	15	102	0	0	123	13	5	0	0	0	18	0	1	1	199	1	202	0	0	107	2	20	129	472
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	5	11	85	0	0	101	15	9	0	0	0	24	0	5	0	182	0	187	0	0	108	1	24	133	445
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	2	13	86	0	0	101	22	12	1	0	0	35	0	1	0	172	0	173	0	0	94	5	19	118	427
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	5	10	90	0	0	105	18	6	1	0	0	25	0	4	2	184	0	190	0	0	87	1	20	108	428
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	18	49	363	0	0	430	68	32	2	0	0	102	0	11	3	737	1	752	0	0	396	9	83	488	1772
% App. Total	0	0	0	0	0		0	0	0	0	0		4.2	11.4	84.4	0	0		66.7	31.4	2	0	0		0	1.5	0.4	98	0.1		0	0	81.1	1.8	17		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.750	.817	.890	.000	.000	.874	.773	.667	.500	.000	.000	.729	.000	.550	.375	.926	.250	.931	.000	.000	.917	.450	.865	.917	.939

N/S: Commonwealth Avenue (Route 30) EB
E/W/NSE: Washington Street/Carriage Road
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Client: HSH/ J. SanClemente

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File Name : 112737 B2
Site Code : TBA
Start Date : 12/14/2011

Groups Printed- Heavy Vehicles

	Commonwealth Avenue (Route 30) EB From North					Carriage Road From Northeast					Washington Street From East					Carriage Road From Southeast					Commonwealth Avenue (Route 30) EB From South					MBTA Tracks From West					
Start Time	Right	Thru	Bear Left	Left	Hard Left	Hard Right	Bear Right	Bear Left	Left	Hard Left	Hard Right	Right	Thru	Left	Hard Left	Hard Right	Right	Bear Right	Bear Left	Hard Left	Hard Right	Right	Bear Right	Thru	Left	Right	Bear Right	Thru	Bear Left	Left	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	1	3	0	0	1	1	0	0	0	0	1	0	1	0	0	0	2	0	1	11
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	1	6	0	0	0	0	0	0	0	0	1	0	2	0	0	0	7	0	1	18
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	1	0	5	0	0	0	8	1	0	21
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	0	0	0	0	0	0	0	0	3	0	0	0	5	0	1	14
Total	0	0	0	0	0	0	0	0	0	0	0	3	19	0	0	1	1	0	0	0	0	3	0	11	0	0	0	22	1	3	64
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	1	10	0	0	0	0	0	0	0	0	0	0	2	0	0	0	7	0	2	22
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	1	9	0	0	0	0	0	0	0	0	0	0	5	0	0	0	7	0	0	22
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	2	0	0	0	6	0	0	11
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	2	0	0	0	6	0	1	17
Total	0	0	0	0	0	0	0	0	0	0	0	2	30	0	0	0	0	0	0	0	0	0	0	11	0	0	0	26	0	3	72
Grand Total	0	0	0	0	0	0	0	0	0	0	0	5	49	0	0	1	1	0	0	0	0	3	0	22	0	0	0	48	1	6	136
Apprch %	0	0	0	0	0	0	0	0	0	0	0	9.3	90.7	0	0	50	50	0	0	0	0	12	0	88	0	0	0	87.3	1.8	10.9	
Total %	0	0	0	0	0	0	0	0	0	0	0	3.7	36	0	0	0.7	0.7	0	0	0	0	2.2	0	16.2	0	0	0	35.3	0.7	4.4	

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 07:30 AM

	Commonwealth Avenue (Route 30) EB From North						Carriage Road From Northeast						Washington Street From East						Carriage Road From Southeast						Commonwealth Avenue (Route 30) EB From South						MBTA Tracks From West						
Start Time	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Int. Total
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	0	**1**	0	**5**	0	**6**	0	0	**8**	**1**	0	**9**	21
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	4	0	0	5	0	0	0	0	0	0	0	0	0	3	0	3	0	0	5	0	1	6	14
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	**10**	**0**	**0**	**11**	0	0	0	0	0	0	0	0	0	2	0	2	0	0	7	0	**2**	9	**22**
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	9	0	0	10	0	0	0	0	0	0	0	0	0	5	0	5	0	0	7	0	0	7	22
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	3	29	0	0	32	0	0	0	0	0	0	0	1	0	15	0	16	0	0	27	1	3	31	79
% App. Total														9.4	90.6	0	0		0	0	0	0	0		0	6.2		93.8	0		0	0	87.1	3.2	9.7		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.750	.725	.000	.000	.727	.000	.000	.000	.000	.000	.000	.000	.250	.000	.750	.000	.667	.000	.000	.844	.250	.375	.861	.898

PRECISION
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N/S: Commonwealth Avenue (Route 30) EB
E/W/NSE: Washington Street/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

File Name : 112737 B2
Site Code : TBA
Start Date : 12/14/2011
Page No : 1

Groups Printed- Peds and Bicycles

	Commonwealth Avenue (Route 30) EB From North						Carriage Road From Northeast						Washington Street From East					
Start Time	Right	Thru	Bear Left	Left	Hard Left	Peds	Hard Right	Bear Right	Bear Left	Left	Hard Left	Peds	Hard Right	Right	Thru	Left	Hard Left	Peds
07:00 AM	0	0	0	0	0	18	0	0	0	0	0	18	0	0	0	0	0	10
07:15 AM																		
07:30 AM	0	0	0	0	0	54	0	0	0	0	0	54	0	0	3	0	0	13
07:45 AM																		
Total	0	0	0	0	0	138	0	0	0	0	0	138	0	0	6	0	0	57
08:00 AM																		
08:15 AM	0	0	0	0	0	39	0	0	0	0	0	39	0	0	0	0	0	19
08:30 AM																		
08:45 AM	0	0	0	0	0	36	0	0	0	0	0	36	0	0	2	0	0	16
Total	0	0	0	0	0	154						154						57
Grand Total	0	0	0	0	0	292	0	0	0	0	0	292	0	0	10	0	0	114
Apprch %	0	0	0	0	0	100	0	0	0	0	0	100	0	0	8.1	0	0	91.9
Total %	0	0	0	0	0	27.2	0	0	0	0	0	27.2	0	0	0.9	0	0	10.6

	Carriage Road From Southeast						Commonwealth Avenue (Route 30) EB From South						MBTA Tracks From West						
Start Time	Hard Right	Right	Bear Right	Bear Left	Hard Left	Peds	Hard Right	Right	Bear Right	Thru	Left	Peds	Right	Bear Right	Thru	Bear Left	Left	Peds	Int. Total
07:00 AM	0	0	0	0	0	14	0	0	0	3	0	14	0	0	3	0	0	6	86
07:15 AM																			
07:30 AM	0	0	0	0	0	22	0	0	0	0	0	22	0	0	0	0	0	7	175
07:45 AM																			
Total	0	0	0	0	0	64	0	0	0	8	0	64	0	0	8	0	0	30	513
08:00 AM																			
08:15 AM	2	0	0	0	0	14	0	0	0	4	2	14	0	0	4	2	0	9	148
08:30 AM																			
08:45 AM	2	2	0	0	0	11	0	0	1	3	0	11	0	0	3	0	0	7	130
Total						63	0	0	1	8	3	63	0	0	8	3	0	33	562
Grand Total	5	6	0	0	0	127	0	0	1	16	3	127	0	0	16	3	0	63	1075
Apprch %	3.6	4.3	0	0	0	92	0	0	0.7	10.9	2	86.4	0	0	19.5	3.7	0	76.8	
Total %	0.5	0.6	0	0	0	11.8	0	0	0.1	1.5	0.3	11.8	0	0	1.5	0.3	0	5.9	

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 07:30 AM

	Commonwealth Avenue (Route 30) EB From North							Carriage Road From Northeast							Washington Street From East						
Start Time	Right	Thru	Bear Left	Left	Hard Left	Peds	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	Peds	App. Total	Hard Right	Right	Thru	Left	Hard Left	Peds	App. Total
07:30 AM	0	0	0	0	0	**54**	**54**	0	0	0	0	0	**54**	**54**	0	0	**3**	0	0	13	16
07:45 AM	0	0	0	0	0	50	50	0	0	0	0	0	50	50	0	0	0	0	0	**25**	**25**
08:00 AM	0	0	0	0	0	45	45	0	0	0	0	0	45	45	0	0	1	0	0	12	13
08:15 AM	0	0	0	0	0	39	39	0	0	0	0	0	39	39	0	0	0	0	0	19	19
Total Volume	0	0	0	0	0	188	188	0	0	0	0	0	188	188	0	0	4	0	0	69	73
% App. Total	0	0	0	0	0	100		0	0	0	0	0	100		0	0	5.5	0	0	94.5	
PHF	.000	.000	.000	.000	.000	.870	.870	.000	.000	.000	.000	.000	.870	.870	.000	.000	.333	.000	.000	.690	.730

	Carriage Road From Southeast							Commonwealth Avenue (Route 30) EB From South							MBTA Tracks From West							
Start Time	Hard Right	Right	Bear Right	Bear Left	Hard Left	Peds	App. Total	Hard Right	Right	Bear Right	Thru	Left	Peds	App. Total	Right	Bear Right	Thru	Bear Left	Left	Peds	App. Total	Int. Total
07:30 AM	0	0	0	0	0	22	22	0	0	0	0	0	22	22	0	0	0	0	0	7	7	**175**
07:45 AM	0	0	0	0	0	15	15	0	0	0	1	0	15	16	0	0	1	0	0	5	6	162
08:00 AM	0	**1**	0	0	0	**24**	**25**	0	0	0	0	1	**24**	**25**	0	0	0	1	0	**10**	11	164
08:15 AM	**2**	0	0	0	0	14	16	0	0	0	**4**	**2**	14	20	0	0	**4**	**2**	0	9	**15**	148
Total Volume	2	1	0	0	0	75	78	0	0	0	5	3	75	83	0	0	5	3	0	31	39	649
% App. Total	2.6	1.3	0	0	0	96.2		0	0	0	6	3.6	90.4		0	0	12.8	7.7	0	79.5		
PHF	.250	.250	.000	.000	.000	.781	.780	.000	.000	.000	.313	.375	.781	.830	.000	.000	.313	.375	.000	.775	.650	.927

N/S: Commonwealth Avenue (Route 30) EB
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File Name : 112737 B2
Site Code : TBA
Start Date : 12/14/2011

Groups Printed- Trains

	Commonwealth Avenue (Route 30) EB From North					Carriage Road From Northeast					Washington Street From East					Carriage Road From Southeast					Commonwealth Avenue (Route 30) EB From South					MBTA Tracks From West					
Start Time	Right	Thru	Bear Left	Left	Hard Left	Hard Right	Bear Right	Bear Left	Left	Hard Left	Hard Right	Right	Thru	Left	Hard Left	Hard Right	Right	Bear Right	Bear Left	Hard Left	Hard Right	Right	Bear Right	Thru	Left	Right	Bear Right	Thru	Bear Left	Left	Int. Total
07:00 AM	0	1	0	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	0	4
07:15 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	3
07:30 AM	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	4
07:45 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	3
Total	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	14
08:00 AM	0	3	0	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	0	6
08:15 AM	0	2	0	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	0	5
08:30 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	3
08:45 AM	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	4
Total	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	18
Grand Total	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	0	0	0	0	0	0	32
Apprch %	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0	
Total %	0	40.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	59.4	0	0	0	0	0	0	

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 07:30 AM

	Commonwealth Avenue (Route 30) EB From North						Carriage Road From Northeast						Washington Street From East						Carriage Road From Southeast						Commonwealth Avenue (Route 30) EB From South						MBTA Tracks From West						
Start Time	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Int. Total
07:30 AM	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	4
07:45 AM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	3
08:00 AM	0	**3**	0	0	0	**3**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**3**	0	**3**	0	0	0	0	0	0	**6**
08:15 AM	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0	5
Total Volume	0	8	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	10	0	0	0	0	0	0	18
% App. Total		100																										100									
PHF	.000	.667	.000	.000	.000	.667	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.833	.000	.833	.000	.000	.000	.000	.000	.000	.750

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N/S: Commonwealth Avenue (Route 30) EB
E/W/NSE: Washington Street/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

File Name : 112737 B2
Site Code : TBA
Start Date : 12/14/2011
Page No : 1

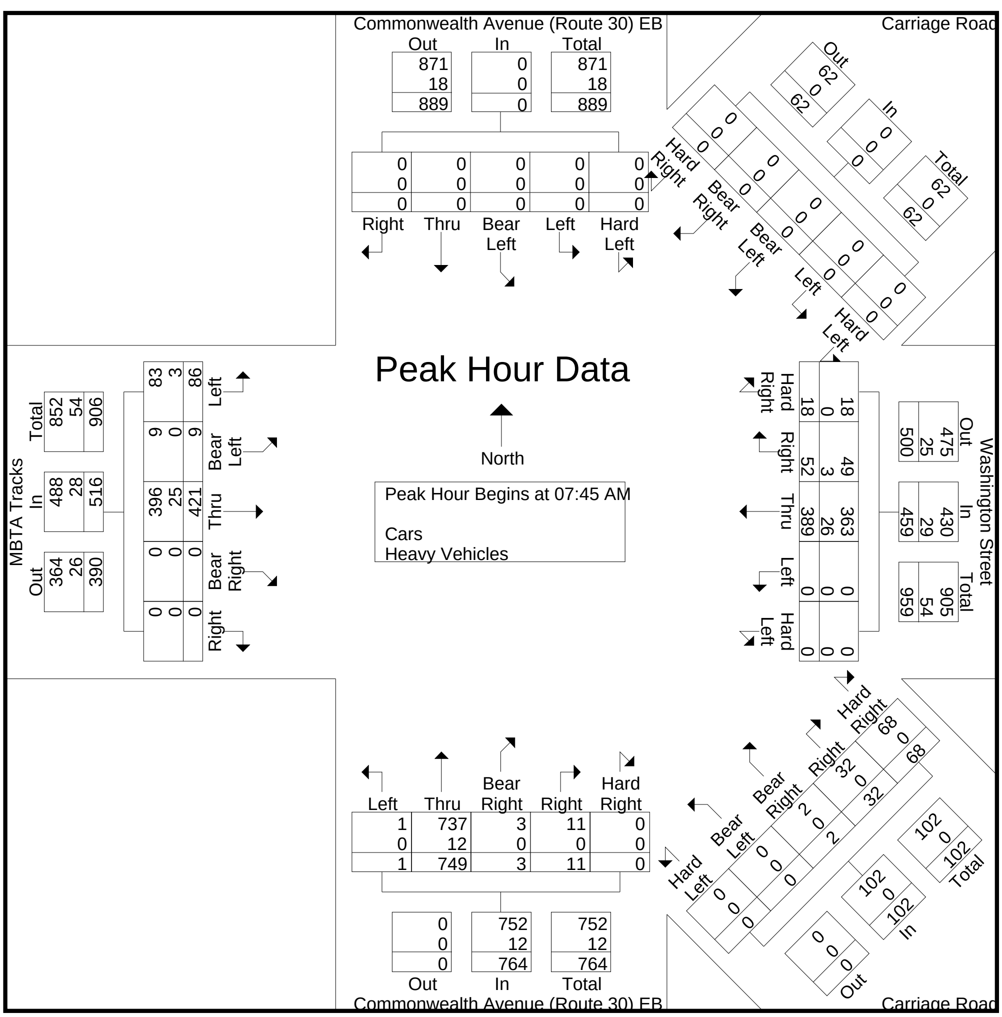
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 07:45 AM

	Commonwealth Avenue (Route 30) EB From North						Carriage Road From Northeast					
Start Time	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0	0	0		0	0	0	0	0	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
Cars	0	0	0	0	0	0	0	0	0	0	0	0
% Cars	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0

	Washington Street From East						Carriage Road From Southeast					
Start Time	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total
07:45 AM	**6**	**16**	**106**	0	0	**128**	13	5	0	0	0	18
08:00 AM	5	12	95	0	0	112	15	9	0	0	0	24
08:15 AM	2	14	95	0	0	111	**22**	**12**	**1**	0	0	**35**
08:30 AM	5	10	93	0	0	108	18	6	1	0	0	25
Total Volume	18	52	389	0	0	459	68	32	2	0	0	102
% App. Total	3.9	11.3	84.7	0	0		66.7	31.4	2	0	0	
PHF	.750	.813	.917	.000	.000	.896	.773	.667	.500	.000	.000	.729
Cars	18	49	363	0	0	430	68	32	2	0	0	102
% Cars	100	94.2	93.3	0	0	93.7	100	100	100	0	0	100
Heavy Vehicles	0	3	26	0	0	29	0	0	0	0	0	0
% Heavy Vehicles	0	5.8	6.7	0	0	6.3	0	0	0	0	0	0

	Commonwealth Avenue (Route 30) EB From South						MBTA Tracks From West						
Start Time	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Int. Total
07:45 AM	0	1	1	**202**	**1**	**205**	0	0	112	2	21	135	**486**
08:00 AM	0	**5**	0	184	0	189	0	0	**115**	1	**26**	**142**	467
08:15 AM	0	1	0	177	0	178	0	0	101	**5**	19	125	449
08:30 AM	0	4	**2**	186	0	192	0	0	93	1	20	114	439
Total Volume	0	11	3	749	1	764	0	0	421	9	86	516	1841
% App. Total	0	1.4	0.4	98	0.1		0	0	81.6	1.7	16.7		
PHF	.000	.550	.375	.927	.250	.932	.000	.000	.915	.450	.827	.908	.947
Cars	0	11	3	737	1	752	0	0	396	9	83	488	1772
% Cars	0	100	100	98.4	100	98.4	0	0	94.1	100	96.5	94.6	96.3
Heavy Vehicles	0	0	0	12	0	12	0	0	25	0	3	28	69
% Heavy Vehicles	0	0	0	1.6	0	1.6	0	0	5.9	0	3.5	5.4	3.7



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N/S: Commonwealth Avenue (Route 30) WB
E/W/NSW: Washington St/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

File Name : 112737 BB1
Site Code : TBA
Start Date : 12/14/2011
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Commonwealth Avenue (Route 30) WB From North					MBTA Tracks From East					Commonwealth Avenue (Route 30) WB From South					Carriage Road From Southwest					Washington Street From West					Carriage Road From Northwest					
Start Time	Hard Right	Right	Bear Right	Thru	Left	Right	Bear Right	Thru	Bear Left	Left	Right	Thru	Bear Left	Left	Hard Left	Hard Right	Bear Right	Bear Left	Left	Hard Left	Hard Right	Right	Thru	Left	Hard Left	Hard Right	Right	Bear Right	Bear Left	Hard Left	Int. Total
04:00 PM	0	1	0	119	35	0	6	63	2	12	0	0	0	0	0	0	0	0	0	0	5	2	90	0	0	11	3	0	0	0	349
04:15 PM	0	3	0	116	37	0	1	68	2	14	0	0	0	0	0	0	0	0	0	0	6	4	95	0	0	9	4	1	1	0	361
04:30 PM	0	0	5	122	42	0	6	74	0	17	0	0	0	0	0	0	0	0	0	0	2	5	99	0	0	3	7	0	0	0	382
04:45 PM	0	1	0	117	35	0	3	76	2	16	0	0	0	0	0	0	0	0	0	0	1	9	94	0	0	8	1	0	2	0	365
Total	0	5	5	474	149	0	16	281	6	59	0	0	0	0	0	0	0	0	0	0	14	20	378	0	0	31	15	1	3	0	1457
05:00 PM	0	1	0	156	39	0	1	79	4	12	0	0	0	0	0	0	0	0	0	0	3	6	103	0	1	8	2	0	1	0	416
05:15 PM	0	0	1	168	40	0	1	83	3	18	0	0	0	0	0	0	0	0	0	0	2	7	116	0	1	9	5	0	0	0	454
05:30 PM	0	0	0	160	48	0	3	82	2	13	0	0	0	0	0	0	0	0	0	0	2	12	106	0	0	9	10	1	1	0	449
05:45 PM	0	2	0	142	41	0	1	78	5	13	0	0	0	0	0	0	0	0	0	0	1	6	105	0	0	13	5	0	0	0	412
Total	0	3	1	626	168	0	6	322	14	56	0	0	0	0	0	0	0	0	0	0	8	31	430	0	2	39	22	1	2	0	1731
Grand Total	0	8	6	1100	317	0	22	603	20	115	0	0	0	0	0	0	0	0	0	0	22	51	808	0	2	70	37	2	5	0	3188
Apprch %	0	0.6	0.4	76.9	22.2	0	2.9	79.3	2.6	15.1	0	0	0	0	0	0	0	0	0	0	2.5	5.8	91.5	0	0.2	61.4	32.5	1.8	4.4	0	
Total %	0	0.3	0.2	34.5	9.9	0	0.7	18.9	0.6	3.6	0	0	0	0	0	0	0	0	0	0	0.7	1.6	25.3	0	0.1	2.2	1.2	0.1	0.2	0	
Cars	0	6	1	1093	310	0	22	581	20	112	0	0	0	0	0	0	0	0	0	0	22	51	793	0	2	67	35	2	5	0	3122
% Cars	0	75	16.7	99.4	97.8	0	100	96.4	100	97.4	0	0	0	0	0	0	0	0	0	0	100	100	98.1	0	100	95.7	94.6	100	100	0	97.9
Heavy Vehicles	0	2	5	7	7	0	0	22	0	3	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	3	2	0	0	0	66
% Heavy Vehicles	0	25	83.3	0.6	2.2	0	0	3.6	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	1.9	0	0	4.3	5.4	0	0	0	2.1

	Commonwealth Avenue (Route 30) WB From North						MBTA Tracks From East						Commonwealth Avenue (Route 30) WB From South						Carriage Road From Southwest						Washington Street From West						Carriage Road From Northwest						
Start Time	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																																					
Peak Hour for Entire Intersection Begins at 05:00 PM																																					
05:00 PM	0	1	0	156	39	196	0	1	79	4	12	96	0	0	0	0	0	0	0	0	0	0	0	0	**3**	6	103	0	**1**	113	8	2	0	**1**	0	11	416
05:15 PM	0	0	**1**	**168**	40	**209**	0	1	**83**	**3**	**18**	**105**	0	0	0	0	0	0	0	0	0	0	0	0	2	7	**116**	0	1	**126**	9	5	0	0	0	14	**454**
05:30 PM	0	0	0	160	**48**	208	0	**3**	82	2	13	100	0	0	0	0	0	0	0	0	0	0	0	0	2	**12**	106	0	0	120	9	**10**	**1**	1	0	**21**	449
05:45 PM	0	**2**	0	142	41	185	0	1	78	**5**	13	97	0	0	0	0	0	0	0	0	0	0	0	0	1	6	105	0	0	112	**13**	**5**	**0**	**0**	**0**	**18**	412
Total Volume	0	3	1	626	168	798	0	6	322	14	56	398	0	0	0	0	0	0	0	0	0	0	0	0	8	31	430	0	2	471	39	22	1	2	0	64	1731
% App. Total	0	0.4	0.1	78.4	21.1		0	1.5	80.9	3.5	14.1		0	0	0	0	0		0	0	0	0	0		1.7	6.6	91.3	0	0.4		60.9	34.4	1.6	3.1	0		
PHF	.000	.375	.250	.932	.875	.955	.000	.500	.970	.700	.778	.948	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.667	.646	.927	.000	.500	.935	.750	.550	.250	.500	.000	.762	.953
Cars	0	3	1	625	164	793	0	6	309	14	54	383	0	0	0	0	0	0	0	0	0	0	0	0	8	31	422	0	2	463	39	20	1	2	0	62	1701
% Cars	0	100	100	99.8	97.6	99.4	0	100	96.0	100	96.4	96.2	0	0	0	0	0	0	0	0	0	0	0	0	100	100	98.1	0	100	98.3	100	90.9	100	100	0	96.9	98.3
Heavy Vehicles	0	0	0	1	4	5	0	0	13	0	2	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	8	0	2	0	0	0	2	30
% Heavy Vehicles	0	0	0	0.2	2.4	0.6	0	0	4.0	0	3.6	3.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.9	0	0	1.7	0	9.1	0	0	0	3.1	1.7

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E/W/NSW: Washington St/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

File Name : 112737 BB1
Site Code : TBA
Start Date : 12/14/2011
Page No : 1

Groups Printed- Cars

	Commonwealth Avenue (Route 30) WB From North					MBTA Tracks From East					Commonwealth Avenue (Route 30) WB From South					Carriage Road From Southwest					Washington Street From West					Carriage Road From Northwest					
Start Time	Hard Right	Right	Bear Right	Thru	Left	Right	Bear Right	Thru	Bear Left	Left	Right	Thru	Bear Left	Left	Hard Left	Hard Right	Bear Right	Bear Left	Left	Hard Left	Hard Right	Right	Thru	Left	Hard Left	Hard Right	Right	Bear Right	Bear Left	Hard Left	Int. Total
04:00 PM	0	1	0	118	34	0	6	62	2	12	0	0	0	0	0	0	0	0	0	0	5	2	87	0	0	10	3	0	0	0	342
04:15 PM	0	1	0	113	37	0	1	65	2	13	0	0	0	0	0	0	0	0	0	0	6	4	93	0	0	7	4	1	1	0	348
04:30 PM	0	0	0	121	41	0	6	73	0	17	0	0	0	0	0	0	0	0	0	0	2	5	99	0	0	3	7	0	0	0	374
04:45 PM	0	1	0	116	34	0	3	72	2	16	0	0	0	0	0	0	0	0	0	0	1	9	92	0	0	8	1	0	2	0	357
Total	0	3	0	468	146	0	16	272	6	58	0	0	0	0	0	0	0	0	0	0	14	20	371	0	0	28	15	1	3	0	1421
05:00 PM	0	1	0	155	38	0	1	75	4	12	0	0	0	0	0	0	0	0	0	0	3	6	101	0	1	8	2	0	1	0	408
05:15 PM	0	0	1	168	39	0	1	79	3	17	0	0	0	0	0	0	0	0	0	0	2	7	113	0	1	9	4	0	0	0	444
05:30 PM	0	0	0	160	47	0	3	80	2	13	0	0	0	0	0	0	0	0	0	0	2	12	105	0	0	9	9	1	1	0	444
05:45 PM	0	2	0	142	40	0	1	75	5	12	0	0	0	0	0	0	0	0	0	0	1	6	103	0	0	13	5	0	0	0	405
Total	0	3	1	625	164	0	6	309	14	54	0	0	0	0	0	0	0	0	0	0	8	31	422	0	2	39	20	1	2	0	1701
Grand Total	0	6	1	1093	310	0	22	581	20	112	0	0	0	0	0	0	0	0	0	0	22	51	793	0	2	67	35	2	5	0	3122
Apprch %	0	0.4	0.1	77.5	22	0	3	79	2.7	15.2	0	0	0	0	0	0	0	0	0	0	2.5	5.9	91.4	0	0.2	61.5	32.1	1.8	4.6	0	
Total %	0	0.2	0	35	9.9	0	0.7	18.6	0.6	3.6	0	0	0	0	0	0	0	0	0	0	0.7	1.6	25.4	0	0.1	2.1	1.1	0.1	0.2	0	

	Commonwealth Avenue (Route 30) WB From North						MBTA Tracks From East						Commonwealth Avenue (Route 30) WB From South						Carriage Road From Southwest						Washington Street From West						Carriage Road From Northwest						
Start Time	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																																					
Peak Hour for Entire Intersection Begins at 05:00 PM																																					
05:00 PM	0	1	0	155	38	194	0	1	75	4	12	92	0	0	0	0	0	0	0	0	0	0	0	0	3	6	101	0	1	111	8	2	0	1	0	11	408
05:15 PM	0	0	1	168	39	208	0	1	79	3	17	100	0	0	0	0	0	0	0	0	0	0	0	0	2	7	113	0	1	123	9	4	0	0	0	13	444
05:30 PM	0	0	0	160	47	207	0	3	80	2	13	98	0	0	0	0	0	0	0	0	0	0	0	0	2	12	105	0	0	119	9	9	1	1	0	20	444
05:45 PM	0	2	0	142	40	184	0	1	75	5	12	93	0	0	0	0	0	0	0	0	0	0	0	0	1	6	103	0	0	110	13	5	0	0	0	18	405
Total Volume	0	3	1	625	164	793	0	6	309	14	54	383	0	0	0	0	0	0	0	0	0	0	0	0	8	31	422	0	2	463	39	20	1	2	0	62	1701
% App. Total	0	0.4	0.1	78.8	20.7		0	1.6	80.7	3.7	14.1		0	0	0	0	0		0	0	0	0	0		1.7	6.7	91.1	0	0.4		62.9	32.3	1.6	3.2	0		
PHF	.000	.375	.250	.930	.872	.953	.000	.500	.966	.700	.794	.958	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.667	.646	.934	.000	.500	.941	.750	.556	.250	.500	.000	.775	.958

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File Name : 112737 BB1
Site Code : TBA
Start Date : 12/14/2011

Groups Printed- Heavy Vehicles

	Commonwealth Avenue (Route 30) WB From North					MBTA Tracks From East					Commonwealth Avenue (Route 30) WB From South					Carriage Road From Southwest					Washington Street From West					Carriage Road From Northwest					
Start Time	Hard Right	Right	Bear Right	Thru	Left	Right	Bear Right	Thru	Bear Left	Left	Right	Thru	Bear Left	Left	Hard Left	Hard Right	Bear Right	Bear Left	Left	Hard Left	Hard Right	Right	Thru	Left	Hard Left	Hard Right	Right	Bear Right	Bear Left	Hard Left	Int. Total
04:00 PM	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	1	0	0	0	0	7
04:15 PM	0	2	0	3	0	0	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	13
04:30 PM	0	0	5	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
04:45 PM	0	0	0	1	1	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	8
Total	0	2	5	6	3	0	0	9	0	1	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	3	0	0	0	0	36
05:00 PM	0	0	0	1	1	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	8
05:15 PM	0	0	0	0	1	0	0	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	1	0	0	0	10
05:30 PM	0	0	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	5
05:45 PM	0	0	0	0	1	0	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	7
Total	0	0	0	1	4	0	0	13	0	2	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	2	0	0	0	30
Grand Total	0	2	5	7	7	0	0	22	0	3	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	3	2	0	0	0	66
Apprch %	0	9.5	23.8	33.3	33.3	0	0	88	0	12	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	60	40	0	0	0	
Total %	0	3	7.6	10.6	10.6	0	0	33.3	0	4.5	0	0	0	0	0	0	0	0	0	0	0	0	22.7	0	0	4.5	3	0	0	0	

	Commonwealth Avenue (Route 30) WB From North						MBTA Tracks From East						Commonwealth Avenue (Route 30) WB From South						Carriage Road From Southwest						Washington Street From West						Carriage Road From Northwest						
Start Time	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																																					
Peak Hour for Entire Intersection Begins at 04:15 PM																																					
04:15 PM	0	**2**	0	**3**	0	5	0	0	3	0	**1**	**4**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**2**	0	0	**2**	**2**	0	0	0	0	**2**	**13**
04:30 PM	0	0	**5**	1	**1**	**7**	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
04:45 PM	0	0	0	1	1	2	0	0	**4**	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	8
05:00 PM	0	0	0	1	1	2	0	0	4	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	8
Total Volume	0	2	5	6	3	16	0	0	12	0	1	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	6	2	0	0	0	0	2	37
% App. Total		12.5	31.2	37.5	18.8		0	0	92.3	0	7.7																100				100						
PHF	.000	.250	.250	.500	.750	.571	.000	.000	.750	.000	.250	.813	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.750	.000	.000	.750	.250	.000	.000	.000	.000	.250	.712

PRECISION
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N/S: Commonwealth Avenue (Route 30) WB
E/W/NSW: Washington St/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

File Name : 112737 BB1
Site Code : TBA
Start Date : 12/14/2011

Groups Printed- Peds and Bicycles

	Commonwealth Avenue (Route 30) WB From North						MBTA Tracks From East						Commonwealth Avenue (Route 30) WB From South						Carriage Road From Southwest						Washington Street From West						Carriage Road From Northwest						
Start Time	Hard Right	Right	Bear Right	Thru	Left	Peds	Right	Bear Right	Thru	Bear Left	Left	Peds	Right	Thru	Bear Left	Left	Hard Left	Peds	Hard Right	Bear Right	Bear Left	Left	Hard Left	Peds	Hard Right	Right	Thru	Left	Hard Left	Peds	Hard Right	Right	Bear Right	Bear Left	Hard Left	Peds	Int. Total
04:00 PM	0	0	0	0	0	32	0	0	0	0	0	2	0	0	0	0	0	23	0	0	0	0	0	23	0	0	1	0	0	11	0	0	0	0	0	32	124
04:15 PM																																					
04:30 PM	0	0	0	0	0	27	0	0	0	0	0	2	0	0	0	0	0	12	0	0	0	0	0	12	0	0	1	0	0	1	0	0	0	1	0	27	83
04:45 PM																																					
Total	0	0	0	1	0	145	0	0	4	0	0	5	0	0	0	0	0	52	0	0	0	0	0	52	0	0	4	0	1	34	0	2	0	1	0	145	446
05:00 PM																																					
05:15 PM	0	0	0	1	0	57	0	0	0	1	0	0	0	0	0	0	0	20	0	0	0	0	0	20	0	0	1	0	0	4	0	0	0	0	0	57	161
05:30 PM																																					
05:45 PM	0	0	0	1	0	51	0	0	1	0	0	4	0	0	0	0	0	18	0	0	0	0	0	18	0	0	2	0	0	17	0	1	0	0	0	51	164
Total	0	0	0	2	0	200																														200	623
Grand Total	0	0	0	3	0	345	0	0	6	1	0	10	0	0	0	0	0	136	0	0	0	0	0	136	0	0	8	0	1	73	1	3	0	1	0	345	1069
Apprch %	0	0	0	0.9	0	99.1	0	0	35.3	5.9	0	58.8	0	0	0	0	0	100	0	0	0	0	0	100	0	0	9.8	0	1.2	89	0.3	0.9	0	0.3	0	98.6	
Total %	0	0	0	0.3	0	32.3	0	0	0.6	0.1	0	0.9	0	0	0	0	0	12.7	0	0	0	0	0	12.7	0	0	0.7	0	0.1	6.8	0.1	0.3	0	0.1	0	32.3	

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 05:00 PM

	Commonwealth Avenue (Route 30) WB From North							MBTA Tracks From East							Commonwealth Avenue (Route 30) WB From South							Carriage Road From Southwest							Washington Street From West							Carriage Road From Northwest							
Start Time	Hard Right	Right	Bear Right	Thru	Left	Peds	App. Total	Right	Bear Right	Thru	Bear Left	Left	Peds	App. Total	Right	Thru	Bear Left	Left	Hard Left	Peds	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	Peds	App. Total	Hard Right	Right	Thru	Left	Hard Left	Peds	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	Peds	App. Total	Int. Total
05:00 PM	0	0	0	0	0	39	39	0	0	**1**	0	0	0	1	0	0	0	0	0	**26**	**26**	0	0	0	0	0	**26**	**26**	0	0	1	0	0	5	6	0	0	0	0	0	39	39	137
05:15 PM	0	0	0	**1**	0	**57**	**58**	0	0	0	**1**	0	0	1	0	0	0	0	0	20	20	0	0	0	0	0	20	20	0	0	1	0	0	4	5	0	0	0	0	0	**57**	**57**	161
05:30 PM	0	0	0	0	0	53	53	0	0	0	0	0	1	1	0	0	0	0	0	20	20	0	0	0	0	0	20	20	0	0	0	0	0	13	13	**1**	0	0	0	0	53	54	161
05:45 PM	0	0	0	1	0	51	52	0	0	1	0	0	**4**	**5**	0	0	0	0	0	18	18	0	0	0	0	0	18	18	0	0	**2**	0	0	**17**	**19**	0	**1**	0	0	0	51	52	**164**
Total Volume	0	0	0	2	0	200	202	0	0	2	1	0	5	8	0	0	0	0	0	84	84	0	0	0	0	0	84	84	0	0	4	0	0	39	43	1	1	0	0	0	200	202	623
% App. Total	0	0	0	1	0	99		0	0	25	12.5	0	62.5		0	0	0	0	0	100		0	0	0	0	0	100		0	0	9.3	0	0	90.7		0.5	0.5	0	0	0	99		
PHF	.000	.000	.000	.500	.000	.877	.871	.000	.000	.500	.250	.000	.313	.400	.000	.000	.000	.000	.000	.808	.808	.000	.000	.000	.000	.000	.808	.808	.000	.000	.500	.000	.000	.574	.566	.250	.250	.000	.000	.000	.877	.886	.950

PRECISION
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N/S: Commonwealth Avenue (Route 30) WB
E/W/NSW: Washington St/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

File Name : 112737 BB1
Site Code : TBA
Start Date : 12/14/2011

Groups Printed- Trains

	Commonwealth Avenue (Route 30) WB From North					MBTA Tracks From East					Commonwealth Avenue (Route 30) WB From South					Carriage Road From Southwest					Washington Street From West					Carriage Road From Northwest					
Start Time	Hard Right	Right	Bear Right	Thru	Left	Right	Bear Right	Thru	Bear Left	Left	Right	Thru	Bear Left	Left	Hard Left	Hard Right	Bear Right	Bear Left	Left	Hard Left	Hard Right	Right	Thru	Left	Hard Left	Hard Right	Right	Bear Right	Bear Left	Hard Left	Int. Total
04:00 PM	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
04:15 PM	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
04:30 PM	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
04:45 PM	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
Total	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
05:00 PM	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
05:15 PM	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
05:30 PM	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
05:45 PM	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
Total	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
Grand Total	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
Apprch %	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	
Total %																															

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 04:00 PM

	Commonwealth Avenue (Route 30) WB From North						MBTA Tracks From East						Commonwealth Avenue (Route 30) WB From South						Carriage Road From Southwest						Washington Street From West						Carriage Road From Northwest						
Start Time	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Int. Total
04:00 PM	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	0	0	0	0	0
04:15 PM	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	0	0	0	0	0
04:30 PM	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	0	0	0	0	0
04:45 PM	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	0	0	0	0	0
Total Volume	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	0	0	0	0	0
% App. Total	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		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

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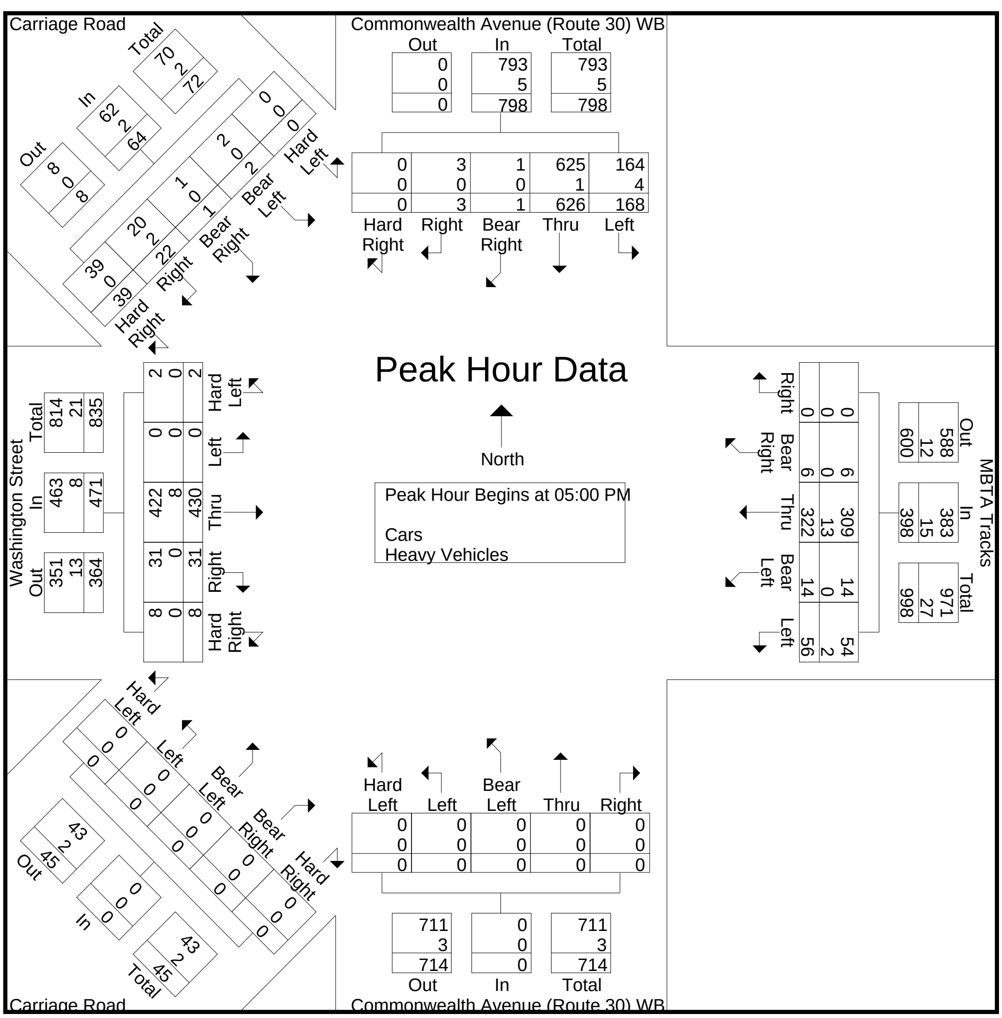
N/S: Commonwealth Avenue (Route 30) WB
E/W/NSW: Washington St/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

File Name : 112737 BB1
Site Code : TBA
Start Date : 12/14/2011

	Commonwealth Avenue (Route 30) WB From North						MBTA Tracks From East					
Start Time	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1												
Peak Hour for Entire Intersection Begins at 05:00 PM												
05:00 PM	0	1	0	156	39	196	0	1	79	4	12	96
05:15 PM	0	0	1	168	40	209	0	1	83	3	18	105
05:30 PM	0	0	0	160	48	208	0	3	82	2	13	100
05:45 PM	0	2	0	142	41	185	0	1	78	5	13	97
Total Volume	0	3	1	626	168	798	0	6	322	14	56	398
% App. Total	0	0.4	0.1	78.4	21.1		0	1.5	80.9	3.5	14.1	
PHF	.000	.375	.250	.932	.875	.955	.000	.500	.970	.700	.778	.948
Cars	0	3	1	625	164	793	0	6	309	14	54	383
% Cars	0	100	100	99.8	97.6	99.4	0	100	96.0	100	96.4	96.2
Heavy Vehicles	0	0	0	1	4	5	0	0	13	0	2	15
% Heavy Vehicles	0	0	0	0.2	2.4	0.6	0	0	4.0	0	3.6	3.8

	Commonwealth Avenue (Route 30) WB From South						Carriage Road From Southwest					
Start Time	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0	0	0		0	0	0	0	0	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
Cars	0	0	0	0	0	0	0	0	0	0	0	0
% Cars	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0

	Washington Street From West						Carriage Road From Northwest						
Start Time	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Int. Total
05:00 PM	3	6	103	0	1	113	8	2	0	1	0	11	416
05:15 PM	2	7	116	0	1	126	9	5	0	0	0	14	454
05:30 PM	2	12	106	0	0	120	9	10	1	1	0	21	449
05:45 PM	1	6	105	0	0	112	13	5	0	0	0	18	412
Total Volume	8	31	430	0	2	471	39	22	1	2	0	64	1731
% App. Total	1.7	6.6	91.3	0	0.4		60.9	34.4	1.6	3.1	0		
PHF	.667	.646	.927	.000	.500	.935	.750	.550	.250	.500	.000	.762	.953
Cars	8	31	422	0	2	463	39	20	1	2	0	62	1701
% Cars	100	100	98.1	0	100	98.3	100	90.9	100	100	0	96.9	98.3
Heavy Vehicles	0	0	8	0	0	8	0	2	0	0	0	2	30
% Heavy Vehicles	0	0	1.9	0	0	1.7	0	9.1	0	0	0	3.1	1.7



N/S: Commonwealth Avenue (Route 30) EB
E/W/NSE: Washington Street/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

PRECISION DATA INDUSTRIES, LLC
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File Name : 112737 BB2
Site Code : TBA
Start Date : 12/14/2011

Groups Printed- Cars - Heavy Vehicles

	Commonwealth Avenue (Route 30) EB From North					Carriage Road From Northeast					Washington Street From East				
Start Time	Right	Thru	Bear Left	Left	Hard Left	Hard Right	Bear Right	Bear Left	Left	Hard Left	Hard Right	Right	Thru	Left	Hard Left
04:00 PM	0	0	0	0	0	0	0	0	0	0	5	7	79	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	11	6	82	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	5	10	93	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	6	8	95	0	0
Total	0	0	0	0	0	0	0	0	0	0	27	31	349	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0	1	13	95	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	6	102	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	3	13	98	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	4	7	101	0	0
Total	0	0	0	0	0	0	0	0	0	0	8	39	396	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	35	70	745	0	0
Apprch %	0	0	0	0	0	0	0	0	0	0	4.1	8.2	87.6	0	0
Total %	0	0	0	0	0	0	0	0	0	0	1.2	2.4	25.6	0	0
Cars	0	0	0	0	0	0	0	0	0	0	35	68	721	0	0
% Cars	0	0	0	0	0	0	0	0	0	0	100	97.1	96.8	0	0
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	2	24	0	0
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	2.9	3.2	0	0

	Carriage Road From Southeast					Commonwealth Avenue (Route 30) EB From South					MBTA Tracks From West					
Start Time	Hard Right	Right	Bear Right	Bear Left	Hard Left	Hard Right	Right	Bear Right	Thru	Left	Right	Bear Right	Thru	Bear Left	Left	Int. Total
04:00 PM	13	6	0	0	0	0	10	0	74	0	0	0	99	5	18	316
04:15 PM	8	3	0	0	0	0	2	1	101	0	0	0	107	2	16	339
04:30 PM	14	3	0	0	0	0	2	1	97	1	0	0	119	4	16	365
04:45 PM	8	3	0	1	0	0	4	3	96	1	0	0	112	3	17	357
Total	43	15	0	1	0	0	18	5	368	2	0	0	437	14	67	1377
05:00 PM	13	3	1	0	0	0	8	1	80	0	0	0	121	1	16	353
05:15 PM	16	1	2	0	0	0	8	1	94	1	0	0	135	3	13	382
05:30 PM	17	3	1	0	0	0	10	0	96	0	0	0	129	6	14	390
05:45 PM	22	13	0	1	0	0	7	4	101	0	0	0	122	5	18	405
Total	68	20	4	1	0	0	33	6	371	1	0	0	507	15	61	1530
Grand Total	111	35	4	2	0	0	51	11	739	3	0	0	944	29	128	2907
Apprch %	73	23	2.6	1.3	0	0	6.3	1.4	91.9	0.4	0	0	85.7	2.6	11.6	
Total %	3.8	1.2	0.1	0.1	0	0	1.8	0.4	25.4	0.1	0	0	32.5	1	4.4	
Cars	111	32	2	2	0	0	48	11	733	3	0	0	923	29	127	2845
% Cars	100	91.4	50	100	0	0	94.1	100	99.2	100	0	0	97.8	100	99.2	97.9
Heavy Vehicles	0	3	2	0	0	0	3	0	6	0	0	0	21	0	1	62
% Heavy Vehicles	0	8.6	50	0	0	0	5.9	0	0.8	0	0	0	2.2	0	0.8	2.1

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 05:00 PM

	Commonwealth Avenue (Route 30) EB From North						Carriage Road From Northeast						Washington Street From East					
Start Time	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	13	95	0	0	109
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	6	102	0	0	108
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	3	13	98	0	0	114
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	4	7	101	0	0	112
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	8	39	396	0	0	443
% App. Total	0	0	0	0	0		0	0	0	0	0		1.8	8.8	89.4	0	0	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.500	.750	.971	.000	.000	.971
Cars	0	0	0	0	0	0	0	0	0	0	0	0	8	37	381	0	0	426
% Cars	0	0	0	0	0	0	0	0	0	0	0	0	100	94.9	96.2	0	0	96.2
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	2	15	0	0	17
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	5.1	3.8	0	0	3.8

	Carriage Road From Southeast						Commonwealth Avenue (Route 30) EB From South						MBTA Tracks From West						
Start Time	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Int. Total
05:00 PM	13	3	1	0	0	17	0	8	1	80	0	89	0	0	121	1	16	138	353
05:15 PM	16	1	2	0	0	19	0	8	1	94	1	104	0	0	135	3	13	151	382
05:30 PM	17	3	1	0	0	21	0	10	0	96	0	106	0	0	129	6	14	149	390
05:45 PM	22	13	0	1	0	36	0	7	4	101	0	112	0	0	122	5	18	145	405
Total Volume	68	20	4	1	0	93	0	33	6	371	1	411	0	0	507	15	61	583	1530
% App. Total	73.1	21.5	4.3	1.1	0		0	8	1.5	90.3	0.2		0	0	87	2.6	10.5		
PHF	.773	.385	.500	.250	.000	.646	.000	.825	.375	.918	.250	.917	.000	.000	.939	.625	.847	.965	.944
Cars	68	19	2	1	0	90	0	32	6	367	1	406	0	0	496	15	60	571	1493
% Cars	100	95.0	50.0	100	0	96.8	0	97.0	100	98.9	100	98.8	0	0	97.8	100	98.4	97.9	97.6
Heavy Vehicles	0	1	2	0	0	3	0	1	0	4	0	5	0	0	11	0	1	12	37
% Heavy Vehicles	0	5.0	50.0	0	0	3.2	0	3.0	0	1.1	0	1.2	0	0	2.2	0	1.6	2.1	2.4

N/S: Commonwealth Avenue (Route 30) EB
E/W/NSE: Washington Street/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

PRECISION DATA INDUSTRIES, LLC
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File Name : 112737 BB2
Site Code : TBA
Start Date : 12/14/2011

Groups Printed- Cars

	Commonwealth Avenue (Route 30) EB From North					Carriage Road From Northeast					Washington Street From East					Carriage Road From Southeast					Commonwealth Avenue (Route 30) EB From South					MBTA Tracks From West					
Start Time	Right	Thru	Bear Left	Left	Hard Left	Hard Right	Bear Right	Bear Left	Left	Hard Left	Hard Right	Right	Thru	Left	Hard Left	Hard Right	Right	Bear Right	Bear Left	Hard Left	Hard Right	Right	Bear Right	Thru	Left	Right	Bear Right	Thru	Bear Left	Left	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0	5	7	78	0	0	13	4	0	0	0	0	10	0	73	0	0	0	95	5	18	308
04:15 PM	0	0	0	0	0	0	0	0	0	0	11	6	79	0	0	8	3	0	0	0	0	0	1	100	0	0	0	105	2	16	331
04:30 PM	0	0	0	0	0	0	0	0	0	0	5	10	92	0	0	14	3	0	0	0	0	2	1	97	1	0	0	118	4	16	363
04:45 PM	0	0	0	0	0	0	0	0	0	0	6	8	91	0	0	8	3	0	1	0	0	4	3	96	1	0	0	109	3	17	350
Total	0	0	0	0	0	0	0	0	0	0	27	31	340	0	0	43	13	0	1	0	0	16	5	366	2	0	0	427	14	67	1352
05:00 PM	0	0	0	0	0	0	0	0	0	0	1	12	91	0	0	13	2	0	0	0	0	8	1	78	0	0	0	118	1	16	341
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	6	97	0	0	16	1	2	0	0	0	7	1	93	1	0	0	131	3	13	371
05:30 PM	0	0	0	0	0	0	0	0	0	0	3	13	96	0	0	17	3	0	0	0	0	10	0	96	0	0	0	128	6	13	385
05:45 PM	0	0	0	0	0	0	0	0	0	0	4	6	97	0	0	22	13	0	1	0	0	7	4	100	0	0	0	119	5	18	396
Total	0	0	0	0	0	0	0	0	0	0	8	37	381	0	0	68	19	2	1	0	0	32	6	367	1	0	0	496	15	60	1493
Grand Total	0	0	0	0	0	0	0	0	0	0	35	68	721	0	0	111	32	2	2	0	0	48	11	733	3	0	0	923	29	127	2845
Apprch %	0	0	0	0	0	0	0	0	0	0	4.2	8.3	87.5	0	0	75.5	21.8	1.4	1.4	0	0	6	1.4	92.2	0.4	0	0	85.5	2.7	11.8	
Total %	0	0	0	0	0	0	0	0	0	0	1.2	2.4	25.3	0	0	3.9	1.1	0.1	0.1	0	0	1.7	0.4	25.8	0.1	0	0	32.4	1	4.5	

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 05:00 PM

	Commonwealth Avenue (Route 30) EB From North						Carriage Road From Northeast						Washington Street From East						Carriage Road From Southeast						Commonwealth Avenue (Route 30) EB From South						MBTA Tracks From West						
Start Time	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Int. Total
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	12	91	0	0	104	13	2	0	0	0	15	0	8	1	78	0	87	0	0	118	1	16	135	341
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	6	**97**	**0**	**0**	103	16	1	**2**	0	0	19	0	7	1	93	**1**	102	0	0	**131**	3	13	**147**	371
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	3	**13**	96	0	0	**112**	17	3	0	0	0	20	0	**10**	**0**	96	0	106	0	0	128	**6**	13	147	385
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	**4**	6	97	0	0	107	**22**	**13**	**0**	**1**	0	**36**	0	7	**4**	**100**	0	**111**	0	0	119	5	**18**	142	**396**
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	8	37	381	0	0	426	68	19	2	1	0	90	0	32	6	367	1	406	0	0	496	15	60	571	1493
% App. Total	0	0	0	0	0		0	0	0	0	0		1.9	8.7	89.4	0	0		75.6	21.1	2.2	1.1	0		0	7.9	1.5	90.4	0.2		0	0	86.9	2.6	10.5		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.500	.712	.982	.000	.000	.951	.773	.365	.250	.250	.000	.625	.000	.800	.375	.918	.250	.914	.000	.000	.947	.625	.833	.971	.943

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N/S: Commonwealth Avenue (Route 30) EB
E/W/NSE: Washington Street/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

File Name : 112737 BB2
Site Code : TBA
Start Date : 12/14/2011

Groups Printed- Heavy Vehicles

	Commonwealth Avenue (Route 30) EB From North					Carriage Road From Northeast					Washington Street From East					Carriage Road From Southeast					Commonwealth Avenue (Route 30) EB From South					MBTA Tracks From West					
Start Time	Right	Thru	Bear Left	Left	Hard Left	Hard Right	Bear Right	Bear Left	Left	Hard Left	Hard Right	Right	Thru	Left	Hard Left	Hard Right	Right	Bear Right	Bear Left	Hard Left	Hard Right	Right	Bear Right	Thru	Left	Right	Bear Right	Thru	Bear Left	Left	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0	0	0	1	0	0	0	4	0	0	8
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	2	0	1	0	0	0	2	0	0	8
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	7
Total	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	2	0	0	0	0	2	0	2	0	0	0	10	0	0	25
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	0	1	1	0	0	0	0	0	2	0	0	0	3	0	0	12
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	1	0	1	0	0	0	4	0	0	11
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1	5
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0	0	9
Total	0	0	0	0	0	0	0	0	0	0	0	2	15	0	0	0	1	2	0	0	0	1	0	4	0	0	0	11	0	1	37
Grand Total	0	0	0	0	0	0	0	0	0	0	0	2	24	0	0	0	3	2	0	0	0	3	0	6	0	0	0	21	0	1	62
Apprch %	0	0	0	0	0	0	0	0	0	0	0	7.7	92.3	0	0	0	60	40	0	0	0	33.3	0	66.7	0	0	0	95.5	0	4.5	
Total %	0	0	0	0	0	0	0	0	0	0	0	3.2	38.7	0	0	0	4.8	3.2	0	0	0	4.8	0	9.7	0	0	0	33.9	0	1.6	

	Commonwealth Avenue (Route 30) EB From North						Carriage Road From Northeast						Washington Street From East						Carriage Road From Southeast						Commonwealth Avenue (Route 30) EB From South						MBTA Tracks From West						
Start Time	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																																					
Peak Hour for Entire Intersection Begins at 05:00 PM																																					
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	4	0	0	**5**	0	**1**	**1**	0	0	**2**	0	0	0	**2**	0	**2**	0	0	3	0	0	3	**12**
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**5**	0	0	5	0	0	0	0	0	0	0	**1**	0	1	0	2	0	0	**4**	0	0	**4**	11
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	**1**	2	5
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	5	0	0	0	0	0	0	0	0	0	1	0	1	0	0	3	0	0	3	9
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	2	15	0	0	17	0	1	2	0	0	3	0	1	0	4	0	5	0	0	11	0	1	12	37
% App. Total													0	11.8	88.2	0	0		0	33.3	66.7	0	0		0	20	0	80	0		0	0	91.7	0	8.3		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.500	.750	.000	.000	.850	.000	.250	.500	.000	.000	.375	.000	.250	.000	.500	.000	.625	.000	.000	.688	.000	.250	.750	.771

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City, State: Brighton, MA
Client: HSH/ J. SanClemente

File Name : 112737 BB2
Site Code : TBA
Start Date : 12/14/2011
Page No : 1

Groups Printed- Peds and Bicycles

	Commonwealth Avenue (Route 30) EB From North						Carriage Road From Northeast						Washington Street From East					
Start Time	Right	Thru	Bear Left	Left	Hard Left	Peds	Hard Right	Bear Right	Bear Left	Left	Hard Left	Peds	Hard Right	Right	Thru	Left	Hard Left	Peds
04:00 PM	0	0	0	0	0	32	0	0	0	0	0	32	0	0	0	0	0	30
04:15 PM																		
04:30 PM	0	0	0	0	0	49	0	0	0	0	0	49	1	0	0	0	0	32
04:45 PM																		
Total	0	0	0	0	0	173	0	0	0	0	0	173	1	0	4	0	0	129
05:00 PM																		
05:15 PM	0	0	0	0	0	45	0	0	0	0	0	45	0	0	0	0	0	36
05:30 PM																		
05:45 PM	0	0	0	0	0	52	0	0	0	0	0	52	0	0	1	0	0	39
Total	0	0	0	0	0	196						196						128
Grand Total	0	0	0	0	0	369	0	0	0	0	0	369	2	0	6	0	0	257
Apprch %	0	0	0	0	0	100	0	0	0	0	0	100	0.8	0	2.3	0	0	97
Total %	0	0	0	0	0	29.6	0	0	0	0	0	29.6	0.2	0	0.5	0	0	20.6

	Carriage Road From Southeast						Commonwealth Avenue (Route 30) EB From South						MBTA Tracks From West						
Start Time	Hard Right	Right	Bear Right	Bear Left	Hard Left	Peds	Hard Right	Right	Bear Right	Thru	Left	Peds	Right	Bear Right	Thru	Bear Left	Left	Peds	Int. Total
04:00 PM	1	0	0	0	0	18	0	0	0	0	0	18	0	0	1	0	0	3	135
04:15 PM																			
04:30 PM	0	0	0	0	0	7	0	0	0	0	1	7	0	0	0	0	0	4	150
04:45 PM																			
Total	1	0	0	0	0	45	0	0	0	0	1	45	0	0	2	1	0	8	583
05:00 PM																			
05:15 PM	0	0	0	0	0	11	0	0	0	0	0	11	0	0	1	0	0	0	149
05:30 PM																			
05:45 PM	0	0	0	0	0	14	0	0	0	0	0	14	0	0	5	0	0	1	178
Total						64	0	0	0	0	0	64	0	0	8	0	0	6	665
Grand Total	1	0	0	0	0	109	0	0	0	0	1	109	0	0	10	1	0	14	1248
Apprch %	0.9	0	0	0	0	99.1	0	0	0	0	0.9	99.1	0	0	40	4	0	56	
Total %	0.1	0	0	0	0	8.7	0	0	0	0	0.1	8.7	0	0	0.8	0.1	0	1.1	

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 05:00 PM

	Commonwealth Avenue (Route 30) EB From North							Carriage Road From Northeast							Washington Street From East						
Start Time	Right	Thru	Bear Left	Left	Hard Left	Peds	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	Peds	App. Total	Hard Right	Right	Thru	Left	Hard Left	Peds	App. Total
05:00 PM	0	0	0	0	0	51	51	0	0	0	0	0	51	51	0	0	1	0	0	22	23
05:15 PM	0	0	0	0	0	45	45	0	0	0	0	0	45	45	0	0	0	0	0	36	36
05:30 PM	0	0	0	0	0	48	48	0	0	0	0	0	48	48	1	0	0	0	0	31	32
05:45 PM	0	0	0	0	0	52	52	0	0	0	0	0	52	52	0	0	1	0	0	39	40
Total Volume	0	0	0	0	0	196	196	0	0	0	0	0	196	196	1	0	2	0	0	128	131
% App. Total	0	0	0	0	0	100		0	0	0	0	0	100		0.8	0	1.5	0	0	97.7	
PHF	.000	.000	.000	.000	.000	.942	.942	.000	.000	.000	.000	.000	.942	.942	.250	.000	.500	.000	.000	.821	.819

	Carriage Road From Southeast							Commonwealth Avenue (Route 30) EB From South							MBTA Tracks From West							
Start Time	Hard Right	Right	Bear Right	Bear Left	Hard Left	Peds	App. Total	Hard Right	Right	Bear Right	Thru	Left	Peds	App. Total	Right	Bear Right	Thru	Bear Left	Left	Peds	App. Total	Int. Total
05:00 PM	0	0	0	0	0	17	17	0	0	0	0	0	17	17	0	0	1	0	0	0	1	160
05:15 PM	0	0	0	0	0	11	11	0	0	0	0	0	11	11	0	0	1	0	0	0	1	149
05:30 PM	0	0	0	0	0	22	22	0	0	0	0	0	22	22	0	0	1	0	0	5	6	178
05:45 PM	0	0	0	0	0	14	14	0	0	0	0	0	14	14	0	0	5	0	0	1	6	178
Total Volume	0	0	0	0	0	64	64	0	0	0	0	0	64	64	0	0	8	0	0	6	14	665
% App. Total	0	0	0	0	0	100		0	0	0	0	0	100		0	0	57.1	0	0	42.9		
PHF	.000	.000	.000	.000	.000	.727	.727	.000	.000	.000	.000	.000	.727	.727	.000	.000	.400	.000	.000	.300	.583	.934

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E/W/NSE: Washington Street/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

File Name : 112737 BB2
Site Code : TBA
Start Date : 12/14/2011

Groups Printed- Trains

	Commonwealth Avenue (Route 30) EB From North					Carriage Road From Northeast					Washington Street From East					Carriage Road From Southeast					Commonwealth Avenue (Route 30) EB From South					MBTA Tracks From West					
Start Time	Right	Thru	Bear Left	Left	Hard Left	Hard Right	Bear Right	Bear Left	Left	Hard Left	Hard Right	Right	Thru	Left	Hard Left	Hard Right	Right	Bear Right	Bear Left	Hard Left	Hard Right	Right	Bear Right	Thru	Left	Right	Bear Right	Thru	Bear Left	Left	Int. Total
04:00 PM	0	3	0	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	0	6
04:15 PM	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	4
04:30 PM	0	2	0	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	0	5
04:45 PM	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3
Total	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	18
05:00 PM	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	5
05:15 PM	0	2	0	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	0	5
05:30 PM	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	4
05:45 PM	0	3	0	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	0	6
Total	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	20
Grand Total	0	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	0	0	0	0	0	0	38
Apprch %	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0	
Total %	0	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0	0	0	0	

	Commonwealth Avenue (Route 30) EB From North						Carriage Road From Northeast						Washington Street From East						Carriage Road From Southeast						Commonwealth Avenue (Route 30) EB From South						MBTA Tracks From West						
Start Time	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																																					
Peak Hour for Entire Intersection Begins at 05:00 PM																																					
05:00 PM	0	**3**	0	0	0	**3**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	5
05:15 PM	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**3**	0	**3**	0	0	0	0	0	0	5
05:30 PM	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	4
05:45 PM	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0	**6**
Total Volume	0	10	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	10	0	0	0	0	0	0	20
% App. Total		100																										100									
PHF	.000	.833	.000	.000	.000	.833	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.833	.000	.833	.000	.000	.000	.000	.000	.000	.833

PRECISION DATA INDUSTRIES, LLC
P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

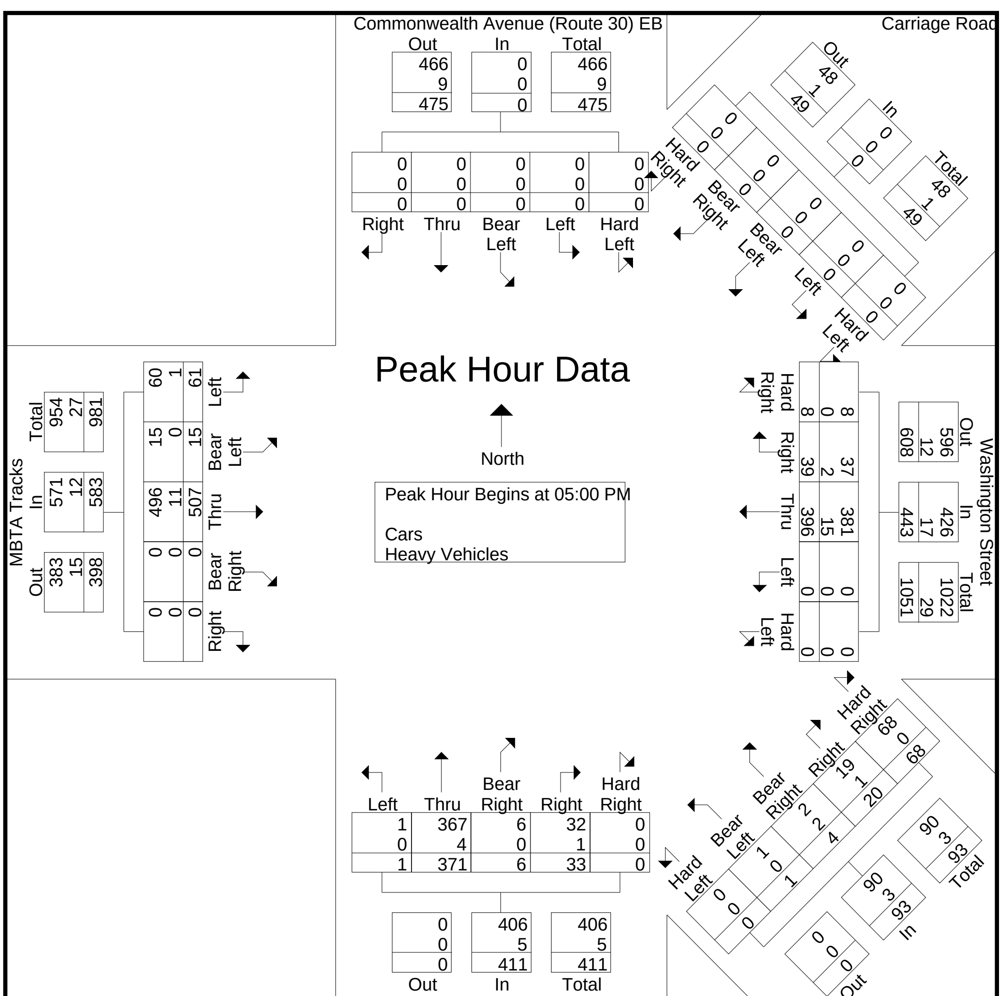
N/S: Commonwealth Avenue (Route 30) EB
E/W/NSE: Washington Street/Carriage Road
City, State: Brighton, MA
Client: HSH/ J. SanClemente

File Name : 112737 BB2
Site Code : TBA
Start Date : 12/14/2011
Page No : 1

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 05:00 PM

	Commonwealth Avenue (Route 30) EB From North						Carriage Road From Northeast						Washington Street From East					
Start Time	Right	Thru	Bear Left	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	Hard Left	App. Total
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	13	95	0	0	109
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	6	102	0	0	108
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	3	13	98	0	0	114
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	4	7	101	0	0	112
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	8	39	396	0	0	443
% App. Total	0	0	0	0	0		0	0	0	0	0		1.8	8.8	89.4	0	0	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.500	.750	.971	.000	.000	.971
Cars	0	0	0	0	0	0	0	0	0	0	0	0	8	37	381	0	0	426
% Cars	0	0	0	0	0	0	0	0	0	0	0	0	100	94.9	96.2	0	0	96.2
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	2	15	0	0	17
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	5.1	3.8	0	0	3.8

	Carriage Road From Southeast						Commonwealth Avenue (Route 30) EB From South						MBTA Tracks From West						
Start Time	Hard Right	Right	Bear Right	Bear Left	Hard Left	App. Total	Hard Right	Right	Bear Right	Thru	Left	App. Total	Right	Bear Right	Thru	Bear Left	Left	App. Total	Int. Total
05:00 PM	13	3	1	0	0	17	0	8	1	80	0	89	0	0	121	1	16	138	353
05:15 PM	16	1	2	0	0	19	0	8	1	94	1	104	0	0	135	3	13	151	382
05:30 PM	17	3	1	0	0	21	0	10	0	96	0	106	0	0	129	6	14	149	390
05:45 PM	22	13	0	1	0	36	0	7	4	101	0	112	0	0	122	5	18	145	405
Total Volume	68	20	4	1	0	93	0	33	6	371	1	411	0	0	507	15	61	583	1530
% App. Total	73.1	21.5	4.3	1.1	0		0	8	1.5	90.3	0.2		0	0	87	2.6	10.5		
PHF	.773	.385	.500	.250	.000	.646	.000	.825	.375	.918	.250	.917	.000	.000	.939	.625	.847	.965	.944
Cars	68	19	2	1	0	90	0	32	6	367	1	406	0	0	496	15	60	571	1493
% Cars	100	95.0	50.0	100	0	96.8	0	97.0	100	98.9	100	98.8	0	0	97.8	100	98.4	97.9	97.6
Heavy Vehicles	0	1	2	0	0	3	0	1	0	4	0	5	0	0	11	0	1	12	37
% Heavy Vehicles	0	5.0	50.0	0	0	3.2	0	3.0	0	1.1	0	1.2	0	0	2.2	0	1.6	2.1	2.4



TRIP GENERATION CALCULATIONS

Brighton Marine Residences

Trip Generation Assessment--Daily

HOWARD/STEIN-HUDSON ASSOCIATES

9-Jul-14

AVERAGE

Existing Apartment Units	0
Proposed Total Units	100
Net Added Units	100

			Vehicular Trip Generation					Conversion to Person Trips		Mode Share Split								Vehicular Trips		
Land Use	**Size**	**Category**	**Unadjusted Vehicle Trips**	**Internal trips**	**Pass-by %**	**Pass-By Trips**	**Less capture trips**	**Assumed national vehicle occupancy rate[1]**	**Converted to New Person trips**	**Transit Share[2]**	**Transit Trips**	**Walk/Bike/ Other Share[2]**	**Walk/ Bike/ Other Trips**	**Vehicle Share[2]**	**Total Vehicle Person Trips**	**Pass-By vehicle Share**	**Total Vehicle Pass-By Person Trips**	**Assumed local auto occupancy rate for autos[3]**	**Total Adjusted Auto Trips**	**Total Adjusted Auto Trips (Pass-By)**
Daily																				
Apartment	100	Total	666	0			666	1.13	**752**		**166**		**142**		**444**			1.13	**392**	
	Units	In	333		0.00		333	1.13	**376**	22%	**83**	19%	**71**	59%	**222**			1.13	**196**	
		Out	333		0.00		333	1.13	**376**	22%	**83**	19%	**71**	59%	**222**			1.13	**196**	
AM Peak Hour																				
Apartment	100	Total	51	0			51	1.13	**57**		**12**		**16**		**29**			1.13	**25**	
	Units	In	10		0.00		10	1.13	**11**	30%	**3**	19%	**2**	51%	**6**			1.13	**5**	
		Out	41		0.00		41	1.13	**46**	20%	**9**	30%	**14**	50%	**23**			1.13	**20**	
PM Peak Hour																				
Apartment	100	Total	62	0			62	1.13	**70**		**17**		**19**		**36**			1.13	**32**	
	Units	In	40		0.00		40	1.13	**45**	20%	**9**	30%	**14**	50%	**23**			1.13	**20**	
		Out	22		0.00		22	1.13	**25**	30%	**8**	19%	**5**	51%	**13**			1.13	**12**	

1. 2009 National vehicle occupancy rates - 1.13:home to work; 1.84: family/personal business; 1.78: shopping; 2.2 social/recreational
2. Mode shares based on peak-hour BTD Data for Area 8.
3. Local vehicle occupancy rates based on 2009 National vehicle occupancy rates.
4. ITE Trip Generation Rate, 9th Edition, LUC 310 (Hotel), Average rate

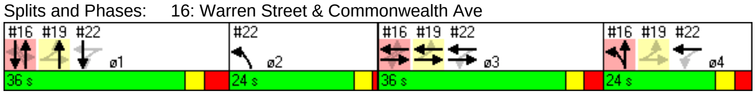
INTERSECTION CAPACITY ANALYSIS WORKSHEETS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Leading Detector (ft)	50	50		50	50		50	50		50	50		
Trailing Detector (ft)	0	0		0	0		0	0		0	0		
Turning Speed (mph)	15		9	15		9	15		9	15		9	
Satd. Flow (prot)	0	1756	0	0	1850	0	0	3486	0	0	3468	0	
Flt Permitted		0.793			0.901			0.676			0.837		
Satd. Flow (perm)	0	1405	0	0	1675	0	0	2385	0	0	2906	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		24			1			2			13		
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		70			71			510			528		
Travel Time (s)		1.6			1.6			11.6			12.0		
Volume (vph)	61	163	129	23	221	4	233	707	18	5	298	45	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	66	177	140	25	240	4	253	768	20	5	324	49	
Lane Group Flow (vph)	0	383	0	0	269	0	0	1041	0	0	378	0	
Turn Type	Perm			Perm			pm+pt			Perm			
Protected Phases		3			3		4	1 4			1		2
Permitted Phases	3			3			1 4			1			
Detector Phases	3	3		3	3		4	1 4		1	1		
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0			8.0	8.0		8.0
Minimum Split (s)	28.0	28.0		28.0	28.0		24.0			28.0	28.0		22.0
Total Split (s)	36.0	36.0	0.0	36.0	36.0	0.0	24.0	60.0	0.0	36.0	36.0	0.0	24.0
Total Split (%)	30.0%	30.0%	0.0%	30.0%	30.0%	0.0%	20.0%	50.0%	0.0%	30.0%	30.0%	0.0%	20%
Maximum Green (s)	30.0	30.0		30.0	30.0		18.0			29.0	29.0		20.0
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0			3.0	3.0		3.0
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0			4.0	4.0		1.0
Lead/Lag	Lead	Lead		Lead	Lead		Lag			Lead	Lead		Lag
Lead-Lag Optimize?													
Vehicle Extension (s)	1.0	1.0		1.0	1.0		1.0			1.0	1.0		1.0
Recall Mode	C-Max	C-Max		C-Max	C-Max		Max			None	None		Max
Walk Time (s)							7.0			7.0	7.0		7.0
Flash Dont Walk (s)							9.0			14.0	14.0		8.0
Pedestrian Calls (#/hr)							16			31	31		7
Act Effct Green (s)		37.2			37.2			46.8			26.8		
Actuated g/C Ratio		0.31			0.31			0.39			0.22		
v/c Ratio		0.85			0.52			0.93			0.57		
Control Delay		31.7			5.1			45.5			42.8		
Queue Delay		3.1			0.0			1.3			0.1		
Total Delay		34.8			5.1			46.8			42.9		
LOS		C			A			D			D		
Approach Delay		34.8			5.1			46.8			42.9		
Approach LOS		C			A			D			D		
Queue Length 50th (ft)		270			11			330			130		
Queue Length 95th (ft)		#484			16			386			175		
Internal Link Dist (ft)		1			1			430			448		
Turn Bay Length (ft)													
Base Capacity (vph)		452			520			1218			784		
Starvation Cap Reductn		0			0			0			0		
Spillback Cap Reductn		25			0			59			45		
Storage Cap Reductn		0			0			0			0		
Reduced v/c Ratio		0.90			0.52			0.90			0.51		

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 3:EBWB, Start of Green
Natural Cycle: 105
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 38.4 Intersection LOS: D
Intersection Capacity Utilization 79.5% ICU Level of Service D
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 16: Warren Street & Commonwealth Ave

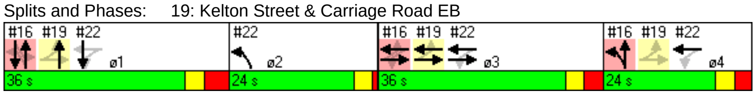


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2	ø4
Lane Configurations														
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		
Leading Detector (ft)	50	50			50			50						
Trailing Detector (ft)	0	0			0			0						
Turning Speed (mph)	15		9	15		9	15		9	15		9		
Satd. Flow (prot)	0	1857	0	0	1861	0	0	1742	0	0	0	0		
Flt Permitted		0.989												
Satd. Flow (perm)	0	1842	0	0	1861	0	0	1742	0	0	0	0		
Right Turn on Red			Yes			Yes			Yes			Yes		
Satd. Flow (RTOR)								15						
Link Speed (mph)		30			30			30			30			
Link Distance (ft)		71			457			375			418			
Travel Time (s)		1.6			10.4			8.5			9.5			
Volume (vph)	13	173	0	0	247	3	0	15	14	0	0	0		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92		
Adj. Flow (vph)	14	188	0	0	268	3	0	16	15	0	0	0		
Lane Group Flow (vph)	0	202	0	0	271	0	0	31	0	0	0	0		
Turn Type	custom													
Protected Phases		3			3			1!					2	4
Permitted Phases	1 3 4!	1 3 4!												
Detector Phases	1 3 4	3			3			1						
Minimum Initial (s)		8.0			8.0			8.0					8.0	8.0
Minimum Split (s)		28.0			28.0			28.0					22.0	24.0
Total Split (s)	96.0	36.0	0.0	0.0	36.0	0.0	0.0	36.0	0.0	0.0	0.0	0.0	24.0	24.0
Total Split (%)	80.0%	30.0%	0.0%	0.0%	30.0%	0.0%	0.0%	30.0%	0.0%	0.0%	0.0%	0.0%	20%	20%
Maximum Green (s)		30.0			30.0			29.0					20.0	18.0
Yellow Time (s)		3.0			3.0			3.0					3.0	3.0
All-Red Time (s)		3.0			3.0			4.0					1.0	3.0
Lead/Lag		Lead			Lead			Lead					Lag	Lag
Lead-Lag Optimize?														
Vehicle Extension (s)		1.0			1.0			1.0					1.0	1.0
Recall Mode		C-Max			C-Max			None					Max	Max
Walk Time (s)								7.0					7.0	7.0
Flash Dont Walk (s)								14.0					8.0	9.0
Pedestrian Calls (#/hr)								31					7	16
Act Effct Green (s)		88.0			37.2			26.8						
Actuated g/C Ratio		0.73			0.31			0.22						
v/c Ratio		0.15			0.47			0.08						
Control Delay		0.5			38.4			21.5						
Queue Delay		0.0			0.2			0.0						
Total Delay		0.5			38.6			21.5						
LOS		A			D			C						
Approach Delay		0.5			38.6			21.5						
Approach LOS		A			D			C						
Queue Length 50th (ft)		2			174			10						
Queue Length 95th (ft)		m3			269			34						
Internal Link Dist (ft)		1			377			295			338			
Turn Bay Length (ft)														
Base Capacity (vph)		1356			577			476						
Starvation Cap Reductn		0			0			0						
Spillback Cap Reductn		0			49			0						
Storage Cap Reductn		0			0			0						
Reduced v/c Ratio		0.15			0.51			0.07						

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 3:EBWB, Start of Green
Natural Cycle: 105
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 22.3 Intersection LOS: C
Intersection Capacity Utilization 33.1% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.
! Phase conflict between lane groups.

Splits and Phases: 19: Kelton Street & Carriage Road EB

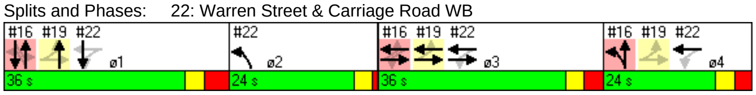


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø4
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Leading Detector (ft)		50		50	50		50				50		
Trailing Detector (ft)		0		0	0		0				0		
Turning Speed (mph)	15		9	15		9	15		9	15		9	
Satd. Flow (prot)	0	1852	0	0	1857	0	1770	0	0	0	1777	0	
Flt Permitted					0.847		0.950						
Satd. Flow (perm)	0	1852	0	0	1578	0	1770	0	0	0	1777	0	
Right Turn on Red			Yes			Yes			No			No	
Satd. Flow (RTOR)		2											
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		368			70			384			360		
Travel Time (s)		8.4			1.6			8.7			8.2		
Volume (vph)	0	259	13	34	465	0	36	0	0	0	134	69	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	0	282	14	37	505	0	39	0	0	0	146	75	
Lane Group Flow (vph)	0	296	0	0	542	0	39	0	0	0	221	0	
Turn Type				custom			custom						
Protected Phases		3			3 4		2				1!		4
Permitted Phases				1 3 4!	1!		2						
Detector Phases		3		1 3 4	3 4		2				1		
Minimum Initial (s)		8.0					8.0				8.0		8.0
Minimum Split (s)		28.0					22.0				28.0		24.0
Total Split (s)	0.0	36.0	0.0	96.0	60.0	0.0	24.0	0.0	0.0	0.0	36.0	0.0	24.0
Total Split (%)	0.0%	30.0%	0.0%	80.0%	50.0%	0.0%	20.0%	0.0%	0.0%	0.0%	30.0%	0.0%	20%
Maximum Green (s)		30.0					20.0				29.0		18.0
Yellow Time (s)		3.0					3.0				3.0		3.0
All-Red Time (s)		3.0					1.0				4.0		3.0
Lead/Lag		Lead					Lag				Lead		Lag
Lead-Lag Optimize?													
Vehicle Extension (s)		1.0					1.0				1.0		1.0
Recall Mode		C-Max					Max				None		Max
Walk Time (s)							7.0				7.0		7.0
Flash Dont Walk (s)							8.0				14.0		9.0
Pedestrian Calls (#/hr)							7				31		16
Act Effct Green (s)		37.2			88.0		20.0				26.8		
Actuated g/C Ratio		0.31			0.73		0.17				0.22		
v/c Ratio		0.51			0.42		0.13				0.56		
Control Delay		39.2			1.0		44.1				45.9		
Queue Delay		0.3			0.0		0.0				0.0		
Total Delay		39.5			1.0		44.1				45.9		
LOS		D			A		D				D		
Approach Delay		39.5			1.0						45.9		
Approach LOS		D			A						D		
Queue Length 50th (ft)		192			4		26				149		
Queue Length 95th (ft)		294			m7		59				222		
Internal Link Dist (ft)		288			1			304			280		
Turn Bay Length (ft)													
Base Capacity (vph)		576			1299		295				474		
Starvation Cap Reductn		0			0		0				0		
Spillback Cap Reductn		48			0		0				0		
Storage Cap Reductn		0			0		0				0		
Reduced v/c Ratio		0.56			0.42		0.13				0.47		

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 3:EBWB, Start of Green
Natural Cycle: 105
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 22.0 Intersection LOS: C
Intersection Capacity Utilization 68.7% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.
! Phase conflict between lane groups.

Splits and Phases: 22: Warren Street & Carriage Road WB

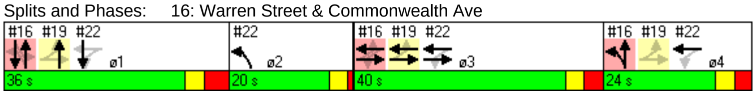


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Leading Detector (ft)	50	50		50	50		50	50		50	50		
Trailing Detector (ft)	0	0		0	0		0	0		0	0		
Turning Speed (mph)	15		9	15		9	15		9	15		9	
Satd. Flow (prot)	0	1733	0	0	1861	0	0	3483	0	0	3490	0	
Flt Permitted		0.929			0.997			0.557			0.943		
Satd. Flow (perm)	0	1618	0	0	1855	0	0	1958	0	0	3294	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		40						5			8		
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		70			71			510			528		
Travel Time (s)		1.6			1.6			11.6			12.0		
Volume (vph)	51	216	251	2	201	1	107	435	28	8	557	53	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	55	235	273	2	218	1	116	473	30	9	605	58	
Lane Group Flow (vph)	0	563	0	0	221	0	0	619	0	0	672	0	
Turn Type	Perm			Perm			pm+pt			Perm			
Protected Phases		3			3		4	1 4			1		2
Permitted Phases	3			3			1 4			1			
Detector Phases	3	3		3	3		4	1 4		1	1		
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0			8.0	8.0		8.0
Minimum Split (s)	24.0	24.0		24.0	24.0		24.0			28.0	28.0		20.0
Total Split (s)	40.0	40.0	0.0	40.0	40.0	0.0	24.0	60.0	0.0	36.0	36.0	0.0	20.0
Total Split (%)	33.3%	33.3%	0.0%	33.3%	33.3%	0.0%	20.0%	50.0%	0.0%	30.0%	30.0%	0.0%	17%
Maximum Green (s)	34.0	34.0		34.0	34.0		18.0			29.0	29.0		16.0
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0			3.0	3.0		3.0
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0			4.0	4.0		1.0
Lead/Lag	Lead	Lead		Lead	Lead		Lag			Lead	Lead		Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes		Yes
Vehicle Extension (s)	1.0	1.0		1.0	1.0		1.0			1.0	1.0		1.0
Recall Mode	C-Max	C-Max		C-Max	C-Max		Max			None	None		Max
Walk Time (s)							7.0			7.0	7.0		7.0
Flash Dont Walk (s)							9.0			14.0	14.0		8.0
Pedestrian Calls (#/hr)							16			32	32		58
Act Effct Green (s)		38.7			38.7			49.3			29.3		
Actuated g/C Ratio		0.32			0.32			0.41			0.24		
v/c Ratio		1.03			0.37			0.58			0.83		
Control Delay		60.3			3.1			24.5			51.8		
Queue Delay		21.0			0.0			0.1			0.4		
Total Delay		81.3			3.1			24.6			52.2		
LOS		F			A			C			D		
Approach Delay		81.3			3.1			24.6			52.2		
Approach LOS		F			A			C			D		
Queue Length 50th (ft)		~462			4			160			252		
Queue Length 95th (ft)		#664			5			204			321		
Internal Link Dist (ft)		1			1			430			448		
Turn Bay Length (ft)													
Base Capacity (vph)		548			598			1105			884		
Starvation Cap Reductn		0			0			0			0		
Spillback Cap Reductn		30			0			41			31		
Storage Cap Reductn		0			0			0			0		
Reduced v/c Ratio		1.09			0.37			0.58			0.79		

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 3:EBWB, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.03
Intersection Signal Delay: 46.6 Intersection LOS: D
Intersection Capacity Utilization 87.0% ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 16: Warren Street & Commonwealth Ave

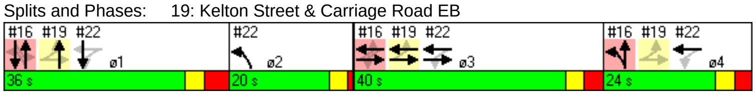


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2	ø4
Lane Configurations														
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		
Leading Detector (ft)	50	50			50			50						
Trailing Detector (ft)	0	0			0			0						
Turning Speed (mph)	15		9	15		9	15		9	15		9		
Satd. Flow (prot)	0	1852	0	0	1853	0	0	1675	0	0	0	0		
Flt Permitted		0.965												
Satd. Flow (perm)	0	1798	0	0	1853	0	0	1675	0	0	0	0		
Right Turn on Red			Yes			Yes			Yes			Yes		
Satd. Flow (RTOR)					2			27						
Link Speed (mph)		30			30			30			30			
Link Distance (ft)		71			457			375			418			
Travel Time (s)		1.6			10.4			8.5			9.5			
Volume (vph)	29	223	0	0	202	8	0	8	25	0	0	0		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92		
Adj. Flow (vph)	32	242	0	0	220	9	0	9	27	0	0	0		
Lane Group Flow (vph)	0	274	0	0	229	0	0	36	0	0	0	0		
Turn Type	custom													
Protected Phases		3			3			1!					2	4
Permitted Phases	1 3 4!	1 3 4!												
Detector Phases	1 3 4	3			3			1						
Minimum Initial (s)		8.0			8.0			8.0					8.0	8.0
Minimum Split (s)		24.0			24.0			28.0					20.0	24.0
Total Split (s)	100.0	40.0	0.0	0.0	40.0	0.0	0.0	36.0	0.0	0.0	0.0	0.0	20.0	24.0
Total Split (%)	83.3%	33.3%	0.0%	0.0%	33.3%	0.0%	0.0%	30.0%	0.0%	0.0%	0.0%	0.0%	17%	20%
Maximum Green (s)		34.0			34.0			29.0					16.0	18.0
Yellow Time (s)		3.0			3.0			3.0					3.0	3.0
All-Red Time (s)		3.0			3.0			4.0					1.0	3.0
Lead/Lag		Lead			Lead			Lead					Lag	Lag
Lead-Lag Optimize?		Yes			Yes			Yes					Yes	Yes
Vehicle Extension (s)		1.0			1.0			1.0					1.0	1.0
Recall Mode		C-Max			C-Max			None					Max	Max
Walk Time (s)								7.0					7.0	7.0
Flash Dont Walk (s)								14.0					8.0	9.0
Pedestrian Calls (#/hr)								32					58	16
Act Effct Green (s)		92.0			38.7			29.3						
Actuated g/C Ratio		0.77			0.32			0.24						
v/c Ratio		0.20			0.38			0.08						
Control Delay		0.4			34.4			15.7						
Queue Delay		0.0			0.1			0.0						
Total Delay		0.4			34.4			15.7						
LOS		A			C			B						
Approach Delay		0.4			34.4			15.7						
Approach LOS		A			C			B						
Queue Length 50th (ft)		3			139			5						
Queue Length 95th (ft)		m3			215			32						
Internal Link Dist (ft)		1			377			295			338			
Turn Bay Length (ft)														
Base Capacity (vph)		1396			598			466						
Starvation Cap Reductn		0			0			0						
Spillback Cap Reductn		0			26			0						
Storage Cap Reductn		0			0			0						
Reduced v/c Ratio		0.20			0.40			0.08						

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 3:EBWB, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.03
Intersection Signal Delay: 15.9 Intersection LOS: B
Intersection Capacity Utilization 41.1% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.
! Phase conflict between lane groups.

Splits and Phases: 19: Kelton Street & Carriage Road EB

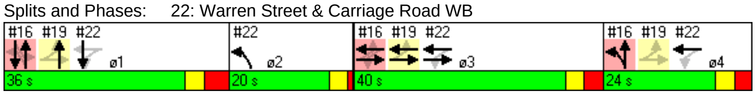


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø4
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Leading Detector (ft)		50		50	50		50				50		
Trailing Detector (ft)		0		0	0		0				0		
Turning Speed (mph)	15		9	15		9	15		9	15		9	
Satd. Flow (prot)	0	1853	0	0	1852	0	1770	0	0	0	1818	0	
Flt Permitted					0.771		0.950						
Satd. Flow (perm)	0	1853	0	0	1436	0	1770	0	0	0	1818	0	
Right Turn on Red			Yes			Yes			No			No	
Satd. Flow (RTOR)		2											
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		368			70			384			360		
Travel Time (s)		8.4			1.6			8.7			8.2		
Volume (vph)	0	366	14	41	320	0	37	0	0	0	200	44	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	0	398	15	45	348	0	40	0	0	0	217	48	
Lane Group Flow (vph)	0	413	0	0	393	0	40	0	0	0	265	0	
Turn Type				custom			custom						
Protected Phases		3			3 4		2				1!		4
Permitted Phases				1 3 4!	1!		2						
Detector Phases		3		1 3 4	3 4		2				1		
Minimum Initial (s)		8.0					8.0				8.0		8.0
Minimum Split (s)		24.0					20.0				28.0		24.0
Total Split (s)	0.0	40.0	0.0	100.0	64.0	0.0	20.0	0.0	0.0	0.0	36.0	0.0	24.0
Total Split (%)	0.0%	33.3%	0.0%	83.3%	53.3%	0.0%	16.7%	0.0%	0.0%	0.0%	30.0%	0.0%	20%
Maximum Green (s)		34.0					16.0				29.0		18.0
Yellow Time (s)		3.0					3.0				3.0		3.0
All-Red Time (s)		3.0					1.0				4.0		3.0
Lead/Lag		Lead					Lag				Lead		Lag
Lead-Lag Optimize?		Yes					Yes				Yes		Yes
Vehicle Extension (s)		1.0					1.0				1.0		1.0
Recall Mode		C-Max					Max				None		Max
Walk Time (s)							7.0				7.0		7.0
Flash Dont Walk (s)							8.0				14.0		9.0
Pedestrian Calls (#/hr)							58				32		16
Act Effct Green (s)		38.7			92.0		16.0				29.3		
Actuated g/C Ratio		0.32			0.77		0.13				0.24		
v/c Ratio		0.69			0.30		0.17				0.60		
Control Delay		43.2			0.7		48.2				45.7		
Queue Delay		2.7			0.0		0.0				0.0		
Total Delay		45.9			0.7		48.2				45.7		
LOS		D			A		D				D		
Approach Delay		45.9			0.7						45.7		
Approach LOS		D			A						D		
Queue Length 50th (ft)		283			2		28				179		
Queue Length 95th (ft)		407			m3		62				266		
Internal Link Dist (ft)		288			1			304			280		
Turn Bay Length (ft)													
Base Capacity (vph)		598			1318		236				485		
Starvation Cap Reductn		0			0		0				0		
Spillback Cap Reductn		95			0		0				0		
Storage Cap Reductn		0			0		0				0		
Reduced v/c Ratio		0.82			0.30		0.17				0.55		

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 3:EBWB, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.03
Intersection Signal Delay: 29.9 Intersection LOS: C
Intersection Capacity Utilization 69.1% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.
! Phase conflict between lane groups.

Splits and Phases: 22: Warren Street & Carriage Road WB



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Leading Detector (ft)	50	50		50	50		50	50		50	50		
Trailing Detector (ft)	0	0		0	0		0	0		0	0		
Turning Speed (mph)	15		9	15		9	15		9	15		9	
Satd. Flow (prot)	0	1755	0	0	1850	0	0	3486	0	0	3468	0	
Flt Permitted		0.783			0.891			0.670			0.819		
Satd. Flow (perm)	0	1386	0	0	1656	0	0	2364	0	0	2844	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		24			1			2			13		
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		70			71			510			528		
Travel Time (s)		1.6			1.6			11.6			12.0		
Volume (vph)	63	167	135	24	227	4	239	727	18	5	306	46	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	68	182	147	26	247	4	260	790	20	5	333	50	
Lane Group Flow (vph)	0	397	0	0	277	0	0	1070	0	0	388	0	
Turn Type	Perm			Perm			pm+pt			Perm			
Protected Phases		3			3		4	1 4			1		2
Permitted Phases	3			3			1 4			1			
Detector Phases	3	3		3	3		4	1 4		1	1		
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0			8.0	8.0		8.0
Minimum Split (s)	22.5	22.5		22.5	22.5		24.0			28.0	28.0		22.0
Total Split (s)	36.0	36.0	0.0	36.0	36.0	0.0	24.0	60.0	0.0	36.0	36.0	0.0	24.0
Total Split (%)	30.0%	30.0%	0.0%	30.0%	30.0%	0.0%	20.0%	50.0%	0.0%	30.0%	30.0%	0.0%	20%
Maximum Green (s)	30.0	30.0		30.0	30.0		18.0			29.0	29.0		20.0
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0			3.0	3.0		3.0
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0			4.0	4.0		1.0
Lead/Lag	Lead	Lead		Lead	Lead		Lag			Lead	Lead		Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes		Yes
Vehicle Extension (s)	1.0	1.0		1.0	1.0		1.0			1.0	1.0		1.0
Recall Mode	C-Max	C-Max		C-Max	C-Max		Max			None	None		Max
Walk Time (s)							7.0			7.0	7.0		7.0
Flash Dont Walk (s)							9.0			14.0	14.0		8.0
Pedestrian Calls (#/hr)							16			31	31		7
Act Effct Green (s)		35.5			35.5			48.5			28.5		
Actuated g/C Ratio		0.30			0.30			0.40			0.24		
v/c Ratio		0.93			0.57			0.94			0.57		
Control Delay		44.7			6.1			44.5			41.7		
Queue Delay		9.7			0.0			1.1			0.1		
Total Delay		54.4			6.1			45.7			41.7		
LOS		D			A			D			D		
Approach Delay		54.4			6.1			45.7			41.7		
Approach LOS		D			A			D			D		
Queue Length 50th (ft)		~314			14			326			130		
Queue Length 95th (ft)		#513			20			#413			180		
Internal Link Dist (ft)		1			1			430			448		
Turn Bay Length (ft)													
Base Capacity (vph)		427			490			1213			768		
Starvation Cap Reductn		0			0			0			0		
Spillback Cap Reductn		25			0			39			20		
Storage Cap Reductn		0			0			0			0		
Reduced v/c Ratio		0.99			0.57			0.91			0.52		

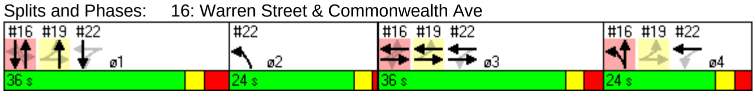
Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 46 (38%), Referenced to phase 3:EBWB, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 41.4 — Intersection LOS: D
Intersection Capacity Utilization 81.4% — ICU Level of Service D
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Splits and Phases: 16: Warren Street & Commonwealth Ave

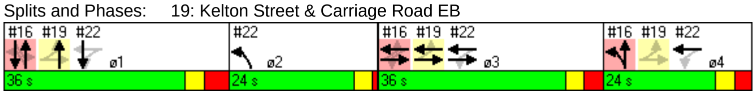


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2	ø4
Lane Configurations														
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		
Leading Detector (ft)	50	50			50			50						
Trailing Detector (ft)	0	0			0			0						
Turning Speed (mph)	15		9	15		9	15		9	15		9		
Satd. Flow (prot)	0	1857	0	0	1861	0	0	1742	0	0	0	0		
Flt Permitted		0.989												
Satd. Flow (perm)	0	1842	0	0	1861	0	0	1742	0	0	0	0		
Right Turn on Red			Yes			Yes			Yes			Yes		
Satd. Flow (RTOR)								15						
Link Speed (mph)		30			30			30			30			
Link Distance (ft)		71			457			375			418			
Travel Time (s)		1.6			10.4			8.5			9.5			
Volume (vph)	13	177	0	0	254	3	0	15	14	0	0	0		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92		
Adj. Flow (vph)	14	192	0	0	276	3	0	16	15	0	0	0		
Lane Group Flow (vph)	0	206	0	0	279	0	0	31	0	0	0	0		
Turn Type	custom													
Protected Phases		3			3			1!					2	4
Permitted Phases	1 3 4!	1 3 4!												
Detector Phases	1 3 4	3			3			1						
Minimum Initial (s)		8.0			8.0			8.0					8.0	8.0
Minimum Split (s)		22.5			22.5			28.0					22.0	24.0
Total Split (s)	96.0	36.0	0.0	0.0	36.0	0.0	0.0	36.0	0.0	0.0	0.0	0.0	24.0	24.0
Total Split (%)	80.0%	30.0%	0.0%	0.0%	30.0%	0.0%	0.0%	30.0%	0.0%	0.0%	0.0%	0.0%	20%	20%
Maximum Green (s)		30.0			30.0			29.0					20.0	18.0
Yellow Time (s)		3.0			3.0			3.0					3.0	3.0
All-Red Time (s)		3.0			3.0			4.0					1.0	3.0
Lead/Lag		Lead			Lead			Lead					Lag	Lag
Lead-Lag Optimize?		Yes			Yes			Yes					Yes	Yes
Vehicle Extension (s)		1.0			1.0			1.0					1.0	1.0
Recall Mode		C-Max			C-Max			None					Max	Max
Walk Time (s)								7.0					7.0	7.0
Flash Dont Walk (s)								14.0					8.0	9.0
Pedestrian Calls (#/hr)								31					7	16
Act Effct Green (s)		88.0			35.5			28.5						
Actuated g/C Ratio		0.73			0.30			0.24						
v/c Ratio		0.15			0.51			0.07						
Control Delay		0.5			40.2			21.2						
Queue Delay		0.0			0.4			0.0						
Total Delay		0.5			40.5			21.2						
LOS		A			D			C						
Approach Delay		0.5			40.5			21.2						
Approach LOS		A			D			C						
Queue Length 50th (ft)		2			187			9						
Queue Length 95th (ft)		m2			277			34						
Internal Link Dist (ft)		1			377			295			338			
Turn Bay Length (ft)														
Base Capacity (vph)		1355			550			476						
Starvation Cap Reductn		0			0			0						
Spillback Cap Reductn		0			53			0						
Storage Cap Reductn		0			0			0						
Reduced v/c Ratio		0.15			0.56			0.07						

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 46 (38%), Referenced to phase 3:EBWB, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 23.4 Intersection LOS: C
Intersection Capacity Utilization 33.3% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.
! Phase conflict between lane groups.

Splits and Phases: 19: Kelton Street & Carriage Road EB

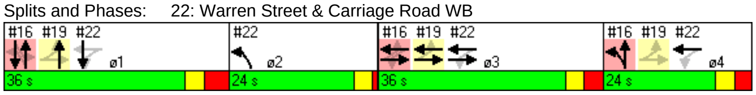


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø4
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Leading Detector (ft)		50		50	50		50				50		
Trailing Detector (ft)		0		0	0		0				0		
Turning Speed (mph)	15		9	15		9	15		9	15		9	
Satd. Flow (prot)	0	1852	0	0	1857	0	1770	0	0	0	1777	0	
Flt Permitted					0.831		0.950						
Satd. Flow (perm)	0	1852	0	0	1548	0	1770	0	0	0	1777	0	
Right Turn on Red			Yes			Yes			No			No	
Satd. Flow (RTOR)		2											
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		368			70			384			360		
Travel Time (s)		8.4			1.6			8.7			8.2		
Volume (vph)	0	266	13	35	477	0	37	0	0	0	141	73	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	0	289	14	38	518	0	40	0	0	0	153	79	
Lane Group Flow (vph)	0	303	0	0	556	0	40	0	0	0	232	0	
Turn Type				custom			custom						
Protected Phases		3			3 4		2				1!		4
Permitted Phases				1 3 4!	1!		2						
Detector Phases		3		1 3 4	3 4		2				1		
Minimum Initial (s)		8.0					8.0				8.0		8.0
Minimum Split (s)		22.5					22.0				28.0		24.0
Total Split (s)	0.0	36.0	0.0	96.0	60.0	0.0	24.0	0.0	0.0	0.0	36.0	0.0	24.0
Total Split (%)	0.0%	30.0%	0.0%	80.0%	50.0%	0.0%	20.0%	0.0%	0.0%	0.0%	30.0%	0.0%	20%
Maximum Green (s)		30.0					20.0				29.0		18.0
Yellow Time (s)		3.0					3.0				3.0		3.0
All-Red Time (s)		3.0					1.0				4.0		3.0
Lead/Lag		Lead					Lag				Lead		Lag
Lead-Lag Optimize?		Yes					Yes				Yes		Yes
Vehicle Extension (s)		1.0					1.0				1.0		1.0
Recall Mode		C-Max					Max				None		Max
Walk Time (s)							7.0				7.0		7.0
Flash Dont Walk (s)							8.0				14.0		9.0
Pedestrian Calls (#/hr)							7				31		16
Act Effct Green (s)		35.5			88.0		20.0				28.5		
Actuated g/C Ratio		0.30			0.73		0.17				0.24		
v/c Ratio		0.55			0.43		0.14				0.55		
Control Delay		41.1			1.0		44.1				44.6		
Queue Delay		1.2			0.0		0.0				0.0		
Total Delay		42.3			1.0		44.1				44.6		
LOS		D			A		D				D		
Approach Delay		42.3			1.0						44.6		
Approach LOS		D			A						D		
Queue Length 50th (ft)		205			4		27				152		
Queue Length 95th (ft)		302			m7		60				233		
Internal Link Dist (ft)		288			1			304			280		
Turn Bay Length (ft)													
Base Capacity (vph)		549			1288		295				474		
Starvation Cap Reductn		0			0		0				0		
Spillback Cap Reductn		96			0		0				0		
Storage Cap Reductn		0			0		0				0		
Reduced v/c Ratio		0.67			0.43		0.14				0.49		

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 46 (38%), Referenced to phase 3:EBWB, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 22.6 Intersection LOS: C
Intersection Capacity Utilization 70.4% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.
! Phase conflict between lane groups.

Splits and Phases: 22: Warren Street & Carriage Road WB

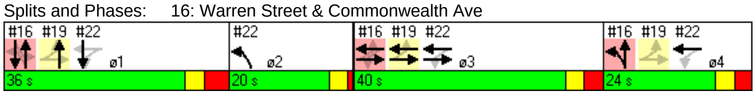


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Leading Detector (ft)	50	50		50	50		50	50		50	50		
Trailing Detector (ft)	0	0		0	0		0	0		0	0		
Turning Speed (mph)	15		9	15		9	15		9	15		9	
Satd. Flow (prot)	0	1731	0	0	1861	0	0	3483	0	0	3490	0	
Flt Permitted		0.922			0.997			0.545			0.943		
Satd. Flow (perm)	0	1604	0	0	1855	0	0	1915	0	0	3294	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		41						6			8		
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		70			71			510			528		
Travel Time (s)		1.6			1.6			11.6			12.0		
Volume (vph)	52	221	259	2	206	1	110	453	29	8	571	54	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	57	240	282	2	224	1	120	492	32	9	621	59	
Lane Group Flow (vph)	0	579	0	0	227	0	0	644	0	0	689	0	
Turn Type	Perm			Perm			pm+pt			Perm			
Protected Phases		3			3		4	1 4			1		2
Permitted Phases	3			3			1 4			1			
Detector Phases	3	3		3	3		4	1 4		1	1		
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0			8.0	8.0		8.0
Minimum Split (s)	22.0	22.0		22.0	22.0		24.0			28.0	28.0		20.0
Total Split (s)	40.0	40.0	0.0	40.0	40.0	0.0	24.0	60.0	0.0	36.0	36.0	0.0	20.0
Total Split (%)	33.3%	33.3%	0.0%	33.3%	33.3%	0.0%	20.0%	50.0%	0.0%	30.0%	30.0%	0.0%	17%
Maximum Green (s)	34.0	34.0		34.0	34.0		18.0			29.0	29.0		16.0
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0			3.0	3.0		3.0
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0			4.0	4.0		1.0
Lead/Lag	Lead	Lead		Lead	Lead		Lag			Lead	Lead		Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes		Yes
Vehicle Extension (s)	1.0	1.0		1.0	1.0		1.0			1.0	1.0		1.0
Recall Mode	C-Max	C-Max		C-Max	C-Max		Max			None	None		Max
Walk Time (s)							7.0			7.0	7.0		7.0
Flash Dont Walk (s)							9.0			14.0	14.0		8.0
Pedestrian Calls (#/hr)							16			32	32		58
Act Effct Green (s)		38.3			38.3			49.7			29.7		
Actuated g/C Ratio		0.32			0.32			0.41			0.25		
v/c Ratio		1.07			0.38			0.61			0.84		
Control Delay		74.6			3.3			24.8			52.4		
Queue Delay		25.2			0.0			0.1			0.3		
Total Delay		99.8			3.3			24.9			52.7		
LOS		F			A			C			D		
Approach Delay		99.8			3.3			24.9			52.7		
Approach LOS		F			A			C			D		
Queue Length 50th (ft)		~499			5			166			258		
Queue Length 95th (ft)		#694			6			213			331		
Internal Link Dist (ft)		1			1			430			448		
Turn Bay Length (ft)													
Base Capacity (vph)		540			593			1095			884		
Starvation Cap Reductn		0			0			0			0		
Spillback Cap Reductn		30			0			37			23		
Storage Cap Reductn		0			0			0			0		
Reduced v/c Ratio		1.14			0.38			0.61			0.80		

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 24 (20%), Referenced to phase 3:EBWB, Start of Green
Natural Cycle: 115
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.07
Intersection Signal Delay: 51.8 Intersection LOS: D
Intersection Capacity Utilization 89.1% ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 16: Warren Street & Commonwealth Ave

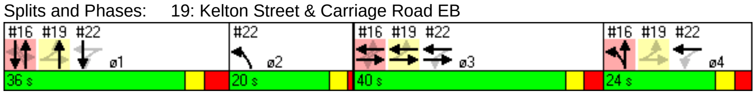


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2	ø4
Lane Configurations														
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		
Leading Detector (ft)	50	50			50			50						
Trailing Detector (ft)	0	0			0			0						
Turning Speed (mph)	15		9	15		9	15		9	15		9		
Satd. Flow (prot)	0	1852	0	0	1853	0	0	1673	0	0	0	0		
Flt Permitted		0.965												
Satd. Flow (perm)	0	1798	0	0	1853	0	0	1673	0	0	0	0		
Right Turn on Red			Yes			Yes			Yes			Yes		
Satd. Flow (RTOR)					2			28						
Link Speed (mph)		30			30			30			30			
Link Distance (ft)		71			457			375			418			
Travel Time (s)		1.6			10.4			8.5			9.5			
Volume (vph)	29	229	0	0	207	8	0	8	26	0	0	0		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92		
Adj. Flow (vph)	32	249	0	0	225	9	0	9	28	0	0	0		
Lane Group Flow (vph)	0	281	0	0	234	0	0	37	0	0	0	0		
Turn Type	custom													
Protected Phases		3			3			1!					2	4
Permitted Phases	1 3 4!	1 3 4!												
Detector Phases	1 3 4	3			3			1						
Minimum Initial (s)		8.0			8.0			8.0					8.0	8.0
Minimum Split (s)		22.0			22.0			28.0					20.0	24.0
Total Split (s)	100.0	40.0	0.0	0.0	40.0	0.0	0.0	36.0	0.0	0.0	0.0	0.0	20.0	24.0
Total Split (%)	83.3%	33.3%	0.0%	0.0%	33.3%	0.0%	0.0%	30.0%	0.0%	0.0%	0.0%	0.0%	17%	20%
Maximum Green (s)		34.0			34.0			29.0					16.0	18.0
Yellow Time (s)		3.0			3.0			3.0					3.0	3.0
All-Red Time (s)		3.0			3.0			4.0					1.0	3.0
Lead/Lag		Lead			Lead			Lead					Lag	Lag
Lead-Lag Optimize?		Yes			Yes			Yes					Yes	Yes
Vehicle Extension (s)		1.0			1.0			1.0					1.0	1.0
Recall Mode		C-Max			C-Max			None					Max	Max
Walk Time (s)								7.0					7.0	7.0
Flash Dont Walk (s)								14.0					8.0	9.0
Pedestrian Calls (#/hr)								32					58	16
Act Effct Green (s)		92.0			38.3			29.7						
Actuated g/C Ratio		0.77			0.32			0.25						
v/c Ratio		0.20			0.39			0.09						
Control Delay		0.4			34.8			15.4						
Queue Delay		0.0			0.1			0.0						
Total Delay		0.4			34.8			15.4						
LOS		A			C			B						
Approach Delay		0.4			34.8			15.4						
Approach LOS		A			C			B						
Queue Length 50th (ft)		3			144			5						
Queue Length 95th (ft)		m3			220			32						
Internal Link Dist (ft)		1			377			295			338			
Turn Bay Length (ft)														
Base Capacity (vph)		1396			593			467						
Starvation Cap Reductn		0			0			0						
Spillback Cap Reductn		0			26			0						
Storage Cap Reductn		0			0			0						
Reduced v/c Ratio		0.20			0.41			0.08						

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 24 (20%), Referenced to phase 3:EBWB, Start of Green
Natural Cycle: 115
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.07
Intersection Signal Delay: 16.0 Intersection LOS: B
Intersection Capacity Utilization 41.7% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.
! Phase conflict between lane groups.

Splits and Phases: 19: Kelton Street & Carriage Road EB

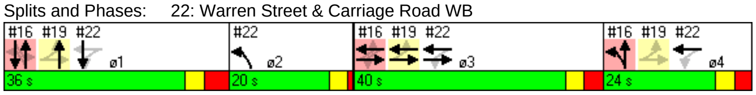


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø4
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Leading Detector (ft)		50		50	50		50				50		
Trailing Detector (ft)		0		0	0		0				0		
Turning Speed (mph)	15		9	15		9	15		9	15		9	
Satd. Flow (prot)	0	1853	0	0	1852	0	1770	0	0	0	1818	0	
Flt Permitted					0.757		0.950						
Satd. Flow (perm)	0	1853	0	0	1410	0	1770	0	0	0	1818	0	
Right Turn on Red			Yes			Yes			No			No	
Satd. Flow (RTOR)		2											
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		368			70			384			360		
Travel Time (s)		8.4			1.6			8.7			8.2		
Volume (vph)	0	374	14	42	328	0	38	0	0	0	208	46	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	0	407	15	46	357	0	41	0	0	0	226	50	
Lane Group Flow (vph)	0	422	0	0	403	0	41	0	0	0	276	0	
Turn Type				custom			custom						
Protected Phases		3			3 4		2				1!		4
Permitted Phases				1 3 4!	1!		2						
Detector Phases		3		1 3 4	3 4		2				1		
Minimum Initial (s)		8.0					8.0				8.0		8.0
Minimum Split (s)		22.0					20.0				28.0		24.0
Total Split (s)	0.0	40.0	0.0	100.0	64.0	0.0	20.0	0.0	0.0	0.0	36.0	0.0	24.0
Total Split (%)	0.0%	33.3%	0.0%	83.3%	53.3%	0.0%	16.7%	0.0%	0.0%	0.0%	30.0%	0.0%	20%
Maximum Green (s)		34.0					16.0				29.0		18.0
Yellow Time (s)		3.0					3.0				3.0		3.0
All-Red Time (s)		3.0					1.0				4.0		3.0
Lead/Lag		Lead					Lag				Lead		Lag
Lead-Lag Optimize?		Yes					Yes				Yes		Yes
Vehicle Extension (s)		1.0					1.0				1.0		1.0
Recall Mode		C-Max					Max				None		Max
Walk Time (s)							7.0				7.0		7.0
Flash Dont Walk (s)							8.0				14.0		9.0
Pedestrian Calls (#/hr)							58				32		16
Act Effct Green (s)		38.3			92.0		16.0				29.7		
Actuated g/C Ratio		0.32			0.77		0.13				0.25		
v/c Ratio		0.71			0.31		0.17				0.61		
Control Delay		44.4			0.7		48.3				46.1		
Queue Delay		4.0			0.0		0.0				0.0		
Total Delay		48.4			0.7		48.3				46.1		
LOS		D			A		D				D		
Approach Delay		48.4			0.7						46.1		
Approach LOS		D			A						D		
Queue Length 50th (ft)		294			2		29				185		
Queue Length 95th (ft)		418			m4		64				276		
Internal Link Dist (ft)		288			1			304			280		
Turn Bay Length (ft)													
Base Capacity (vph)		593			1311		236				485		
Starvation Cap Reductn		0			0		0				0		
Spillback Cap Reductn		103			0		0				0		
Storage Cap Reductn		0			0		0				0		
Reduced v/c Ratio		0.86			0.31		0.17				0.57		

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 24 (20%), Referenced to phase 3:EBWB, Start of Green
Natural Cycle: 115
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.07
Intersection Signal Delay: 31.0 Intersection LOS: C
Intersection Capacity Utilization 70.5% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.
! Phase conflict between lane groups.

Splits and Phases: 22: Warren Street & Carriage Road WB

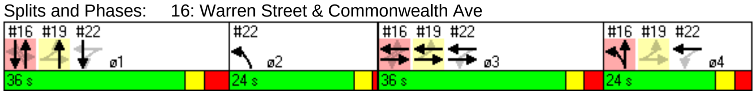


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Leading Detector (ft)	50	50		50	50		50	50		50	50		
Trailing Detector (ft)	0	0		0	0		0	0		0	0		
Turning Speed (mph)	15		9	15		9	15		9	15		9	
Satd. Flow (prot)	0	1755	0	0	1850	0	0	3486	0	0	3468	0	
Flt Permitted		0.783			0.891			0.670			0.819		
Satd. Flow (perm)	0	1386	0	0	1656	0	0	2364	0	0	2844	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		24			1			2			13		
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		70			71			510			528		
Travel Time (s)		1.6			1.6			11.6			12.0		
Volume (vph)	63	167	135	24	227	4	239	727	18	5	306	46	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	68	182	147	26	247	4	260	790	20	5	333	50	
Lane Group Flow (vph)	0	397	0	0	277	0	0	1070	0	0	388	0	
Turn Type	Perm			Perm			pm+pt			Perm			
Protected Phases		3			3		4	1 4			1		2
Permitted Phases	3			3			1 4			1			
Detector Phases	3	3		3	3		4	1 4		1	1		
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0			8.0	8.0		8.0
Minimum Split (s)	22.5	22.5		22.5	22.5		22.0			28.0	28.0		22.0
Total Split (s)	36.0	36.0	0.0	36.0	36.0	0.0	24.0	60.0	0.0	36.0	36.0	0.0	24.0
Total Split (%)	30.0%	30.0%	0.0%	30.0%	30.0%	0.0%	20.0%	50.0%	0.0%	30.0%	30.0%	0.0%	20%
Maximum Green (s)	30.0	30.0		30.0	30.0		18.0			29.0	29.0		20.0
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0			3.0	3.0		3.0
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0			4.0	4.0		1.0
Lead/Lag	Lead	Lead		Lead	Lead		Lag			Lead	Lead		Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes		Yes
Vehicle Extension (s)	1.0	1.0		1.0	1.0		1.0			1.0	1.0		1.0
Recall Mode	C-Max	C-Max		C-Max	C-Max		Max			None	None		Max
Walk Time (s)							7.0			7.0	7.0		7.0
Flash Dont Walk (s)							9.0			14.0	14.0		8.0
Pedestrian Calls (#/hr)							16			31	31		7
Act Effct Green (s)		35.5			35.5			48.5			28.5		
Actuated g/C Ratio		0.30			0.30			0.40			0.24		
v/c Ratio		0.93			0.57			0.94			0.57		
Control Delay		44.6			6.1			44.5			41.7		
Queue Delay		9.7			0.0			1.1			0.1		
Total Delay		54.3			6.1			45.7			41.7		
LOS		D			A			D			D		
Approach Delay		54.3			6.1			45.7			41.7		
Approach LOS		D			A			D			D		
Queue Length 50th (ft)		~313			14			326			130		
Queue Length 95th (ft)		#514			20			#413			180		
Internal Link Dist (ft)		1			1			430			448		
Turn Bay Length (ft)													
Base Capacity (vph)		427			490			1213			768		
Starvation Cap Reductn		0			0			0			0		
Spillback Cap Reductn		25			0			39			20		
Storage Cap Reductn		0			0			0			0		
Reduced v/c Ratio		0.99			0.57			0.91			0.52		

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 24 (20%), Referenced to phase 3:EBWB, Start of Green
Natural Cycle: 95
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 41.4 Intersection LOS: D
Intersection Capacity Utilization 81.4% ICU Level of Service D
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 16: Warren Street & Commonwealth Ave

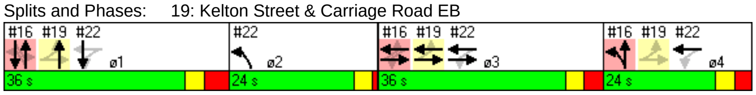


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2	ø4
Lane Configurations														
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		
Leading Detector (ft)	50	50			50			50						
Trailing Detector (ft)	0	0			0			0						
Turning Speed (mph)	15		9	15		9	15		9	15		9		
Satd. Flow (prot)	0	1857	0	0	1861	0	0	1742	0	0	0	0		
Flt Permitted		0.989												
Satd. Flow (perm)	0	1842	0	0	1861	0	0	1742	0	0	0	0		
Right Turn on Red			Yes			Yes			Yes			Yes		
Satd. Flow (RTOR)								15						
Link Speed (mph)		30			30			30			30			
Link Distance (ft)		71			457			375			418			
Travel Time (s)		1.6			10.4			8.5			9.5			
Volume (vph)	13	177	0	0	254	3	0	15	14	0	0	0		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92		
Adj. Flow (vph)	14	192	0	0	276	3	0	16	15	0	0	0		
Lane Group Flow (vph)	0	206	0	0	279	0	0	31	0	0	0	0		
Turn Type	custom													
Protected Phases		3			3			1!					2	4
Permitted Phases	1 3 4!	1 3 4!												
Detector Phases	1 3 4	3			3			1						
Minimum Initial (s)		8.0			8.0			8.0					8.0	8.0
Minimum Split (s)		22.5			22.5			28.0					22.0	22.0
Total Split (s)	96.0	36.0	0.0	0.0	36.0	0.0	0.0	36.0	0.0	0.0	0.0	0.0	24.0	24.0
Total Split (%)	80.0%	30.0%	0.0%	0.0%	30.0%	0.0%	0.0%	30.0%	0.0%	0.0%	0.0%	0.0%	20%	20%
Maximum Green (s)		30.0			30.0			29.0					20.0	18.0
Yellow Time (s)		3.0			3.0			3.0					3.0	3.0
All-Red Time (s)		3.0			3.0			4.0					1.0	3.0
Lead/Lag		Lead			Lead			Lead					Lag	Lag
Lead-Lag Optimize?		Yes			Yes			Yes					Yes	Yes
Vehicle Extension (s)		1.0			1.0			1.0					1.0	1.0
Recall Mode		C-Max			C-Max			None					Max	Max
Walk Time (s)								7.0					7.0	7.0
Flash Dont Walk (s)								14.0					8.0	9.0
Pedestrian Calls (#/hr)								31					7	16
Act Effct Green (s)		88.0			35.5			28.5						
Actuated g/C Ratio		0.73			0.30			0.24						
v/c Ratio		0.15			0.51			0.07						
Control Delay		0.5			40.2			21.2						
Queue Delay		0.0			0.4			0.0						
Total Delay		0.5			40.5			21.2						
LOS		A			D			C						
Approach Delay		0.5			40.5			21.2						
Approach LOS		A			D			C						
Queue Length 50th (ft)		2			187			9						
Queue Length 95th (ft)		m2			277			34						
Internal Link Dist (ft)		1			377			295			338			
Turn Bay Length (ft)														
Base Capacity (vph)		1355			550			476						
Starvation Cap Reductn		0			0			0						
Spillback Cap Reductn		0			53			0						
Storage Cap Reductn		0			0			0						
Reduced v/c Ratio		0.15			0.56			0.07						

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 24 (20%), Referenced to phase 3:EBWB, Start of Green
Natural Cycle: 95
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 23.4 Intersection LOS: C
Intersection Capacity Utilization 33.3% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.
! Phase conflict between lane groups.

Splits and Phases: 19: Kelton Street & Carriage Road EB

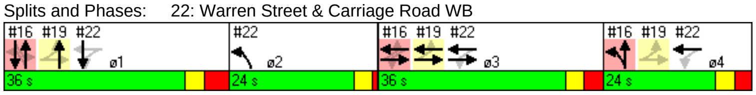


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø4
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Leading Detector (ft)		50		50	50		50				50		
Trailing Detector (ft)		0		0	0		0				0		
Turning Speed (mph)	15		9	15		9	15		9	15		9	
Satd. Flow (prot)	0	1850	0	0	1857	0	1770	0	0	0	1779	0	
Flt Permitted					0.831		0.950						
Satd. Flow (perm)	0	1850	0	0	1548	0	1770	0	0	0	1779	0	
Right Turn on Red			Yes			Yes			No			No	
Satd. Flow (RTOR)		2											
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		368			70			384			360		
Travel Time (s)		8.4			1.6			8.7			8.2		
Volume (vph)	0	266	14	35	477	0	44	0	0	0	144	73	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	0	289	15	38	518	0	48	0	0	0	157	79	
Lane Group Flow (vph)	0	304	0	0	556	0	48	0	0	0	236	0	
Turn Type				custom			custom						
Protected Phases		3			3 4		2				1!		4
Permitted Phases				1 3 4!	1!		2						
Detector Phases		3		1 3 4	3 4		2				1		
Minimum Initial (s)		8.0					8.0				8.0		8.0
Minimum Split (s)		22.5					22.0				28.0		22.0
Total Split (s)	0.0	36.0	0.0	96.0	60.0	0.0	24.0	0.0	0.0	0.0	36.0	0.0	24.0
Total Split (%)	0.0%	30.0%	0.0%	80.0%	50.0%	0.0%	20.0%	0.0%	0.0%	0.0%	30.0%	0.0%	20%
Maximum Green (s)		30.0					20.0				29.0		18.0
Yellow Time (s)		3.0					3.0				3.0		3.0
All-Red Time (s)		3.0					1.0				4.0		3.0
Lead/Lag		Lead					Lag				Lead		Lag
Lead-Lag Optimize?		Yes					Yes				Yes		Yes
Vehicle Extension (s)		1.0					1.0				1.0		1.0
Recall Mode		C-Max					Max				None		Max
Walk Time (s)							7.0				7.0		7.0
Flash Dont Walk (s)							8.0				14.0		9.0
Pedestrian Calls (#/hr)							7				31		16
Act Effct Green (s)		35.5			88.0		20.0				28.5		
Actuated g/C Ratio		0.30			0.73		0.17				0.24		
v/c Ratio		0.55			0.43		0.16				0.56		
Control Delay		41.2			1.0		44.6				44.9		
Queue Delay		1.2			0.0		0.0				0.0		
Total Delay		42.4			1.0		44.6				44.9		
LOS		D			A		D				D		
Approach Delay		42.4			1.0						44.9		
Approach LOS		D			A						D		
Queue Length 50th (ft)		206			4		32				155		
Queue Length 95th (ft)		303			m7		69				237		
Internal Link Dist (ft)		288			1			304			280		
Turn Bay Length (ft)													
Base Capacity (vph)		548			1288		295				474		
Starvation Cap Reductn		0			0		0				0		
Spillback Cap Reductn		96			0		0				0		
Storage Cap Reductn		0			0		0				0		
Reduced v/c Ratio		0.67			0.43		0.16				0.50		

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 24 (20%), Referenced to phase 3:EBWB, Start of Green
Natural Cycle: 95
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 22.9 Intersection LOS: C
Intersection Capacity Utilization 70.6% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.
! Phase conflict between lane groups.

Splits and Phases: 22: Warren Street & Carriage Road WB



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	7	13	1	27	71	4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	14	1	29	77	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					384	
pX, platoon unblocked						
vC, conflicting volume	111	79	82			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	111	79	82			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	100			
cM capacity (veh/h)	885	981	1516			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	22	30	82
Volume Left	8	1	0
Volume Right	14	0	4
cSH	945	1516	1700
Volume to Capacity	0.02	0.00	0.05
Queue Length 95th (ft)	2	0	0
Control Delay (s)	8.9	0.3	0.0
Lane LOS	A	A	
Approach Delay (s)	8.9	0.3	0.0
Approach LOS	A		

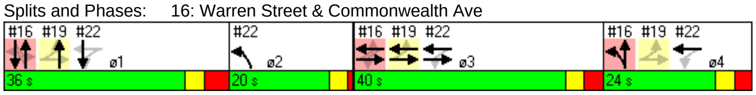
Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	14.0%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Leading Detector (ft)	50	50		50	50		50	50		50	50		
Trailing Detector (ft)	0	0		0	0		0	0		0	0		
Turning Speed (mph)	15		9	15		9	15		9	15		9	
Satd. Flow (prot)	0	1731	0	0	1861	0	0	3483	0	0	3490	0	
Flt Permitted		0.922			0.997			0.545			0.943		
Satd. Flow (perm)	0	1604	0	0	1855	0	0	1915	0	0	3294	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		41						6			8		
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		70			71			510			528		
Travel Time (s)		1.6			1.6			11.6			12.0		
Volume (vph)	52	221	259	2	206	1	110	453	29	8	571	54	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	57	240	282	2	224	1	120	492	32	9	621	59	
Lane Group Flow (vph)	0	579	0	0	227	0	0	644	0	0	689	0	
Turn Type	Perm			Perm			pm+pt			Perm			
Protected Phases		3			3		4	1 4			1		2
Permitted Phases	3			3			1 4			1			
Detector Phases	3	3		3	3		4	1 4		1	1		
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0			8.0	8.0		8.0
Minimum Split (s)	24.0	24.0		24.0	24.0		24.0			28.0	28.0		20.0
Total Split (s)	40.0	40.0	0.0	40.0	40.0	0.0	24.0	60.0	0.0	36.0	36.0	0.0	20.0
Total Split (%)	33.3%	33.3%	0.0%	33.3%	33.3%	0.0%	20.0%	50.0%	0.0%	30.0%	30.0%	0.0%	17%
Maximum Green (s)	34.0	34.0		34.0	34.0		18.0			29.0	29.0		16.0
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0			3.0	3.0		3.0
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0			4.0	4.0		1.0
Lead/Lag	Lead	Lead		Lead	Lead		Lag			Lead	Lead		Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes		Yes
Vehicle Extension (s)	1.0	1.0		1.0	1.0		1.0			1.0	1.0		1.0
Recall Mode	C-Max	C-Max		C-Max	C-Max		Max			None	None		Max
Walk Time (s)							7.0			7.0	7.0		7.0
Flash Dont Walk (s)							9.0			14.0	14.0		8.0
Pedestrian Calls (#/hr)							16			32	32		58
Act Effct Green (s)		38.3			38.3			49.7			29.7		
Actuated g/C Ratio		0.32			0.32			0.41			0.25		
v/c Ratio		1.07			0.38			0.61			0.84		
Control Delay		74.4			3.3			24.8			52.4		
Queue Delay		25.2			0.0			0.1			0.3		
Total Delay		99.6			3.3			24.9			52.7		
LOS		F			A			C			D		
Approach Delay		99.6			3.3			24.9			52.7		
Approach LOS		F			A			C			D		
Queue Length 50th (ft)		~499			5			166			258		
Queue Length 95th (ft)		#694			6			213			331		
Internal Link Dist (ft)		1			1			430			448		
Turn Bay Length (ft)													
Base Capacity (vph)		540			593			1095			884		
Starvation Cap Reductn		0			0			0			0		
Spillback Cap Reductn		30			0			37			23		
Storage Cap Reductn		0			0			0			0		
Reduced v/c Ratio		1.14			0.38			0.61			0.80		

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 3:EBWB, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.07
Intersection Signal Delay: 51.8 Intersection LOS: D
Intersection Capacity Utilization 89.1% ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 16: Warren Street & Commonwealth Ave

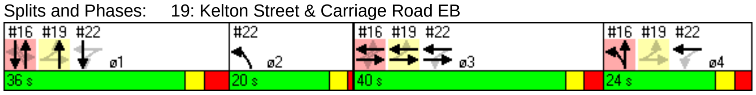


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2	ø4
Lane Configurations														
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		
Leading Detector (ft)	50	50			50			50						
Trailing Detector (ft)	0	0			0			0						
Turning Speed (mph)	15		9	15		9	15		9	15		9		
Satd. Flow (prot)	0	1852	0	0	1853	0	0	1673	0	0	0	0		
Flt Permitted		0.965												
Satd. Flow (perm)	0	1798	0	0	1853	0	0	1673	0	0	0	0		
Right Turn on Red			Yes			Yes			Yes			Yes		
Satd. Flow (RTOR)					2			28						
Link Speed (mph)		30			30			30			30			
Link Distance (ft)		71			457			375			418			
Travel Time (s)		1.6			10.4			8.5			9.5			
Volume (vph)	29	229	0	0	207	8	0	8	26	0	0	0		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92		
Adj. Flow (vph)	32	249	0	0	225	9	0	9	28	0	0	0		
Lane Group Flow (vph)	0	281	0	0	234	0	0	37	0	0	0	0		
Turn Type	custom													
Protected Phases		3			3			1!					2	4
Permitted Phases	1 3 4!	1 3 4!												
Detector Phases	1 3 4	3			3			1						
Minimum Initial (s)		8.0			8.0			8.0					8.0	8.0
Minimum Split (s)		24.0			24.0			28.0					20.0	24.0
Total Split (s)	100.0	40.0	0.0	0.0	40.0	0.0	0.0	36.0	0.0	0.0	0.0	0.0	20.0	24.0
Total Split (%)	83.3%	33.3%	0.0%	0.0%	33.3%	0.0%	0.0%	30.0%	0.0%	0.0%	0.0%	0.0%	17%	20%
Maximum Green (s)		34.0			34.0			29.0					16.0	18.0
Yellow Time (s)		3.0			3.0			3.0					3.0	3.0
All-Red Time (s)		3.0			3.0			4.0					1.0	3.0
Lead/Lag		Lead			Lead			Lead					Lag	Lag
Lead-Lag Optimize?		Yes			Yes			Yes					Yes	Yes
Vehicle Extension (s)		1.0			1.0			1.0					1.0	1.0
Recall Mode		C-Max			C-Max			None					Max	Max
Walk Time (s)								7.0					7.0	7.0
Flash Dont Walk (s)								14.0					8.0	9.0
Pedestrian Calls (#/hr)								32					58	16
Act Effct Green (s)		92.0			38.3			29.7						
Actuated g/C Ratio		0.77			0.32			0.25						
v/c Ratio		0.20			0.39			0.09						
Control Delay		0.4			34.8			15.4						
Queue Delay		0.0			0.1			0.0						
Total Delay		0.4			34.8			15.4						
LOS		A			C			B						
Approach Delay		0.4			34.8			15.4						
Approach LOS		A			C			B						
Queue Length 50th (ft)		3			144			5						
Queue Length 95th (ft)		m3			220			32						
Internal Link Dist (ft)		1			377			295			338			
Turn Bay Length (ft)														
Base Capacity (vph)		1396			593			467						
Starvation Cap Reductn		0			0			0						
Spillback Cap Reductn		0			26			0						
Storage Cap Reductn		0			0			0						
Reduced v/c Ratio		0.20			0.41			0.08						

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 3:EBWB, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.07
Intersection Signal Delay: 16.0 Intersection LOS: B
Intersection Capacity Utilization 41.7% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.
! Phase conflict between lane groups.

Splits and Phases: 19: Kelton Street & Carriage Road EB

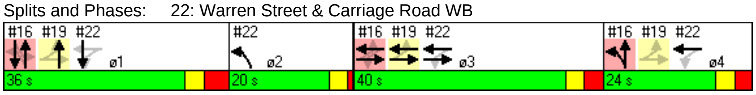


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø4
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Leading Detector (ft)		50		50	50		50				50		
Trailing Detector (ft)		0		0	0		0				0		
Turning Speed (mph)	15		9	15		9	15		9	15		9	
Satd. Flow (prot)	0	1850	0	0	1852	0	1770	0	0	0	1818	0	
Flt Permitted					0.757		0.950						
Satd. Flow (perm)	0	1850	0	0	1410	0	1770	0	0	0	1818	0	
Right Turn on Red			Yes			Yes			No			No	
Satd. Flow (RTOR)		2											
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		368			70			384			360		
Travel Time (s)		8.4			1.6			8.7			8.2		
Volume (vph)	0	374	19	42	328	0	42	0	0	0	218	46	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	0	407	21	46	357	0	46	0	0	0	237	50	
Lane Group Flow (vph)	0	428	0	0	403	0	46	0	0	0	287	0	
Turn Type				custom			custom						
Protected Phases		3			3 4		2				1!		4
Permitted Phases				1 3 4!	1!		2						
Detector Phases		3		1 3 4	3 4		2				1		
Minimum Initial (s)		8.0					8.0				8.0		8.0
Minimum Split (s)		24.0					20.0				28.0		24.0
Total Split (s)	0.0	40.0	0.0	100.0	64.0	0.0	20.0	0.0	0.0	0.0	36.0	0.0	24.0
Total Split (%)	0.0%	33.3%	0.0%	83.3%	53.3%	0.0%	16.7%	0.0%	0.0%	0.0%	30.0%	0.0%	20%
Maximum Green (s)		34.0					16.0				29.0		18.0
Yellow Time (s)		3.0					3.0				3.0		3.0
All-Red Time (s)		3.0					1.0				4.0		3.0
Lead/Lag		Lead					Lag				Lead		Lag
Lead-Lag Optimize?		Yes					Yes				Yes		Yes
Vehicle Extension (s)		1.0					1.0				1.0		1.0
Recall Mode		C-Max					Max				None		Max
Walk Time (s)							7.0				7.0		7.0
Flash Dont Walk (s)							8.0				14.0		9.0
Pedestrian Calls (#/hr)							58				32		16
Act Effct Green (s)		38.3			92.0		16.0				29.7		
Actuated g/C Ratio		0.32			0.77		0.13				0.25		
v/c Ratio		0.72			0.31		0.19				0.64		
Control Delay		44.9			0.7		48.7				47.1		
Queue Delay		4.4			0.0		0.0				0.0		
Total Delay		49.3			0.7		48.7				47.1		
LOS		D			A		D				D		
Approach Delay		49.3			0.7						47.1		
Approach LOS		D			A						D		
Queue Length 50th (ft)		300			2		32				194		
Queue Length 95th (ft)		426			m4		69				289		
Internal Link Dist (ft)		288			1			304			280		
Turn Bay Length (ft)													
Base Capacity (vph)		592			1311		236				485		
Starvation Cap Reductn		0			0		0				0		
Spillback Cap Reductn		101			0		0				0		
Storage Cap Reductn		0			0		0				0		
Reduced v/c Ratio		0.87			0.31		0.19				0.59		

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 3:EBWB, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.07
Intersection Signal Delay: 31.9 Intersection LOS: C
Intersection Capacity Utilization 71.4% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.
! Phase conflict between lane groups.

Splits and Phases: 22: Warren Street & Carriage Road WB



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	4	8	5	33	72	15
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	9	5	36	78	16
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					384	
pX, platoon unblocked						
vC, conflicting volume	133	86	95			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	133	86	95			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	100			
cM capacity (veh/h)	858	972	1499			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	13	41	95
Volume Left	4	5	0
Volume Right	9	0	16
cSH	931	1499	1700
Volume to Capacity	0.01	0.00	0.06
Queue Length 95th (ft)	1	0	0
Control Delay (s)	8.9	1.0	0.0
Lane LOS	A	A	
Approach Delay (s)	8.9	1.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	16.0%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix C

Air Quality

AIR QUALITY APPENDIX

Introduction

This Air Quality Appendix provides modeling assumptions and backup for results presented in Section 3.5 of the report. Included within this documentation is a brief description of the methodology employed along with pertinent calculations and data used in the emissions and dispersion calculations supporting the microscale air quality analysis.

Motor Vehicle Emissions

The EPA MOVES computer program generated motor vehicle emissions used in the garage stationary source analysis along with the mobile source CAL3QHC modeling and mesoscale analysis. The model input parameters were provided by MassDEP. Emission rates were derived for 2014 and 2019 for speed limits of 0, 9, 15, and 30 mph for use in the microscale analyses.

CAL3QHC

For the intersections studied, the CAL3QHC model was applied to calculate CO concentrations at sensitive receptor locations using emission rates derived in MOBILE6.2. The intersection's queue links and free flow links were input to the model along with sensitive receptors at all locations nearby each intersection. The meteorological assumptions input into the model were a 1.0 meter per second wind speed, Pasquill-Gifford Class D stability combined with a mixing height of 1000 meters. For each direction, the full range of wind directions at 10 degree intervals was examined. In addition, a surface roughness (z_0) of 370 cm was used for all intersections. Idle emission rates for queue links were based on 0 mph emission rates derived in MOVES. Emission rates for speeds of 9, 15, and 30 mph were used for right turn, left turn, and free flow links, respectively.

Brighton Marine Health Center - Boston, MA
Background Concentrations

Background Concentrations									
POLLUTANT	AVERAGING TIME	Form	2010	2011	2012	Units	ppm to $\mu g/m^3$ Conversion Factor	Background Concentration ($\mu g/m^3$)	Location
SO_2 (1)(7)	1-Hour	99th %	0.0211	0.0193	0.0132	ppm	2600	54.9	Kenmore Sq., Boston
	3-Hour (8)	H2H	0.0222	0.0246	0.0138	ppm	2600	64.0	Kenmore Sq., Boston
	24-Hour	H2H	0.0079	0.0094	0.0054	ppm	2600	24.4	Kenmore Sq., Boston
	Annual	H	0.00224	0.00236	0.00187	ppm	2600	6.1	Kenmore Sq., Boston
PM-10	24-Hour	H2H	37	38	28	$\mu g/m^3$	1	38.0	Kenmore Sq., Boston
	Annual	H	15.5	16.8	15.7	$\mu g/m^3$	1	16.8	Kenmore Sq., Boston
PM-2.5	24-Hour (4)	98th %	21.9	21.2	22.1	$\mu g/m^3$	1	21.7	Kenmore Sq., Boston
	Annual (5)	H	9.31	9.37	9.03	$\mu g/m^3$	1	9.2	Kenmore Sq., Boston
NO_2 (3)	1-Hour (6)	98th %	0.0515	0.0529	0.049	ppm	1880	96.1	Kenmore Sq., Boston
	Annual	H	0.0191	0.02036	0.0191	ppm	1880	38.3	Kenmore Sq., Boston
CO (2)	1-Hour	H2H	1.8	1.5	1.3	ppm	1140	2052	Kenmore Sq., Boston
	8-Hour	H2H	0.9	1.2	0.9	ppm	1140	1368	Kenmore Sq., Boston

From 2007-2012 MassDEP Annual Data Summaries

[1] SO_2 reported in ppm or ppb. Converted to $\mu g/m^3$ using factor of 1 ppm = 2600 $\mu g/m^3$.

[2] CO reported in ppm or ppb. Converted to $\mu g/m^3$ using factor of 1 ppm = 1140 $\mu g/m^3$.

[3] NO_2 reported in ppm or ppb. Converted to $\mu g/m^3$ using factor of 1 ppm = 1880 $\mu g/m^3$.

[4] Background level for 24-hour PM-2.5 is the average concentration of the 98th percentile for three years.

[5] Background level for annual PM-2.5 is the average for three years.

[6] Background level for 1-hour NO2 is the average of the 98th percentile of the daily maximum 1-hour values a over three years.

[7] The 24-hour and Annual standards were revoked by EPA on June 22, 2010, Federal Register 75-119, p. 35520.

[8] The 2010 - 2012 SO_2 3-hr value is not reported. 1-hr H2H used instead.

Due to excessive size CAL3QHC, and MOVES input and output files are available on digital media upon request.

Appendix D

Climate Change Checklists

Climate Change Preparedness and Resiliency Checklist for New Construction

In November 2013, in conformance with the Mayor's 2011 Climate Action Leadership Committee's recommendations, the Boston Redevelopment Authority adopted policy for all development projects subject to Boston Zoning Article 80 Small and Large Project Review, including all Institutional Master Plan modifications and updates, are to complete the following checklist and provide any necessary responses regarding project resiliency, preparedness, and to mitigate any identified adverse impacts that might arise under future climate conditions.

For more information about the City of Boston's climate policies and practices, and the 2011 update of the climate action plan, *A Climate of Progress*, please see the City's climate action web pages at http://www.cityofboston.gov/climate

In advance we thank you for your time and assistance in advancing best practices in Boston.

Climate Change Analysis and Information Sources:

1. Northeast Climate Impacts Assessment (www.climatechoices.org/ne/)
2. USGCRP 2009 (http://www.globalchange.gov/publications/reports/scientific-assessments/us-impacts/)
3. Army Corps of Engineers guidance on sea level rise (http://planning.usace.army.mil/toolbox/library/ECs/EC11652212Nov2011.pdf)
4. Proceeding of the National Academy of Science, "Global sea level rise linked to global temperature", Vermeer and Rahmstorf, 2009 (http://www.pnas.org/content/early/2009/12/04/0907765106.full.pdf)
5. "Hotspot of accelerated sea-level rise on the Atlantic coast of North America", Asbury H. Sallenger Jr*, Kara S. Doran and Peter A. Howd, 2012 (http://www.bostonredevelopmentauthority.org/planning/Hotspot of Accelerated Sea-level Rise 2012.pdf)
6. "Building Resilience in Boston": Best Practices for Climate Change Adaptation and Resilience for Existing Buildings, Linnean Solutions, The Built Environment Coalition, The Resilient Design Institute, 2103 (http://www.greenribboncommission.org/downloads/Building_Resilience_in_Boston_SML.pdf)

Checklist

Please respond to all of the checklist questions to the fullest extent possible. For projects that respond "Yes" to any of the D.1 – Sea-Level Rise and Storms, Location Description and Classification questions, please respond to all of the remaining Section D questions.

Checklist responses are due at the time of initial project filing or Notice of Project Change and final filings just prior seeking Final BRA Approval. A PDF of your response to the Checklist should be submitted to the Boston Redevelopment Authority via your project manager.

Please Note: When initiating a new project, please visit the BRA web site for the most current Climate Change Preparedness & Resiliency Checklist.

A.1 - Project Information

Project Name:	BMHC – Veterans Mixed Income Housing Project (New Building)
Project Address Primary:	1485 Commonwealth Avenue
Project Address Additional:	
Project Contact (name / Title / Company / email / phone):	

A.2 - Team Description

Owner / Developer:	WinnDevelopment
Architect:	The Architectural Team
Engineer (building systems):	Petersen Engineering
Sustainability / LEED:	Conservation Services Group
Permitting:	Epsilon Associates, Inc
Construction Management:	
Climate Change Expert:	Epsilon Associates, Inc

A.3 - Project Permitting and Phase

At what phase is the project – most recent completed submission at the time of this response?

☑ PNF / Expanded PNF Submission	☐ Draft / Final Project Impact Report Submission	☐ BRA Board Approved	☐ Notice of Project Change
☐ Planned Development Area	☐ BRA Final Design Approved	☐ Under Construction	☐ Construction just completed:

A.4 - Building Classification and Description

List the principal Building Uses:	Residential
List the First Floor Uses:	*Residential, Amenity Space*

What is the principal Construction Type – select most appropriate type?

☑ Wood Frame	☐ Masonry	☐ Steel Frame	☐ Concrete

Describe the building?

Site Area:	*66,580 SF*	Building Area:	*111,650 SF*
Building Height:	*77 Ft.*	Number of Stories:	*6 Flrs.*
First Floor Elevation (reference Boston City Base):	*120 Elev.*	Are there below grade spaces/levels, if yes how many:	*1 Number of Levels*

A.5 - Green Building

Which LEED Rating System(s) and version has or will your project use (by area for multiple rating systems)?

Select by Primary Use:	☐ New Construction	☐ Core & Shell	☐ Healthcare	☐ Schools
	☐ Retail	☑ Homes Midrise	☐ Homes	☐ Other
Select LEED Outcome:	☐ Certified	☑ Silver	☐ Gold	☐ Platinum

Will the project be USGBC Registered and / or USGBC Certified?

Registered:	*Yes / No*	Certified:	*Yes / No*

A.6 - Building Energy-

What are the base and peak operating energy loads for the building?

Electric:	*1470 (kW)*	Heating:	*1.75 (MMBtu/hr)*
What is the planned building Energy Use Intensity:	*13 (kWh/SF)*	Cooling:	*140 (Tons/hr)*

What are the peak energy demands of your critical systems in the event of a service interruption?

Electric:	*35 (kW)*	Heating:	*0.015 (MMBtu/hr)*
		Cooling:	*2 (Tons/hr)*

What is nature and source of your back-up / emergency generators?

Electrical Generation:	*150 (kW)*		Fuel Source:	*Diesel*
System Type and Number of Units:	☑ Combustion Engine	☐ Gas Turbine	☐ Combine Heat and Power	*(Units)*

B - Extreme Weather and Heat Events

Climate change will result in more extreme weather events including higher year round average temperatures, higher peak temperatures, and more periods of extended peak temperatures. The section explores how a project responds to higher temperatures and heat waves.

B.1 - Analysis

What is the full expected life of the project?

Select most appropriate:	☐ 10 Years	☐ 25 Years	☑ 50 Years	☐ 75 Years

What is the full expected operational life of key building systems (e.g. heating, cooling, ventilation)?

Select most appropriate:	☐ 10 Years	☑ 25 Years	☐ 50 Years	☐ 75 Years

What time span of future Climate Conditions was considered?

Select most appropriate:	☐ 10 Years	☐ 25 Years	☑ 50 Years	☐ 75 Years

Analysis Conditions - What range of temperatures will be used for project planning – Low/High?

8/91 Deg.	Based on ASHRAE Fundamentals 2013 99.6% heating; 0.4% cooling

What Extreme Heat Event characteristics will be used for project planning – Peak High, Duration, and Frequency?

95 Deg.	*5 Days*	*6 Events / yr.*

What Drought characteristics will be used for project planning – Duration and Frequency?

30-90 Days	*0.2 Events / yr.*

What Extreme Rain Event characteristics will be used for project planning – Seasonal Rain Fall, Peak Rain Fall, and Frequency of Events per year?

45 Inches / yr.	*4 Inches*	*0.5 Events / yr.*

What Extreme Wind Storm Event characteristics will be used for project planning – Peak Wind Speed, Duration of Storm Event, and Frequency of Events per year?

130 Peak Wind	*10 Hours*	*0.25 Events / yr.*

B.2 - Mitigation Strategies

What will be the overall energy performance, based on use, of the project and how will performance be determined?

Building energy use below code:	*20%*
How is performance determined:	Energy Model

What specific measures will the project employ to reduce building energy consumption?

Select all appropriate:	☑ High performance building envelop	☐ High performance lighting & controls	☐ Building day lighting	☑ EnergyStar equip. / appliances
	☑ High performance HVAC equipment	☑ Energy recovery ventilation	☐ No active cooling	☐ No active heating
Describe any added measures:				

What are the insulation (R) values for building envelop elements?

Roof:	*R = 40*	Walls / Curtain Wall Assembly:	*R = 21BATTS + R7.5 continuous insulation*
Foundation:	*R = 5*	Basement / Slab:	*R =10*
Windows:	*R = / U =0.4*	Doors:	*R = / U =0.7*

What specific measures will the project employ to reduce building energy demands on the utilities and infrastructure?

	☐ On-site clean energy / CHP system(s)	☐ Building-wide power dimming	☐ Thermal energy storage systems	☐ Ground source heat pump
	☑ On-site Solar PV	☐ On-site Solar Thermal	☐ Wind power	☐ None
Describe any added measures:				

Will the project employ Distributed Energy / Smart Grid Infrastructure and /or Systems?

Select all appropriate:				
	☐ Connected to local distributed electrical	☐ Building will be Smart Grid ready	☐ Connected to distributed steam, hot, chilled water	☐ Distributed thermal energy ready

Will the building remain operable without utility power for an extended period?

	Yes / No	If yes, for how long:	*Days*
If Yes, is building "Islandable?			
If Yes, describe strategies:	The life safety and safe room will be powered for as long as fuel is available for the emergency generator.		

Describe any non-mechanical strategies that will support building functionality and use during an extended interruption(s) of utility services and infrastructure:

Select all appropriate:				
	☐ Solar oriented – longer south walls	☐ Prevailing winds oriented	☐ External shading devices	☐ Tuned glazing,
	☑ Building cool zones	☑ Operable windows	☐ Natural ventilation	☐ Building shading
	☐ Potable water for drinking / food preparation	☐ Potable water for sinks / sanitary systems	☐ Waste water storage capacity	☑ High Performance Building Envelop
Describe any added measures:				

What measures will the project employ to reduce urban heat-island effect?

Select all appropriate:				
	☑ High reflective paving materials	☑ Shade trees & shrubs	☑ High reflective roof materials	☐ Vegetated roofs
Describe other strategies:				

What measures will the project employ to accommodate rain events and more rain fall?

Select all appropriate:				
	☑ On-site retention systems & ponds	☑ Infiltration galleries & areas	☐ Vegetated water capture systems	☐ Vegetated roofs
Describe other strategies:				

What measures will the project employ to accommodate extreme storm events and high winds?

Select all appropriate:				
	☑ Hardened building structure & elements	☐ Buried utilities & hardened infrastructure	☐ Hazard removal & protective landscapes	☑ Soft & permeable surfaces (water infiltration)
Describe other strategies:				

C - Sea-Level Rise and Storms

Rising Sea-Levels and more frequent Extreme Storms increase the probability of coastal and river flooding and enlarging the extent of the 100 Year Flood Plain. This section explores if a project is or might be subject to Sea-Level Rise and Storm impacts.

C.1 - Location Description and Classification:

Do you believe the building to susceptible to flooding now or during the full expected life of the building?

	Yes / No

Describe site conditions?

Site Elevation – Low/High Points:	*109/122 Boston City Base Elev.(Ft.)*
Building Proximity to Water:	*520 Ft.*

Is the site or building located in any of the following?

Coastal Zone:	*Yes / No*	Velocity Zone:	*Yes / No*
Flood Zone:	*Yes / No*	Area Prone to Flooding:	*Yes / No*

Will the 2013 Preliminary FEMA Flood Insurance Rate Maps or future floodplain delineation updates due to Climate Change result in a change of the classification of the site or building location?

2013 FEMA Prelim. FIRMs:	*Yes / No*	Future floodplain delineation updates:	*Yes / No*

What is the project or building proximity to nearest Coastal, Velocity or Flood Zone or Area Prone to Flooding?

	>5000 Ft.

If you answered YES to any of the above Location Description and Classification questions, please complete the following questions. ***Otherwise you have completed the questionnaire; thank you!***

C - Sea-Level Rise and Storms

This section explores how a project responds to Sea-Level Rise and / or increase in storm frequency or severity.

C.2 - Analysis

How were impacts from higher sea levels and more frequent and extreme storm events analyzed:

Sea Level Rise:	*Ft.*	Frequency of storms:	*per year*

C.3 - Building Flood Proofing

Describe any strategies to limit storm and flood damage and to maintain functionality during an extended periods of disruption.

What will be the Building Flood Proof Elevation and First Floor Elevation:

Flood Proof Elevation:	*Boston City Base Elev.(Ft.)*	First Floor Elevation:	*Boston City Base Elev. (Ft.)*

Will the project employ temporary measures to prevent building flooding (e.g. barricades, flood gates):

	Yes / No	If Yes, to what elevation	*Boston City Base Elev. (Ft.)*
If Yes, describe:			

What measures will be taken to ensure the integrity of critical building systems during a flood or severe storm event:

☐ Systems located above 1st Floor.	☐ Water tight utility conduits	☐ Waste water back flow prevention	☐ Storm water back flow prevention

Were the differing effects of fresh water and salt water flooding considered:

Yes / No

Will the project site / building(s) be accessible during periods of inundation or limited access to transportation:

Yes / No	If yes, to what height above 100 Year Floodplain:	*Boston City Base Elev. (Ft.)*

Will the project employ hard and / or soft landscape elements as velocity barriers to reduce wind or wave impacts?

	Yes / No
If Yes, describe:	

Will the building remain occupiable without utility power during an extended period of inundation:

Yes / No	If Yes, for how long:	*days*

Describe any additional strategies to addressing sea level rise and or sever storm impacts:

C.4 - Building Resilience and Adaptability

Describe any strategies that would support rapid recovery after a weather event and accommodate future building changes that respond to climate change:

Will the building be able to withstand severe storm impacts and endure temporary inundation?

Select appropriate:	*Yes / No*	☐ Hardened / Resilient Ground Floor Construction	☐ Temporary shutters and or barricades	☐ Resilient site design, materials and construction

Can the site and building be reasonably modified to increase Building Flood Proof Elevation?

Select appropriate:	*Yes / No*	☐ Surrounding site elevation can be raised	☐ Building ground floor can be raised	☐ Construction been engineered
Describe additional strategies:				

Has the building been planned and designed to accommodate future resiliency enhancements?

Select appropriate:	*Yes / No*	☐ Solar PV	☐ Solar Thermal	☐ Clean Energy / CHP System(s)
		☐ Potable water storage	☐ Wastewater storage	☐ Back up energy systems & fuel
Describe any specific or additional strategies:				

Thank you for completing the Boston Climate Change Resilience and Preparedness Checklist!

For questions or comments about this checklist or Climate Change Resiliency and Preparedness best practices, please contact: John.Dalzell.BRA@cityofboston.gov

Climate Change Preparedness and Resiliency Checklist for New Construction

In November 2013, in conformance with the Mayor's 2011 Climate Action Leadership Committee's recommendations, the Boston Redevelopment Authority adopted policy for all development projects subject to Boston Zoning Article 80 Small and Large Project Review, including all Institutional Master Plan modifications and updates, are to complete the following checklist and provide any necessary responses regarding project resiliency, preparedness, and to mitigate any identified adverse impacts that might arise under future climate conditions.

For more information about the City of Boston's climate policies and practices, and the 2011 update of the climate action plan, *A Climate of Progress*, please see the City's climate action web pages at http://www.cityofboston.gov/climate

In advance we thank you for your time and assistance in advancing best practices in Boston.

Climate Change Analysis and Information Sources:

1. Northeast Climate Impacts Assessment (www.climatechoices.org/ne/)
2. USGCRP 2009 (http://www.globalchange.gov/publications/reports/scientific-assessments/us-impacts/)
3. Army Corps of Engineers guidance on sea level rise (http://planning.usace.army.mil/toolbox/library/ECs/EC11652212Nov2011.pdf)
4. Proceeding of the National Academy of Science, "Global sea level rise linked to global temperature", Vermeer and Rahmstorf, 2009 (http://www.pnas.org/content/early/2009/12/04/0907765106.full.pdf)
5. "Hotspot of accelerated sea-level rise on the Atlantic coast of North America", Asbury H. Sallenger Jr*, Kara S. Doran and Peter A. Howd, 2012 (http://www.bostonredevelopmentauthority.org/planning/Hotspot of Accelerated Sea-level Rise 2012.pdf)
6. "Building Resilience in Boston": Best Practices for Climate Change Adaptation and Resilience for Existing Buildings, Linnean Solutions, The Built Environment Coalition, The Resilient Design Institute, 2103 (http://www.greenribboncommission.org/downloads/Building_Resilience_in_Boston_SML.pdf)

Checklist

Please respond to all of the checklist questions to the fullest extent possible. For projects that respond "Yes" to any of the D.1 – Sea-Level Rise and Storms, Location Description and Classification questions, please respond to all of the remaining Section D questions.

Checklist responses are due at the time of initial project filing or Notice of Project Change and final filings just prior seeking Final BRA Approval. A PDF of your response to the Checklist should be submitted to the Boston Redevelopment Authority via your project manager.

Please Note: When initiating a new project, please visit the BRA web site for the most current Climate Change Preparedness & Resiliency Checklist.

A.1 - Project Information

Project Name:	BMHC – Veterans Mixed Income Housing Project (Building 3)
Project Address Primary:	1485 Commonwealth Avenue
Project Address Additional:	
Project Contact (name / Title / Company / email / phone):	

A.2 - Team Description

Owner / Developer:	WinnDevelopment
Architect:	The Architectural Team
Engineer (building systems):	Petersen Engineering
Sustainability / LEED:	Conservation Services Group
Permitting:	Epsilon Associates, Inc
Construction Management:	
Climate Change Expert:	Epsilon Associates, Inc

A.3 - Project Permitting and Phase

At what phase is the project – most recent completed submission at the time of this response?

☑ PNF / Expanded PNF Submission	☐ Draft / Final Project Impact Report Submission	☐ BRA Board Approved	☐ Notice of Project Change
☐ Planned Development Area	☐ BRA Final Design Approved	☐ Under Construction	☐ Construction just completed:

A.4 - Building Classification and Description

List the principal Building Uses:	Residential
List the First Floor Uses:	*Amenity Space*

What is the principal Construction Type – select most appropriate type? **Renovation only**

☐ Wood Frame	☐ Masonry	☐ Steel Frame	☐ Concrete

Describe the building?

Site Area:	*66,580 SF*	Building Area:	*2,560 SF*
Building Height:	*30 Ft.*	Number of Stories:	*2 Flrs.*
First Floor Elevation (reference Boston City Base):	*120 Elev.*	Are there below grade spaces/levels, if yes how many:	*No*

A.5 - Green Building

Which LEED Rating System(s) and version has or will your project use (by area for multiple rating systems)?

Select by Primary Use:	☐ New Construction	☐ Core & Shell	☐ Healthcare	☐ Schools
	☐ Retail	☐ Homes Midrise	☑ Homes	☐ Other
Select LEED Outcome:	☑ Certified	☐ Silver	☐ Gold	☐ Platinum

Will the project be USGBC Registered and / or USGBC Certified?

Registered:	*$\boxed{\text{Yes}}$ / No*	Certified:	*TBD*

A.6 - Building Energy-

What are the base and peak operating energy loads for the building?

Electric:	*32 kW*	Heating:	*0.045 MMBtu/hr*
What is the planned building Energy Use Intensity:	*19 kWh/SF*	Cooling:	*4 Tons/hr*

What are the peak energy demands of your critical systems in the event of a service interruption?

Electric:	*0.5 kW*	Heating:	*N/A*
		Cooling:	*N/A*

What is nature and source of your back-up / emergency generators?

Electrical Generation:	*N/A*		Fuel Source:	
System Type and Number of Units:	☐ Combustion Engine	☐ Gas Turbine	☐ Combine Heat and Power	*(Units)*

B - Extreme Weather and Heat Events

Climate change will result in more extreme weather events including higher year round average temperatures, higher peak temperatures, and more periods of extended peak temperatures. The section explores how a project responds to higher temperatures and heat waves.

B.1 - Analysis

What is the full expected life of the project?

Select most appropriate:	☐ 10 Years	☐ 25 Years	☑ 50 Years	☐ 75 Years

What is the full expected operational life of key building systems (e.g. heating, cooling, ventilation)?

Select most appropriate:	☐ 10 Years	☑ 25 Years	☐ 50 Years	☐ 75 Years

What time span of future Climate Conditions was considered?

Select most appropriate:	☐ 10 Years	☐ 25 Years	☑ 50 Years	☐ 75 Years

Analysis Conditions - What range of temperatures will be used for project planning – Low/High?

8/91 Deg.	Based on ASHRAE Fundamentals 2013 99.6% heating; 0.4% cooling

What Extreme Heat Event characteristics will be used for project planning – Peak High, Duration, and Frequency?

95 Deg.	*5 Days*	*6 Events / yr.*

What Drought characteristics will be used for project planning – Duration and Frequency?

30-90 Days	*0.2 Events / yr.*

What Extreme Rain Event characteristics will be used for project planning – Seasonal Rain Fall, Peak Rain Fall, and Frequency of Events per year?

45 Inches / yr.	*4 Inches*	*0.5 Events / yr.*

What Extreme Wind Storm Event characteristics will be used for project planning – Peak Wind Speed, Duration of Storm Event, and Frequency of Events per year?

130 Peak Wind	*10 Hours*	*0.25 Events / yr.*

B.2 - Mitigation Strategies

What will be the overall energy performance, based on use, of the project and how will performance be determined?

Building energy use below code:	*25%*[1][2]
How is performance determined:	Energy Model

What specific measures will the project employ to reduce building energy consumption?

Select all appropriate:	☐ High performance building envelop	☐ High performance lighting & controls	☐ Building day lighting	☑ EnergyStar equip. / appliances
	☑ High performance HVAC equipment	☑ Energy recovery ventilation	☐ No active cooling	☐ No active heating
Describe any added measures:				

What are the insulation (R) values for building envelop elements?

Roof:	*R = 38*	Walls / Curtain Wall Assembly:	*R = 13*
Foundation:	*R = 1*	Basement / Slab:	*R =1*
Windows:	*R = 3*	Doors:	*R = 2*

What specific measures will the project employ to reduce building energy demands on the utilities and infrastructure?

[1] MA Stretch Energy Code does not apply to this building because it states in Section 101.2, "renovations of existing commercial buildings, and replacement or reconstruction of existing commercial building components and elements, are not subject to the provisions of this code." Also, historic buildings are exempt from the Stretch Code.

[2] Per 2009 IECC Section 101.4.3 Additions, Alterations, Renovations or Repairs, the existing wall systems are considered unaltered portions of the building and therefore do not need to comply with 2009 IECC requirements for new construction. The energy model will use existing enclosure as the baseline.

	☐ On-site clean energy / CHP system(s)	☐ Building-wide power dimming	☐ Thermal energy storage systems	☐ Ground source heat pump
	☐ On-site Solar PV	☐ On-site Solar Thermal	☐ Wind power	☐ None
Describe any added measures:				

Will the project employ Distributed Energy / Smart Grid Infrastructure and /or Systems?

Select all appropriate:	☐ Connected to local distributed electrical	☐ Building will be Smart Grid ready	☐ Connected to distributed steam, hot, chilled water	☐ Distributed thermal energy ready

Will the building remain operable without utility power for an extended period?

	Yes / $\boxed{\text{No}}$	If yes, for how long:	*Days*
If Yes, is building "Islandable?			
If Yes, describe strategies:			

Describe any non-mechanical strategies that will support building functionality and use during an extended interruption(s) of utility services and infrastructure:

Select all appropriate:	☐ Solar oriented – longer south walls	☐ Prevailing winds oriented	☐ External shading devices	☐ Tuned glazing,
	☐ Building cool zones	☑ Operable windows	☐ Natural ventilation	☐ Building shading
	☐ Potable water for drinking / food preparation	☐ Potable water for sinks / sanitary systems	☐ Waste water storage capacity	☐ High Performance Building Envelop
Describe any added measures:				

What measures will the project employ to reduce urban heat-island effect?

Select all appropriate:	☑ High reflective paving materials	☑ Shade trees & shrubs	☐ High reflective roof materials	☐ Vegetated roofs
Describe other strategies:				

What measures will the project employ to accommodate rain events and more rain fall?

Select all appropriate:	☑ On-site retention systems & ponds	☑ Infiltration galleries & areas	☐ Vegetated water capture systems	☐ Vegetated roofs
Describe other strategies:				

What measures will the project employ to accommodate extreme storm events and high winds?

Select all appropriate:	☐ Hardened building structure & elements	☑ Buried utilities & hardened infrastructure	☐ Hazard removal & protective landscapes	☑ Soft & permeable surfaces (water infiltration)
Describe other strategies:				

C - Sea-Level Rise and Storms

Rising Sea-Levels and more frequent Extreme Storms increase the probability of coastal and river flooding and enlarging the extent of the 100 Year Flood Plain. This section explores if a project is or might be subject to Sea-Level Rise and Storm impacts.

C.1 - Location Description and Classification:

Do you believe the building to susceptible to flooding now or during the full expected life of the building?

Yes / No

Describe site conditions?

Site Elevation – Low/High Points:	*119/122 Boston City Base Elev.(Ft.)*
Building Proximity to Water:	*520 Ft.*

Is the site or building located in any of the following?

Coastal Zone:	*Yes / No*	Velocity Zone:	*Yes / No*
Flood Zone:	*Yes / No*	Area Prone to Flooding:	*Yes / No*

Will the 2013 Preliminary FEMA Flood Insurance Rate Maps or future floodplain delineation updates due to Climate Change result in a change of the classification of the site or building location?

2013 FEMA Prelim. FIRMs:	*Yes / No*	Future floodplain delineation updates:	*Yes / No*

What is the project or building proximity to nearest Coastal, Velocity or Flood Zone or Area Prone to Flooding?

>5000 Ft.

If you answered YES to any of the above Location Description and Classification questions, please complete the following questions. Otherwise you have completed the questionnaire; thank you!

C - Sea-Level Rise and Storms

This section explores how a project responds to Sea-Level Rise and / or increase in storm frequency or severity.

C.2 - Analysis

How were impacts from higher sea levels and more frequent and extreme storm events analyzed:

Sea Level Rise:	*Ft.*	Frequency of storms:	*per year*

C.3 - Building Flood Proofing

Describe any strategies to limit storm and flood damage and to maintain functionality during an extended periods of disruption.

What will be the Building Flood Proof Elevation and First Floor Elevation:

Flood Proof Elevation:	*Boston City Base Elev.(Ft.)*	First Floor Elevation:	*Boston City Base Elev. (Ft.)*

Will the project employ temporary measures to prevent building flooding (e.g. barricades, flood gates):

	Yes / No	If Yes, to what elevation	*Boston City Base Elev. (Ft.)*
If Yes, describe:			

What measures will be taken to ensure the integrity of critical building systems during a flood or severe storm event:

☐ Systems located above 1st Floor.	☐ Water tight utility conduits	☐ Waste water back flow prevention	☐ Storm water back flow prevention

Were the differing effects of fresh water and salt water flooding considered:

Yes / No

Will the project site / building(s) be accessible during periods of inundation or limited access to transportation:

Yes / No	If yes, to what height above 100 Year Floodplain:	*Boston City Base Elev. (Ft.)*

Will the project employ hard and / or soft landscape elements as velocity barriers to reduce wind or wave impacts?

	Yes / No
If Yes, describe:	

Will the building remain occupiable without utility power during an extended period of inundation:

Yes / No	If Yes, for how long:	*days*

Describe any additional strategies to addressing sea level rise and or sever storm impacts:

C.4 - Building Resilience and Adaptability

Describe any strategies that would support rapid recovery after a weather event and accommodate future building changes that respond to climate change:

Will the building be able to withstand severe storm impacts and endure temporary inundation?

Select appropriate:	*Yes / No*	☐ Hardened / Resilient Ground Floor Construction	☐ Temporary shutters and or barricades	☐ Resilient site design, materials and construction

Can the site and building be reasonably modified to increase Building Flood Proof Elevation?

Select appropriate:	*Yes / No*	☐ Surrounding site elevation can be raised	☐ Building ground floor can be raised	☐ Construction been engineered
Describe additional strategies:				

Has the building been planned and designed to accommodate future resiliency enhancements?

Select appropriate:	*Yes / No*	☐ Solar PV	☐ Solar Thermal	☐ Clean Energy /

				CHP System(s)
		☐ Potable water storage	☐ Wastewater storage	☐ Back up energy systems & fuel
Describe any specific or additional strategies:				

Thank you for completing the Boston Climate Change Resilience and Preparedness Checklist!

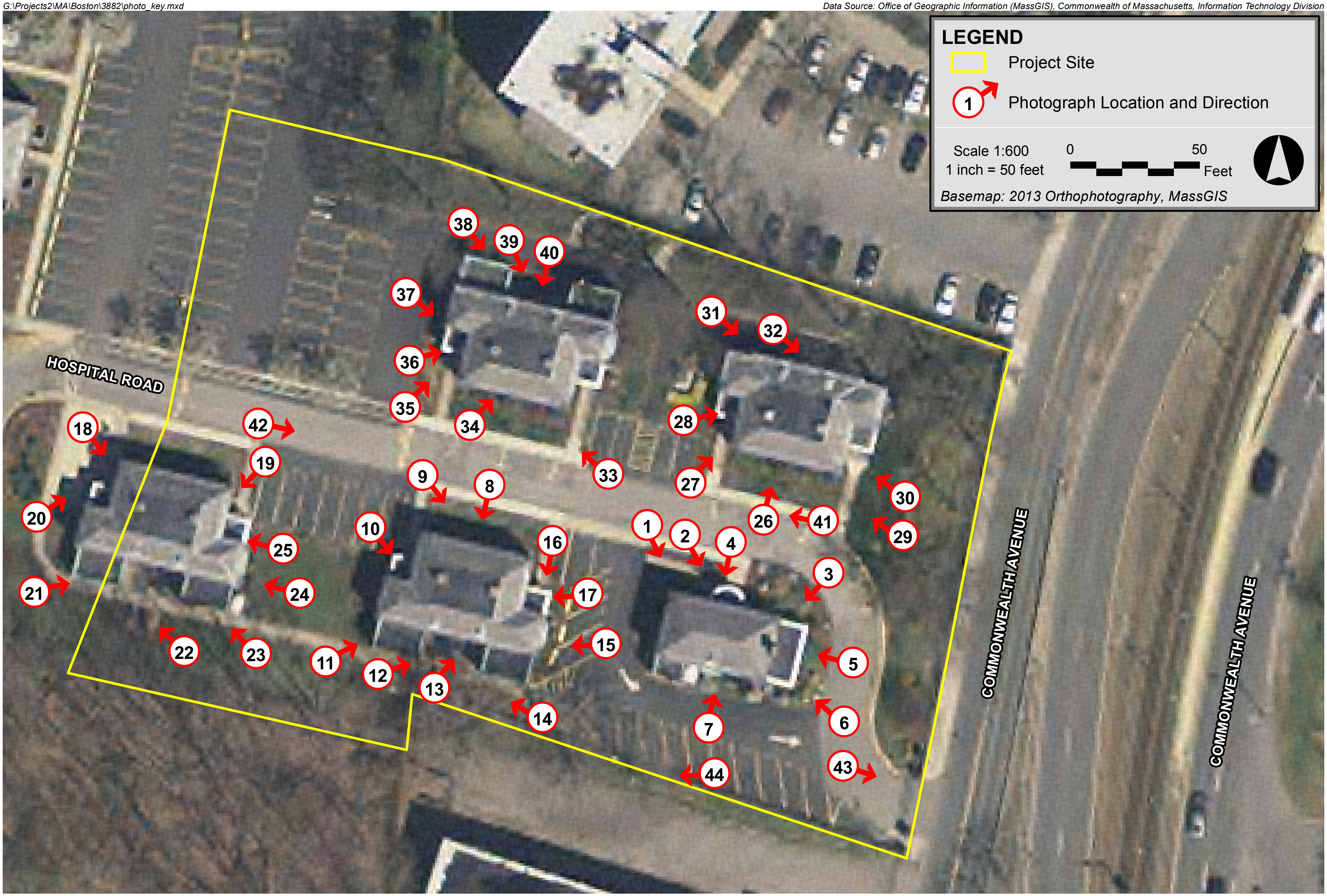
For questions or comments about this checklist or Climate Change Resiliency and Preparedness best practices, please contact: John.Dalzell.BRA@cityofboston.gov

Appendix E

Existing Site Photographs

G:\Projects2\MA\Boston\3882\photo_key.mxd

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



Brighton Marine Health Center **Boston, Massachusetts**

Epsilon ASSOCIATES INC.

Appendix E

Key to Existing Conditions Photographs

1. Building 3, view southeast of north and west elevations, building to remain

2. Building 3, view southeast of north and west elevations, building to remain

3. Building 3, view southwest of north and east elevations, building to remain

4. Building 3, view south of north elevation entrance, building to remain


5. Building 3, view west of east elevation, building to remain


6. Building 3, view northwest of south and east elevations, building to remain


7. Building 3, view north of south elevation, building to remain

8. Building 4, view south of north elevation

9. Building 4, view southeast of north and west elevations

10. Building 4, view southeast of west elevation

11. Building 4, view northeast of west and south elevations


12. Building 4, view northeast of south elevation


13. Building 4, view northeast of south elevation, fire escape


14. Building 4, view northwest of south elevation


15. Building 4, view west of east elevation

16. Building 4, view south of north elevation entrance

17. Building 4, view west of east elevation at entrance

18. Building 5, view southeast of north and west elevations

19. Building 5, view southwest of north and east elevations

20. Building 5, view northeast of infill at entrance off west elevation

21. Building 5, view northeast of west and south elevations

22. Building 5, view northwest of south elevation

23. Building 5, view northwest of south and east elevations

24. Building 5, view west of east elevation

25. Building 5, view west of east elevation, window

26. Building 6, view north of south elevation

27. Building 6, view northeast of west and south elevations

28. Building 6, view northeast of west elevation window

29. Building 6, view northwest of south and east elevations

30. Building 6, view northwest of east elevation

31. Building 6, view southeast of north elevation

32. Building 6, view southeast of north elevation

33. Building 7, view northwest of south and east elevations

34. Building 7, view northeast of south elevation

35. Building 7, view northeast of west and south elevation

36. Building 7, view northeast of east elevation window

37. Building 7, view southeast of west elevation

38. Building 7, view southeast of west and north elevations

39. Building 7, view southeast of north elevation

40. Building 7, view south of north elevation

41. Site, view west of center driveway from Building 6

42. Site, view east of center driveway from Building 5

43. Site, view east of entrance gate

44. Site, view west of south walkway from Building 3

Appendix F

Accessibility Checklist

Accessibility Checklist

(to be added to the BRA Development Review Guidelines)

In 2009, a nine-member Advisory Board was appointed to the Commission for Persons with Disabilities in an effort to reduce architectural, procedural, attitudinal, and communication barriers affecting persons with disabilities in the City of Boston. These efforts were instituted to work toward creating universal access in the built environment.

In line with these priorities, the Accessibility Checklist aims to support the inclusion of people with disabilities. In order to complete the Checklist, you must provide specific detail, including descriptions, diagrams and data, of the universal access elements that will ensure all individuals have an equal experience that includes full participation in the built environment throughout the proposed buildings and open space.

In conformance with this directive, all development projects subject to Boston Zoning Article 80 Small and Large Project Review, including all Institutional Master Plan modifications and updates, are to complete the following checklist and provide any necessary responses regarding the following:

- improvements for pedestrian and vehicular circulation and access;
- encourage new buildings and public spaces to be designed to enhance and preserve Boston's system of parks, squares, walkways, and active shopping streets;
- ensure that persons with disabilities have full access to buildings open to the public;
- afford such persons the educational, employment, and recreational opportunities available to all citizens; and
- preserve and increase the supply of living space accessible to persons with disabilities.

We would like to thank you in advance for your time and effort in advancing best practices and progressive approaches to expand accessibility throughout Boston's built environment.

Accessibility Analysis Information Sources:

1. Americans with Disabilities Act – 2010 ADA Standards for Accessible Design
   a. http://www.ada.gov/2010ADAstandards_index.htm
2. Massachusetts Architectural Access Board 521 CMR
   a. http://www.mass.gov/eopss/consumer-prot-and-bus-lic/license-type/aab/aab-rules-and-regulations-pdf.html
3. Boston Complete Street Guidelines
   a. http://bostoncompletestreets.org/
4. City of Boston Mayors Commission for Persons with Disabilities Advisory Board
   a. http://www.cityofboston.gov/Disability
5. City of Boston – Public Works Sidewalk Reconstruction Policy
   a. http://www.cityofboston.gov/images_documents/sidewalk%20policy%200114_tcm3-41668.pdf
6. Massachusetts Office On Disability Accessible Parking Requirements
   a. www.mass.gov/anf/docs/mod/hp-parking-regulations-mod.doc
7. MBTA Fixed Route Accessible Transit Stations
   a. http://www.mbta.com/about_the_mbta/accessibility/

Article 80 | ACCESSIBILTY CHECKLIST

Project Information

Project Name:	Brighton Marine Health Center – Veterans Mixed Income Housing Project
Project Address Primary:	1485 Commonwealth Avenue
Project Address Additional:	
Project Contact (name / Title / Company / email / phone):	

Team Description

Owner / Developer:	WinnDevelopment
Architect:	The Architectural Team
Engineer (building systems):	Petersen Engineering
Sustainability / LEED:	Conservation Services Group
Permitting:	Epsilon Associates, Inc
Construction Management:	

Project Permitting and Phase

At what phase is the project – at time of this questionnaire?

☑ PNF / Expanded PNF Submitted	Draft / Final Project Impact Report Submitted	BRA Board Approved
BRA Design Approved	Under Construction	Construction just completed:

Building Classification and Description

What are the principal Building Uses - select all appropriate uses?

Residential – One to Three Unit	☑ Residential - Multi-unit, Four +	Institutional	Education
Commercial	Office	Retail	Assembly
Laboratory / Medical	Manufacturing / Industrial	Mercantile	Storage, Utility and Other

First Floor Uses (List)	*Residential, Amenity Space*

What is the Construction Type – select most appropriate type?

☑ Wood Frame	Masonry	Steel Frame	Concrete

Describe the building?

Site Area:	*66,580 SF*	Building Area:	*111,650 SF*
Building Height:	*77 Ft.*	Number of Stories:	*6 Flrs.*
First Floor Elevation:	*120 Elev.*	Are there below grade spaces:	☑ *Yes / No*

Assessment of Existing Infrastructure for Accessibility:

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

Provide a description of the development neighborhood and identifying characteristics.	The Brighton Marine Health Center is located in the Brighton neighborhood of Boston, and is surrounded by a variety of uses. Hospital uses are located to the north and west (St. Elizabeth's Medical Center and Franciscan Hospital for Children). Brighton High School is also located to the west. To the north is the Regency Building apartments and commercial uses beyond, and to the south are the Charing Cross residential building, currently under construction, Fidelis Way Park, commercial uses and the Commonwealth housing development beyond. The nearby sites are similarly designed with low- to mid-rise buildings surrounded by surface parking lots and landscaped area. To the east of the site is a residential

	neighborhood with four to five-story multi-family residential buildings.
List the surrounding ADA compliant MBTA transit lines and the proximity to the development site: Commuter rail, subway, bus, etc.	The nearest ADA compliant MBTA transit station is the Washington Street station on the Green Line B Branch, approximately 0.3 miles from the Project site.
List the surrounding institutions: hospitals, public housing and elderly and disabled housing developments, educational facilities, etc.	Within a ½ mile radius of the Project site, nearby hospitals include St. Elizabeth's Medical Center and Kindred Hospital. Nearby schools include the Michael Driscoll School, Mt St Joseph Academy, Jackson Mann School, Horace Mann School, Horace Mann School for the Deaf, Baldwin Early Learning Center, Kennedy Hope Academy, Brighton High School, Boston Community Leadership Academy, Kennedy Day School and the Bryman Institute. There are also several long term care facilities, which are the Providence House, Corey Hill Nursing Home, Wingate at Brighton Rehab, St Elizabeth's Medical Center TCU, and the Brighton House Rehab and Nursing Center.
Is the proposed development on a priority accessible route to a key public use facility? List the surrounding: government buildings, libraries, community centers and recreational facilities and other related facilities.	The Project site is located near several parks, including Corey Hill Park, Coolidge Playground, Joyce Playground, Cunningham Park, Fidelis Way Park, Ringer Playground and the Penniman Road Play Area. Also within a ½ mile are a Police and Fire Department, and the Jackson Mann Community Center.

Surrounding Site Conditions – Existing:

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

Are there sidewalks and pedestrian ramps existing at the development site?	Yes, an existing sidewalk abuts the Project site to the west. The existing sidewalk does not include pedestrian ramps.
If yes above, list the existing sidewalk and pedestrian ramp materials and physical condition at the development site.	The existing sidewalk material is concrete with granite curbing. The physical condition of the existing sidewalk is average except for a portion of the the existing sidewalk where severe cracking has occurred and another area that has been patched with bituminous paving.
Are the sidewalks and pedestrian ramps existing-to-remain? **If yes,** have the sidewalks and pedestrian ramps been verified as compliant? **If yes,** please provide surveyors report.	No, new sidewalks and pedestrian ramps are proposed as part of the Project.

Is the development site within a historic district? If yes, please identify.	The proposed Project is located within the Washington-Warren Streets Institution Area, an area included in the Inventory of Historic and Archaeological Assets of the Commonwealth.

Surrounding Site Conditions – Proposed

This section identifies the proposed condition of the walkways and pedestrian ramps in and around the development site. The width of the sidewalk contributes to the degree of comfort and enjoyment of walking along a street. Narrow sidewalks do not support lively pedestrian activity, and may create dangerous conditions that force people to walk in the street. Typically, a five foot wide Pedestrian Zone supports two people walking side by side or two wheelchairs passing each other. An eight foot wide Pedestrian Zone allows two pairs of people to comfortable pass each other, and a ten foot or wider Pedestrian Zone can support high volumes of pedestrians.

Are the proposed sidewalks consistent with the Boston Complete Street Guidelines? See: www.bostoncompletestreets.org	As part of the Project, the Proponent will bring all abutting sidewalks and pedestrian ramps to the City of Boston standards in accordance with the Boston Complete Streets design guidelines. This will include the reconstruction and widening of the sidewalks where possible, the installation of new, accessible ramps, improvements to street lighting where necessary, planting of street trees, and providing bicycle storage racks surrounding the site, where appropriate.
If yes above, choose which Street Type was applied: Downtown Commercial, Downtown Mixed-use, Neighborhood Main, Connector, Residential, Industrial, Shared Street, Parkway, Boulevard.	The Carriage Road portion of Commonwealth Avenue, fronting the development site, is best classified as a Neighborhood Residential street type.
What is the total width of the proposed sidewalk? List the widths of the proposed zones: Frontage, Pedestrian and Furnishing Zone.	The total width of the abutting sidewalk along Commonwealth Avenue varies in width from approximately 6 feet to 7 feet. The sidewalk width is constrained by an existing brick retaining wall on the west side and the curb line to the east. The Frontage Zone is 0 feet, but a wide landscaped open space immediately abuts the sidewalk to the west. The proposed Pedestrian Zone is 4'-6" to 5'-6". The proposed Furnishing Zone is 1'-6" to provide for new street lights and other utilities.
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?	The proposed sidewalk material for the Pedestrian and Frontage Zones is concrete. The sidewalk is primarily located on the City of Boston pedestrian right-of-way, although a narrow section of the sidewalk (approximately 1'6") is located on private property within the Project site boundaries.

If the pedestrian right-of-way is on private property, will the proponent seek a pedestrian easement with the City of Boston Public Improvement Commission?	The sidewalk is primarily located on the City of Boston pedestrian right-of-way, although a narrow section of the sidewalk (approximately 1'6") is located on private property. The Proponent may grant a pedestrian easement to the Public Improvement Commission.
Will sidewalk cafes or other furnishings be programmed for the pedestrian right-of-way?	No, sidewalk cafes or other furnishings are not proposed along the pedestrian right-of-way. Such features are programmed for the proposed outdoor courtyard abutting the sidewalk.
If yes above, what are the proposed dimensions of the sidewalk café or furnishings and what will the right-of-way clearance be?	N/A

Proposed Accessible Parking:

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

What is the total number of parking spaces provided at the development site parking lot or garage?	The Project will include 49 garage parking spaces and 52 surface parking spaces for a total of 101 spaces.
What is the total number of accessible spaces provided at the development site?	The Project will include 5 accessible parking spaces – 2 garage parking spaces and 3 surface parking spaces.
Will any on street accessible parking spaces be required? If yes, has the proponent contacted the Commission for Persons with Disabilities and City of Boston Transportation Department regarding this need?	On street parking is not available on the street fronting the Project site.
Where is accessible visitor parking located?	The accessible visitor parking is located in the surface lot adjacent to the main entrance.
Has a drop-off area been identified? If yes, will it be	Yes, an accessible drop-off area is proposed adjacent to the main entrance.

accessible?	
Include a diagram of the accessible routes to and from the accessible parking lot/garage and drop-off areas to the development entry locations. Please include route distances.	A diagram indicating the accessible routes to and from the accessible parking lot/garage and drop-off areas to the development entry locations is included at the end of this checklist. Route distances are also included.

Circulation and Accessible Routes:

The primary objective in designing smooth and continuous paths of travel is to accommodate persons of all abilities that allow for universal access to entryways, common spaces and the visit-ability* of neighbors.

**Visit-ability – Neighbors ability to access and visit with neighbors without architectural barrier limitations*

Provide a diagram of the accessible route connections through the site.	A diagram of the accessible route connections through the site is included at the end of this checklist.
Describe accessibility at each entryway: Flush Condition, Stairs, Ramp Elevator.	A flush condition is proposed at all entryways at the proposed new main building and the renovated Building 3, except at the existing bowed portico at Building 3, where an existing stair with two steps is located.
Are the accessible entrance and the standard entrance integrated?	Yes, the accessible entrances and standard entrances are integrated.
If no above, what is the reason?	N/A
Will there be a roof deck or outdoor courtyard space? If yes, include diagram of the accessible route.	A new outdoor courtyard is proposed.
Has an accessible routes way-finding and signage package been developed? If yes, please describe.	No, an accessible route way-finding and signage package has yet to be developed.

Accessible Units: (If applicable)

In order to facilitate access to housing opportunities this section addresses the number of accessible units that are proposed for the development site that remove barriers to housing choice.

What is the total number of proposed units for the development?	The Project will include 100 units in the new apartment building and one unit in the existing Building 3.

How many units are for sale; how many are for rent? What is the market value vs. affordable breakdown?	All units will be rental units. Approximately 80 of the 101 units will have various levels of affordability.
How many accessible units are being proposed?	5 units will be accessible, as shown in the diagram attached to this checklist.
Please provide plan and diagram of the accessible units.	A floor plan and diagram of the accessible units is included at the end of this checklist.
How many accessible units will also be affordable? If none, please describe reason.	Four of the accessible units will also be affordable.
Do standard units have architectural barriers that would prevent entry or use of common space for persons with mobility impairments? Example: stairs at entry or step to balcony. **If yes,** please provide reason.	No, residential units do not have architectural barriers that would prevent entry or use of common space for persons with mobility impairments.
Has the proponent reviewed or presented the proposed plan to the City of Boston Mayor's Commission for Persons with Disabilities Advisory Board?	The Proponent has not presented the plan to the Advisory Board.
Did the Advisory Board vote to support this project? **If no,** what recommendations did the Advisory Board give to make this project more accessible?	N/A

Thank you for completing the Accessibility Checklist!

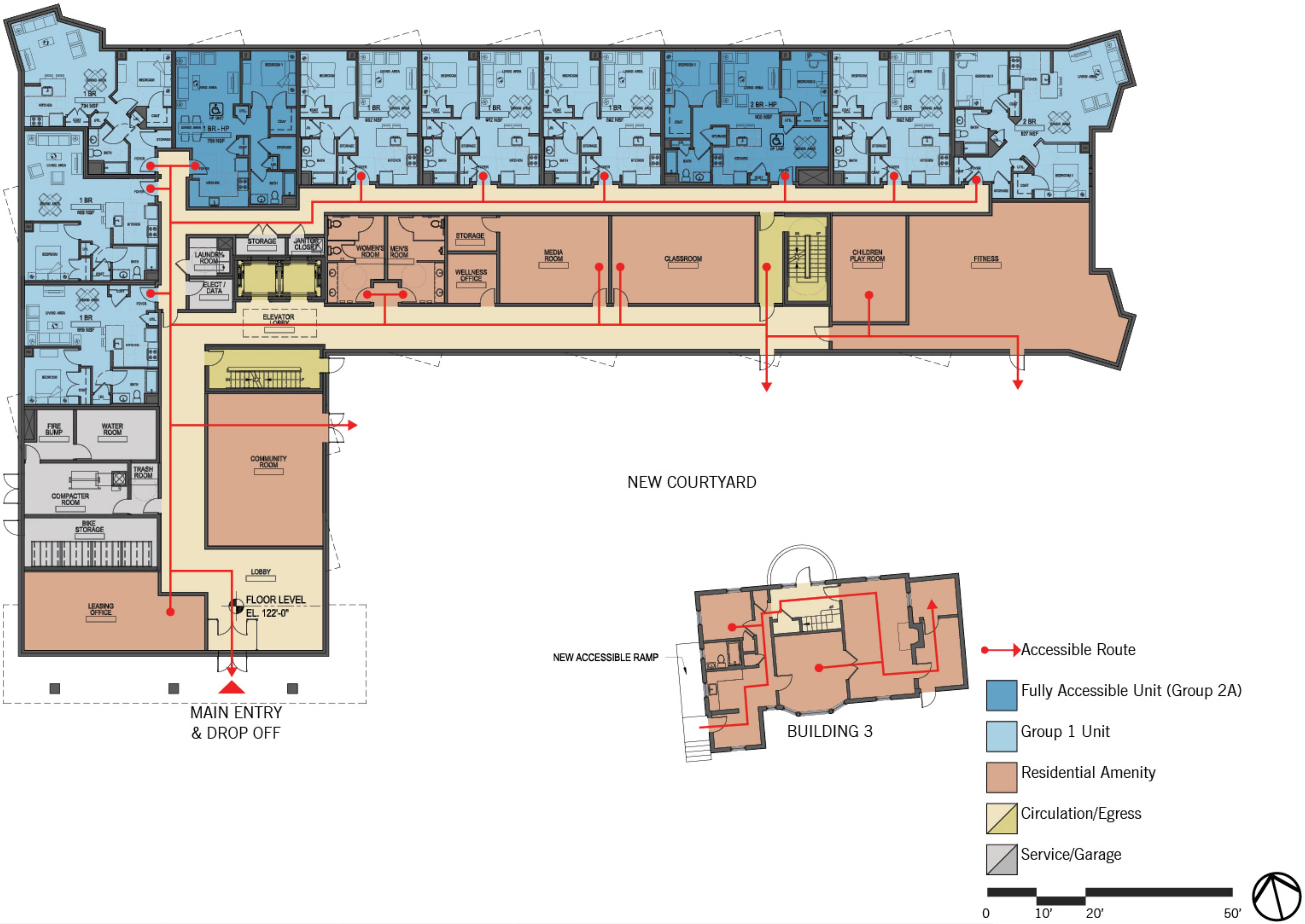
For questions or comments about this checklist or accessibility practices, please contact:

kathryn.quigley@boston.gov | Mayors Commission for Persons with Disabilities

BMHC - Veterans Mixed Income Housing Project Boston, MA

tat | the architectural team

Second Floor Plan



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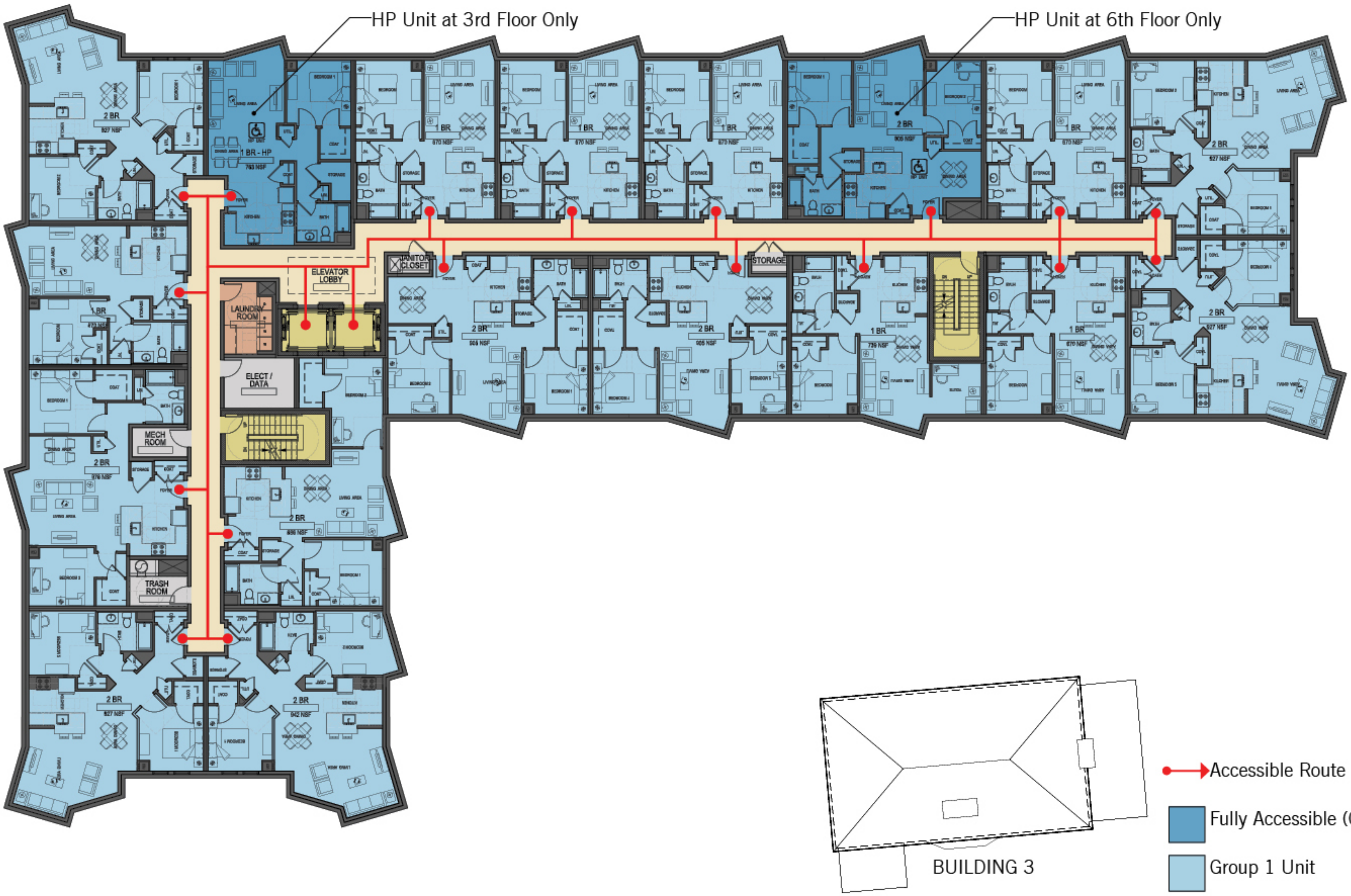
Accessible Route & Units
First Floor Plan



Accessible Route

Fully Accessible (Group 2A Unit)

Group 1 Unit

Residential Amenity

Circulation/Egress

Service/Garage

0 10' 20' 50'

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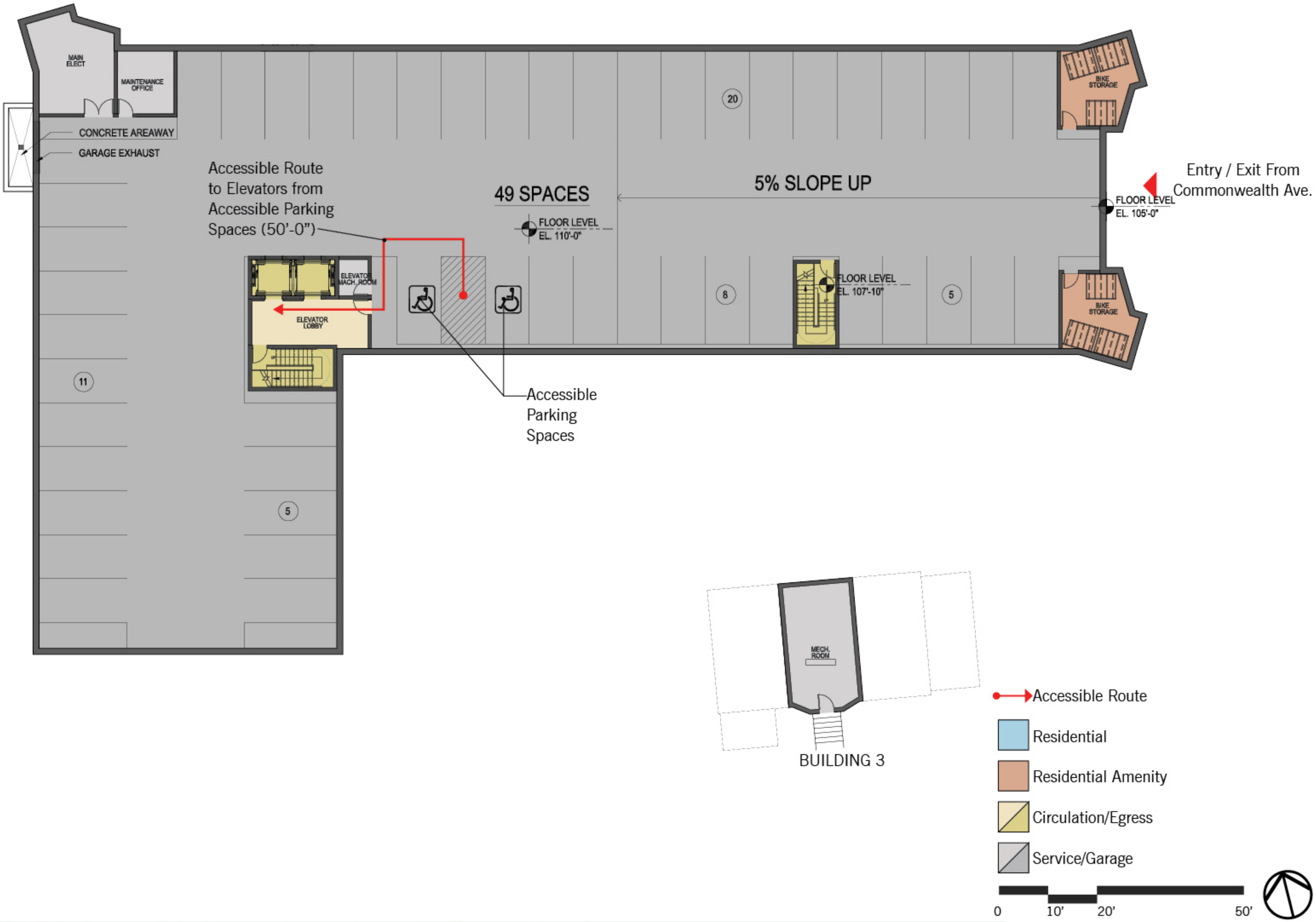
Accessible Route & Units
Typical Floor Plan (Levels 3-6)



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Basement Floor Plan

Main Entry Accessible Route

0 6' 12' 24' 48'

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LANDSCAPE ARCHITECT:
A. T. LEONARD & ASSOCIATES
SHAPING LANDSCAPES FOR LIVING AND LEARNING

Accessible Route & Units
Site Plan