The Merano

Project Notification Form

June 27, 2008

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

Submitted by:
Boston Development Group
93 Union Street, Suite 315
Newton Centre, MA 02459

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

In Association with:
CBT Architects, Inc.
Howard/Stein-Hudson Associates, Inc.
Goulston & Storrs
Bryant Associates, Inc.
McPhail Associates, Inc
RW Sullivan Engineering

Epsilon
ASSOCIATES INC.

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Chapter 1.0

General Information and Project Description

1.0 GENERAL INFORMATION AND PROJECT DESCRIPTION

1.1 Project Summary

Located in Boston's historic Bulfinch Triangle, the Merano Project (the Project) proposed by Boston Development Group, a division of First General Realty Corporation (the Proponent) is an approximately 444,000 square foot (sf) mixed-use development that includes approximately 152,000 sf of hotel uses split between a short-term and a long-term hotel, approximately 213,000 sf of office space, approximately 19,000 sf of retail space on the ground floor, approximately 17,000 sf of restaurant space on the ground floor, and approximately 113 double stacked spaces (226 total spaces) in a parking garage on the second floor. The Project site includes the Massachusetts Turnpike Authority's (MTA) Parcel 1B and two parcels that are or will be owned by affiliates of the Proponent, referred to herein as Parcel 1C and the Limone Parcel, and is bounded by Causeway Street, Beverly Street, Valenti Way, North Washington Street, and buildings along Medford Street, including 239 Causeway Street and 98 North Washington Street. Figure 1-1 shows a perspective of the Project, Figure 1-2 shows the location of the Project site, and Figure 1-3 shows the site plan.

The removal of the elevated Central Artery and Green Line structures allows the reconnection of the North End to other neighborhoods of Boston, transforming the area from the shadowed streets created by the old Central Artery, to a more aesthetically pleasing pedestrian and mixed-use environment. The redevelopment of Parcel 1B will reinforce the ongoing revitalization of the Bulfinch Triangle by infusing the area with street level retail and restaurant uses, and bringing new visitors to the area through the short-term and long-term hotels. The design defines continuous streetwall edges along Causeway Street, Beverly Street and Valenti Way, bringing continuity to the Downtown North and Bulfinch Triangle neighborhoods, and bridging the gap left by the former Central Artery between the North End, the West End, and Beacon Hill neighborhoods. The Project's massing and design will help tie the neighborhoods together by respecting the fabric of the neighborhood which existed before the construction of the Central Artery.

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cbt

Figure 1-1

Perspective of the Project from the Corner of Causeway Street and Beverly Street

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Figure 1-2
Aerial Locus Map

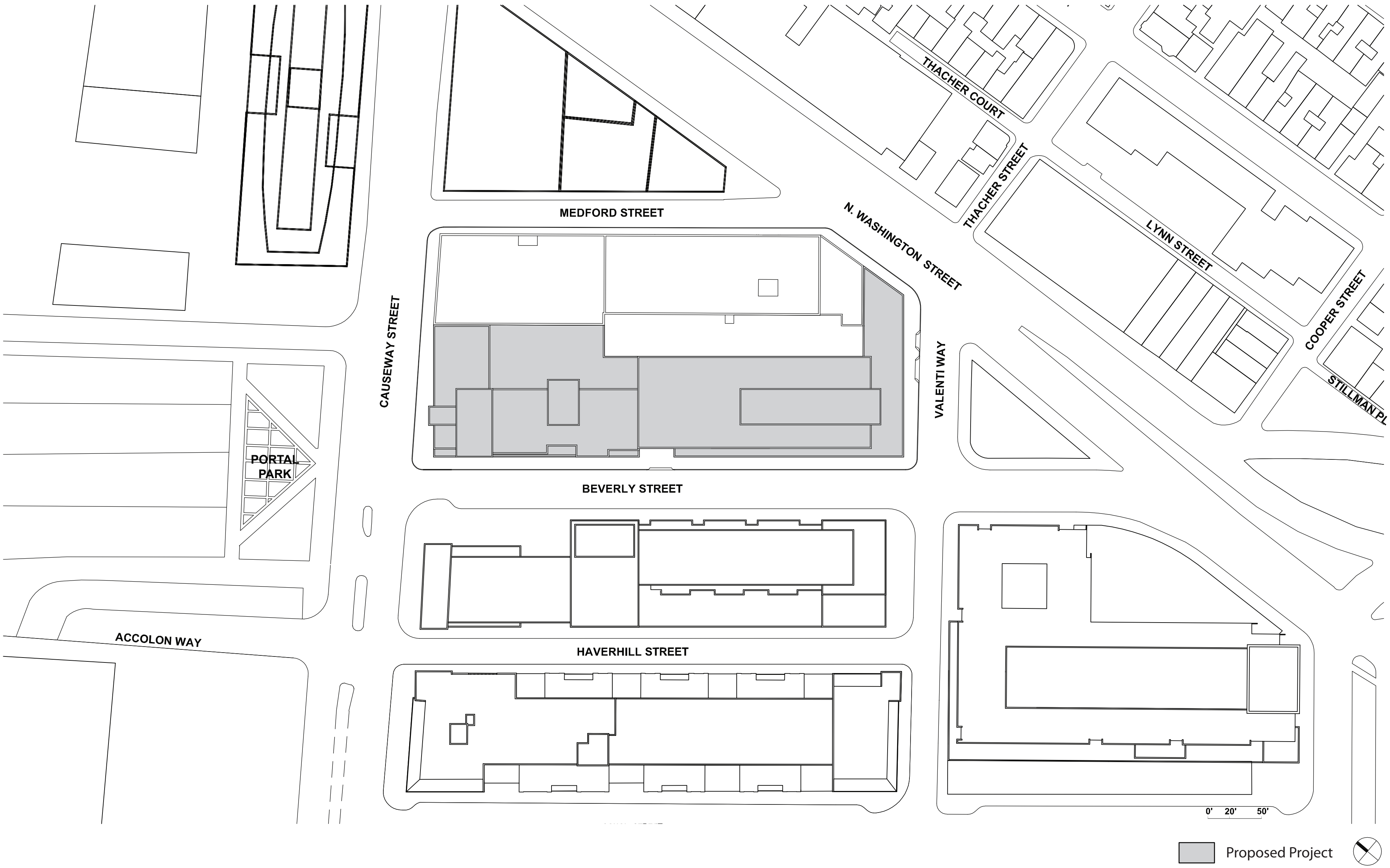

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Figure 1-3

Site Plan

1.2 Development Team

Project Name:	The Merano
Address/Location:	Massachusetts Turnpike Authority Parcel 1B, bounded by Causeway Street, Beverly Street, Valenti Way, North Washington Street and the buildings along Medford Street (239 Causeway Street and 98 North Washington Street)
Developer:	Boston Development Group A division of First General Realty Corp. 93 Union Street, Suite 315 Newton Centre, MA 02459 (617) 332-6400 David Zussman Richard Wakeman, Jr.
Architect:	CBT Architects, Inc. 110 Canal Street Boston, MA 02114 (617) 262-4354 Chris Coios Chris Semmelink
Permitting Consultant:	Epsilon Associates, Inc. 3 Clock Tower Place, Suite 250 Maynard, MA 01754 (978) 897-7100 Cindy Schlessinger Laura Rome Geoff Starsiak
Transportation and Parking Consultant:	Howard/Stein-Hudson Associates, Inc. 38 Chauncy Street, 9th floor Boston, MA 02111 (617) 482-7080 Keri Pyke
Legal Counsel:	Goulston & Storrs 400 Atlantic Avenue Boston, MA 02110 (617) 482-1776 Matthew Kiefer Peter Kochansky
Civil Engineer:	Bryant Associates, Inc. 98 North Washington Street, Suite B1 Boston, MA 02114 (617) 248-0300 John Cusack

Geotechnical Engineer:	McPhail Associates, Inc. 2269 Massachusetts Avenue Cambridge, MA 02140 (617) 868-1420 Jonathan Patch
MEP Engineer	RW Sullivan Engineering The Schrafft Center 529 Main Street, Suite 203 Boston, MA 02129 (617) 523-8227 Quy Vu

1.3 Development Opportunity

1.3.1 Area Background

For more than a decade, the Downtown North area, and the Bulfinch Triangle neighborhood in particular, has been the subject of a number of significant studies. Driven by the opportunities resulting from the Central Artery/Tunnel (CA/T) project, these studies have resulted in a substantial amount of knowledge regarding the area, its history and its character. Additionally, these studies have resulted in an overall planning framework for informing and guiding the area's future urban design and development. Documents such as the North Area Planning Initiative and the Bulfinch Triangle Design and Development Guidelines have articulated a comprehensive vision to shape the area's future urban environment.

The Project has been designed to uphold the principles that define the Bulfinch Triangle Design and Development Guidelines. These guidelines were created from hundreds of hours of work by the City and the community, and honor not only the history of the neighborhood but also its future.

1.3.2 Development Site

The Project site, made available for development through the demolition of the elevated I-93 highway structures, is approximately 54,900 sf in total, and consists of the MTA's Parcel 1B and two parcels that are or will be owned by affiliates of the Proponent, Parcel 1C and the Limone Parcel. Located in the Bulfinch Triangle area, the Project adds to the mix of uses currently being considered or developed in the area, reconnecting the North End to the West End. In addition, the site is located proximate to public transportation facilities at North Station and Haymarket Station and is accessible to the regional roadway network.

1.4 Project Description

1.4.1 Building Program and Project Elements

The Project is a mixed-used development totaling approximately 444,000 sf, including an approximately 153 key, 79,000 sf hotel, an approximately 121 key, 73,000 sf extended stay hotel, approximately 213,000 sf of commercial office space, and approximately 36,000 sf of restaurant and retail uses on the ground floor. One level of above grade parking with approximately 226 valet service parking spaces will be included. The Project also incorporates approximately 7,500 sf of loading, vehicle access, mechanical and storage space. Figures showing the floor plans, elevations, sections, and perspectives of the Project can be found in Appendix A.

Table 1-1 shows the dimensions of the Project.

Table 1-1 Approximate Project Dimensions

Project Element	Dimension
Project Site	54,900 sf*
Short-term stay hotel	153 rooms / 79,000 sf
Long-term stay hotel	121 rooms / 73,000 sf
Office	213,000 sf
Retail	19,000 sf
Restaurant	17,000 sf
Parking	226 spaces / 43,000 sf
Floor Area Ratio	8.37**
Building Heights (measured according to Boston Zoning Code)	149 feet

*Including the site dimensions of 239 Causeway Street and 98 North Washington Street which are owned by the Proponent, the area is approximately 86,000 sf.

** The FAR for the Project alone will be approximately 8.37. The FAR for the Project site and the land and buildings adjacent to the Project and owned by the Proponent, will be approximately 6.63.

1.4.2 Proposed Uses

1.4.2.1 Hotel

Given the entertainment and sports venue at the nearby TD Banknorth Garden, there is a need for hotel space in the neighborhood to accommodate out of town visitors and fans attending events at the Garden. Although there are several other high-end boutique style hotels in the vicinity, the Project proposes two larger, moderately priced hotels, both shorter-term and extended stay hotels, which the Proponent expects will be operated by a single hotel provider, a Courtyard by Marriott and an extended stay Towneplace Suites by Marriott. The hospitality uses proposed as part of the Project will activate the area and complement the retail and restaurant uses within both the Project and the neighborhood.

1.4.2.2 Office

The Project will leverage its proximity to multiple public transportation options through the development of office space. The Project incorporates 213,000 sf of space to be constructed as commercial office space along Valenti Way and the southeastern portion of the Project site.

1.4.2.3 Retail and Restaurant

It is anticipated that the retail and restaurant component of the Project will comprise approximately 36,000 sf. Potential uses include two restaurants on the corner of Causeway and Beverly streets and smaller retail establishments along the remainder of Beverly Street and Valenti Way. By locating these uses along the ground floor and complementing existing and planned retail and restaurant uses across Beverly and North Washington streets, the proposed Project will encourage pedestrian activity in this area of the Bulfinch Triangle, reconnecting pedestrian links from the Bulfinch Triangle Historic District, across the new Greenway and into the Causeway/North Washington Streets District.. The retail and restaurant uses are being targeted to provide activity throughout the day and evening.

1.4.2.4 Parking

The Project will have one level of above grade parking for approximately 226 parked cars, facilitated by a duplex stack/lift system. The garage will have valet service solely for strictly controlled use by both hotel guests and office tenants and visitors. The parking counts are significantly less than a typical project of this size and type in Boston because of the site's proximity to multiple modes of public transportation.

1.4.3 Access and Loading

1.4.3.1 Pedestrian Access

The project will have a positive impact on the pedestrian environment by adding street level pedestrian and retail uses and defining continuous streetwall edges along Causeway Street, Beverly Street and Valenti Way. Pedestrian access to the hotels will be from Beverly Street approximately mid-block, off of a *porte cochere*. The office space will be accessed from further south along Beverly Street. The restaurants and retail spaces are located off Causeway Street, Beverly Street, Valenti Way, and North Washington Street and will activate the pedestrian environment by providing a number of doorway openings and street-level glazing.

1.4.3.2 Passenger Vehicle Access

Passenger vehicles will access the garage from a private drive internal to the site entering off of Beverly Street. The garage will be serviced by a valet system. A *porte cochere* is located at the entrance to the driveway. The two-way garage ramp is located off of the driveway past the *porte cochere*. The driveway also will be accessible to taxis and airport shuttles. The internal drive also connects to Valenti Way.

1.4.3.3 Loading/Emergency Vehicle Access

The loading docks and service entrances to the buildings are located off of the private drive, and are thus shielded from the public. Primary vehicular access to the site is off of Beverly Street, and egress is onto Valenti Way. Emergency vehicles will use the same drive. Both the Beverly Street and Valenti Way access points to the private drive are covered and will provide appropriate clearances for trucks.

1.4.4 Design Concept

Fronting on Causeway and Beverly streets and Valenti Way, the new building will offer an active streetscape with multiple pedestrian entry points and glassy retail storefronts to complement the busy North Station area.

The design of the new building centers on simple volumes for the office and hotel elements, which are broken down in scale through the modulation of façade depth and varying materials of brick, stone, glass and precast concrete. The building fills out the site to the sidewalks, holding the street edge and aligning with adjacent parcels to provide definition to the newly created Beverly Street and Valenti Way.

The scale of the building is highest along Causeway Street where the building, along with its neighbor, Central Artery Parcel 1A, forms a gateway to the city from the north and fronts on Portal Park and the Leonard P. Zakim Bridge. Along Beverly Street, the building sets back above the eighth floor and is reduced in height to be in scale with adjacent blocks and buildings.

The hotel lobbies are envisioned on the third floor, keeping the maximum ground floor footprint available for restaurant and retail uses.

1.4.5 Project Alternatives / Evolution of Design

Originally the Proponent envisioned a mixed-use development with hotel, office, residential, retail and parking uses constructed on Parcel 1B and Parcel 1C, and on the adjacent buildings owned by the Proponent (239 Causeway Street and 98 North Washington Street). Due to market conditions and financing constraints, the program was changed to incorporate hotel, office, retail and parking, eliminating the residential component. To preserve the sight lines of residents at Strada 234, the program was changed further by eliminating the proposed construction above the existing buildings at 239 Causeway and 98 North Washington streets. The Project has been designed with a vehicular drop off from Beverly Street and vehicular access and egress from both Beverly Street and Valenti Way, thus keeping loading functions and parking within the site.

1.5 Preliminary Project Schedule

It is anticipated that site work will begin in fall 2008, and construction will take approximately 24 months, starting in the first quarter of 2009.

The City of Boston allows construction work from 7:00 a.m. to 6:00 p.m. Monday through Friday. Construction outside of those hours requires a permit. Typical construction hours for the Project will comply with the City's regulations, with no work anticipated on the weekends. In the event that weekend work is necessary, the Proponent will obtain required City approvals.

1.6 Public Benefits

The Project will continue the ongoing redevelopment of the Bulfinch Triangle. The Project site will be transformed from a vacant parcel into a modern mixed-use development with active ground floor uses, and a new aesthetically pleasing pedestrian environment. Additional benefits to the City are described below.

Smart Growth/Transit-Oriented Development

Consistent with smart growth principles, the Project focuses development in an area that was previously developed (i.e. the elevated I-93 and Green Line). In addition, the Project is located proximate to public transportation – the Green, Orange Line and commuter rail at North Station and bus service at Haymarket and on Causeway Street -- and has a mix of complementary uses, including office, hotel, and retail.

The Proponent is committed to implementing a Transportation Demand Management (TDM) program that supports the City's efforts to reduce dependence on the automobile by encouraging travelers to use alternatives to driving alone, especially during peak time periods, and by reducing parking supply. Proposed TDM measures include limiting parking, designating a transportation coordinator, and providing bicycle racks. Additional TDM measures are described in Section 2.3.4.

Design

The site will be developed from a vacant lot to an active mixed-use development with retail and restaurant uses on the ground level and two hotel elements (one extended stay and the other over night). The design of the new building centers on simple volumes for the office and hotel elements of the program, which are broken down in scale through the modulation of façade depth and varying materials of brick, stone, glass and precast concrete. The building fills out the site to the sidewalks, holding the street edge and aligning with adjacent parcels to provide definition to the newly created Beverly Street and Valenti Way. The development will enhance pedestrian access around and through the site by providing wide sidewalks, and lighting. The building will be designed to be LEED certifiable, consistent with the requirements of Article 37 of the Boston Zoning Code. The development of this vacant site with hotel, office and retail uses will promote public safety, encourage walking and transit usage and improve safety and the pedestrian environment.

Improved Street and Pedestrian Environment

New ground-level retail and an improved streetscape, consistent with other developments in the area, will provide an improved pedestrian environment in the Bulfinch Triangle area for residents and visitors. The Project's development of a continuous streetwall along Causeway Street, Beverly Street and Valenti Way will further the ongoing creation of a new pedestrian district on the Bulfinch Triangle parcels. In addition, the Proponent has committed donate $12,000 toward the Bulfinch Triangle Streetscape Improvement Initiative.

Bulfinch Triangle Traffic Study

The Proponent will provide $50,000 toward the Bulfinch Triangle traffic study intended to improve traffic in the area and mitigate future traffic impacts. The study will be directed by the Boston Transportation Department (BTD) and will likely involve other Bulfinch Triangle developers.

Boston Crossroads Initiative

The Proponent will assist in the implementation of the Boston Crossroads Initiative, a planning effort to redesign and revitalize the roads that cross the Rose Fitzgerald Kennedy Greenway and connect people to neighborhoods and destinations on either side. In particular, the Proponent is engaged in the ongoing public planning process for Causeway Street, which will create a more pedestrian-oriented corridor, strengthening the connection between the West End and the North End, and will donate $300,000 to the Initiative or perform Crossroads-approved work adjacent to the Project site.

Sustainable Design/ Green Building

In keeping with the City of Boston's Article 37 Green Buildings Zoning, the Project will achieve, at a minimum, the LEED certified level of 26-32 points. More information on sustainable design can be found in Section 3.12.

Increased Employment

The Project will create approximately 200 to 240 construction jobs and will house approximately 275 permanent jobs. The permanent jobs will result from the proposed office, retail, and hotel components.

New Property Tax and Hotel Tax Revenues

The new development will generate approximately $2,000,000 in annual property taxes, approximately $1,900,000 in annual state and local occupancy tax revenues, and approximately $500,000 in Convention Center tax revenues.

Linkage

The Project will generate approximately $1,800,000 in housing linkage funds and approximately $360,000 in jobs linkage funds to the City of Boston.

1.7 Legal Information

1.7.1 Legal Judgments Adverse to the Proposed Project

A portion of the Project site, described in Section 1.7.4 as Parcel 1C, is the subject of two related lawsuits brought by an affiliate of the Proponent, which owns the parcel, against the Commonwealth of Massachusetts. The actions challenge the sufficiency of awards paid by MHD for takings of easements used by the Massachusetts Highway Department (MHD) during the construction of the Central Artery project. The Proponent is in negotiations with MHD and the MTA to resolve the dispute.

1.7.2 History of Tax Arrears on Property Owned in Boston by the Proponent

The Proponent is not in tax arrears on any property owned within the City of Boston.

1.7.3 Site Control

The Project site consists of three separate parcels that will be owned by affiliates of the Proponent at the time of commencement of construction. One portion of the site, sometimes called Parcel 1C, is an approximately 17,460 sf parcel, currently vacant, owned by the Proponent's affiliate, Beverly-Boston Limited Partnership, by Deed recorded in the Suffolk County Registry of Deeds at Book 21536, Page 32. First General Realty Corp., another affiliate of the Proponent, has entered into an agreement to purchase a second portion of the Project site, an approximately 2,179 sf parcel at the corner of North Washington Street and Valenti Way.

The largest portion of the Project site is an approximately 34,900 sf parcel (Parcel 1B) acquired by the Massachusetts Turnpike Authority (MTA) by Confirmatory Deed from MHD dated December 19, 2007 and recorded at Book 42937, Page 147. After a public procurement process, the MTA selected the Proponent as the Developer of Parcel 1B, and the MTA and the Proponent entered into a Development Agreement for the site, which requires the parties to negotiate a ground lease for Parcel 1B. The parties are currently negotiating the terms of the ground lease.

The Project site includes several easements in favor of MHD relating to the Central Artery project tunnel facilities located within the Project site. The Proponent is working with the MTA to confirm that those easements will not interfere with the construction of the Project.

1.7.4 Legal Description - Site Limits

Being a certain parcel of land in the City of Boston, County of Suffolk in the Commonwealth of Massachusetts, more particularly bounded and described as follows:

Beginning at the intersection of the northwesterly sideline of Anthony "Rip" Valenti Way and the northeasterly sideline of Beverly Street; thence running by said sideline of Beverly Street approximately,

N 40°10'50" W, a distance of approximately 446.91 feet to a point on the southeasterly sideline of Causeway Street; thence turning and running along said sideline,

N 53°56'54" E, a distance of approximately 123.78 feet to a point at land now or formerly of Boston Limited Partnership; thence turning and running by said land,

S 40°00'26" E, a distance of 160.09 feet to a point at land now or formerly of 98 North Washington Street, LLC; thence turning and running by said land,

S 50°05'54" W, a distance of 10.36 feet to a point; thence turning and running by said land,

S 40°00'26" E, a distance of 119.46 feet to a point; thence turning and running by said land,

N 49°59'34" E, a distance of 10.43 feet to a point; thence turning and running by said land and land now or formerly of the North Washington Street Condominium and to land now or formerly of Peter and Olympia Limone,

S 40°00'26" E, a distance of 120.40 feet to a point at land now or formerly of said Limone; thence turning and running by land of said Limone,

N 50°12'33" E, a distance of 56.22 feet to a point on the westerly sideline of North Washington Street; thence turning and running by said North Washington Street, S 4°17'56" E, a distance of 49.04 feet to a point at the intersection of the westerly sideline of North Washington Street and the northwesterly sideline of Anthony “Rip” Valenti Way; thence turning and running by the sideline of said Anthony “Rip” Valenti Way,

S 50°4'53" W, a distance of 52.60 feet to a point; thence turning and running by said sideline,

S 48°51'59" W, a distance of 13.80 feet to a point; thence turning and running by said sideline approximately,

S 51°13'14" W, a distance of approximately 83.43 feet to the point of beginning.

Said parcel has an approximate area of 54,900 square feet.

1.8 Regulatory Controls and Permits

Table 1-2 is a list of federal, state and local agencies from which permits or other actions may be required.

Table 1-2 Anticipated Permits, Reviews and Approvals

AGENCY	PERMIT
FEDERAL	
United States Environmental Protection Agency	National Pollution Discharge Elimination System National Environmental Policy Act (NEPA) Review (if required)
Federal Highway Administration	Approval of Non-Highway Use of Highway ROW Surplus approval Section 106 Review
State Historic Preservation Office (Massachusetts Historical Commission)	Section 106 Review
Federal Aviation Administration	Notice of Construction
STATE	
Executive Office of Environmental Affairs, Massachusetts Environmental Policy Act (MEPA) Office	MEPA Review
Executive Office of Transportation and Construction	Approvals under MGL Ch40 Section 54a (if required)
Massachusetts Historical Commission	State Register Review
Department of Environmental Protection Division of Water Pollution Control	Sewer Extension/Connection Permit
Department of Environmental Protection	Notification of Demolition and Construction
Massachusetts Water Resources Authority	Sewer Use Discharge Permit; Construction Dewatering Permit
Massachusetts Turnpike Authority	Execution of Lease Approval of Project Design

Table 1-2 Anticipated Permits, Reviews and Approvals (Continued)

AGENCY	PERMIT
CITY OF BOSTON	
Boston Redevelopment Authority	Article 80 Review
Boston Civic Design Commission	Design Approval
Boston Transportation Department	Construction Management Plan Transportation Access Plan Agreement
Boston Zoning Board of Appeal	Zoning Relief
Boston Landmarks Commission	Party to Section 106 Review; Article 85 Demolition Delay Review
Boston Parks and Recreation Commission	Approval of Demolition and Construction within 100 feet of park or parkway
City of Boston Air Pollution Control Commission	Parking Freeze Permit Exemption
Boston Public Safety Commission, Committee on Licenses	Permit to Erect and Maintain Parking Garage Flammable Storage License
Boston Public Improvement Commission	Sidewalk and Street Related Permitting
Boston Water and Sewer Commission	Site Plan Approval Utility Connection Permits
City of Boston Public Works Department	Curb Cut Permits (minor/driveways) Street Occupancy Permits (construction)
Boston Fire Department	Approvals for fire protection systems
Boston Inspectional Services Department	Building Permit, Occupancy Permits

1.9 Zoning

Based on the Boston Zoning Code's (the Code) maps, Parcel 1B is located within both (1) Parcel 1 of the Central Artery Special District governed by Article 49 of the Code; and (2) the Bulfinch Triangle/Central Artery Area of the Bulfinch Triangle District governed by Article 46 of the Code, while Parcel 1C and the Limone Parcel appear to be located only with the General Area (not the Bulfinch Triangle/Central Artery Area) of the Bulfinch Triangle District. The Proponent will seek confirmation from the Inspectional Services Department and the Boston Zoning Commission as to the precise zoning boundaries.

The Project site is within the Restricted Parking Overlay District and the Groundwater Conservation Overlay District.

Section 49-5 of the Code states that parcels within Parcel 1 of the Central Artery Special District "shall also be deemed part of" the Bulfinch Triangle District governed by Article 46, although Article 46-5 states that certain provisions of Article 46 do not apply to the Bulfinch Triangle/Central Artery Area. Both Articles of the Code thus apply to the Project site. Section 46-5 of the Code provides that for properties within the both the Central Artery Special District and the Bulfinch Triangle/Central Artery Area of the Bulfinch Triangle

Special District, the use, dimensional, and certain other requirements of Article 49 supersede the requirements of Article 46.

In the Central Artery Special District, office and local retail and services uses are allowed. Hotel use is not addressed, so the Proponent assumes that zoning relief is required for hotel use and for uses accessory to the hotel, such as the pool and health club. Parking is listed as a conditional use, and will require zoning relief. In the Bulfinch Triangle District, office, retail, and hotel uses are all allowed. Parking accessory to hotel uses is allowed, but parking accessory to office use is conditional and will require zoning relief.

The maximum building height on Parcel 1 of the Central Artery Special District is 100 feet, and the maximum floor area ratio (FAR) is 8.0. In the Bulfinch Triangle District, the maximum building height for projects that undergo Large Project Review is also 100 feet, and the maximum FAR is 8.0 for projects that undergo Large Project Review and include only the types of uses that the Project will include. Portions of the proposed building will be in excess of 100 feet, and will require zoning relief. The FAR of the Project will be approximately 8.37, although the combined FAR of the Project site and the adjacent properties owned by affiliates of the Proponent is approximately 6.63.

Article 49 and Article 46 of the Code provide that on Parcel 1 in the Central Artery Special District, and in the Bulfinch Triangle District, buildings taller than 80 feet along Causeway Street must be set back a minimum of 25 feet above a height of 65 feet. For the portions of the building outside of Parcel 1, Section 46-8.2(b) requires that buildings on other streets be built coextensive with the street wall of the block. The Proponent expects to seek zoning relief from the setback requirement.

The Project site is within the Groundwater Conservation Overlay District, and will need to achieve consistency with the requirements of Article 32 by ensuring that the Project will have no negative impact on groundwater at the Project site or adjacent sites.

Both Article 49 and Article 46 supersede the minimum off-street parking regulations of Article 23; neither mandates specific minimum parking requirements.

Article 49 supersedes the off-street loading requirements of Article 24, but does not contain specific off-street loading requirements. Article 46 states that the sufficiency of off-street loading facilities for projects subject to Large Project Review shall be determined through such review.

Chapter 2.0

Transportation

2.0 TRANSPORTATION

2.1 Introduction

The Project will be located within the Bulfinch Triangle in the North Station area of Boston (see Figure 2-1). The Project site is bounded by Causeway Street to the north, Valenti Way to the south, an alley and several mid-rise office buildings fronting Medford Street to the east, and Beverly Street to the west.

The site currently contains a surface parking lot at the corner of North Washington Street/Valenti Way; the remainder of the site is grass.

The Project will include:

- Approximately 213,000 square feet of office space;
- Approximately 19,000 square feet of ground floor retail;
- Approximately 17,000 sf of restaurant space;
- Approximately 274 hotel rooms; and
- Up to 226 above-ground garage parking spaces.

Internal vehicular site access to the parking garage will be via a *porte cochère* connecting Beverly Street and Valenti Way.

The ground floor will be occupied by the *porte cochère*, ground floor retail, lobby areas for the hotel and office uses, and two loading and service areas off the private drive from Valenti Way. Up to 226 stacked parking spaces will be located above the ground floor. Parking is proposed for both the hotel and office uses. The remaining floors will be occupied by hotel and office space.

Under Build Conditions, all intersections and approaches operate at the same LOS as under No-Build Conditions during peak hours, with the exception of North Washington Street/Cross Street/Cooper Street during the a.m. peak hour, which worsens from overall LOS B to overall LOS C. This would still be an acceptable LOS during peak hours for this area.

2.1.1 Purpose, Scope, and Methodology of the Transportation Analysis

The study team conducted this transportation study and supporting analysis in accordance with Boston Transportation Department and Massachusetts Environmental Policy Act guidelines. Although BTD has not yet issued a formal Transportation Access Plan Scope, the Proponent developed the following scope of work in conjunction with BTD staff:

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Not to Scale

Figure 2-1
Locus Map

- Definition and presentation of existing transportation conditions in the study area, including traffic operations, roadway capacities, parking, public transit, pedestrian circulation, bicycle accommodations, loading, and site conditions;

- Evaluation of the Project's future, long-term impacts on traffic, public transit, pedestrian, bicycle, and parking conditions. This section evaluates future transportation conditions and assesses potential transportation impacts associated with the development and other neighboring projects. The analysis evaluates long-term impacts for the year 2013, based on a five-year horizon from the existing year, and identifies expected roadway, parking, transit, pedestrian, and loading capacities and deficiencies. It includes the following scenarios:

  - The No-Build Scenario (2013), based on projections and identification of other proposed or planned developments and roadway changes in the vicinity of the site.

  - The Build Scenario (2013), including specific travel demand forecasts for the Project.

- Identification of appropriate measures to mitigate Project impacts identified in the above sections, including roadway geometric/traffic signal and surveillance improvements, pedestrian amenities, a transportation demand management program, participation in transportation management associations (TMAs), and long-term Project impact monitoring.

- Evaluation of the Project's short-term traffic impacts related to construction activity.

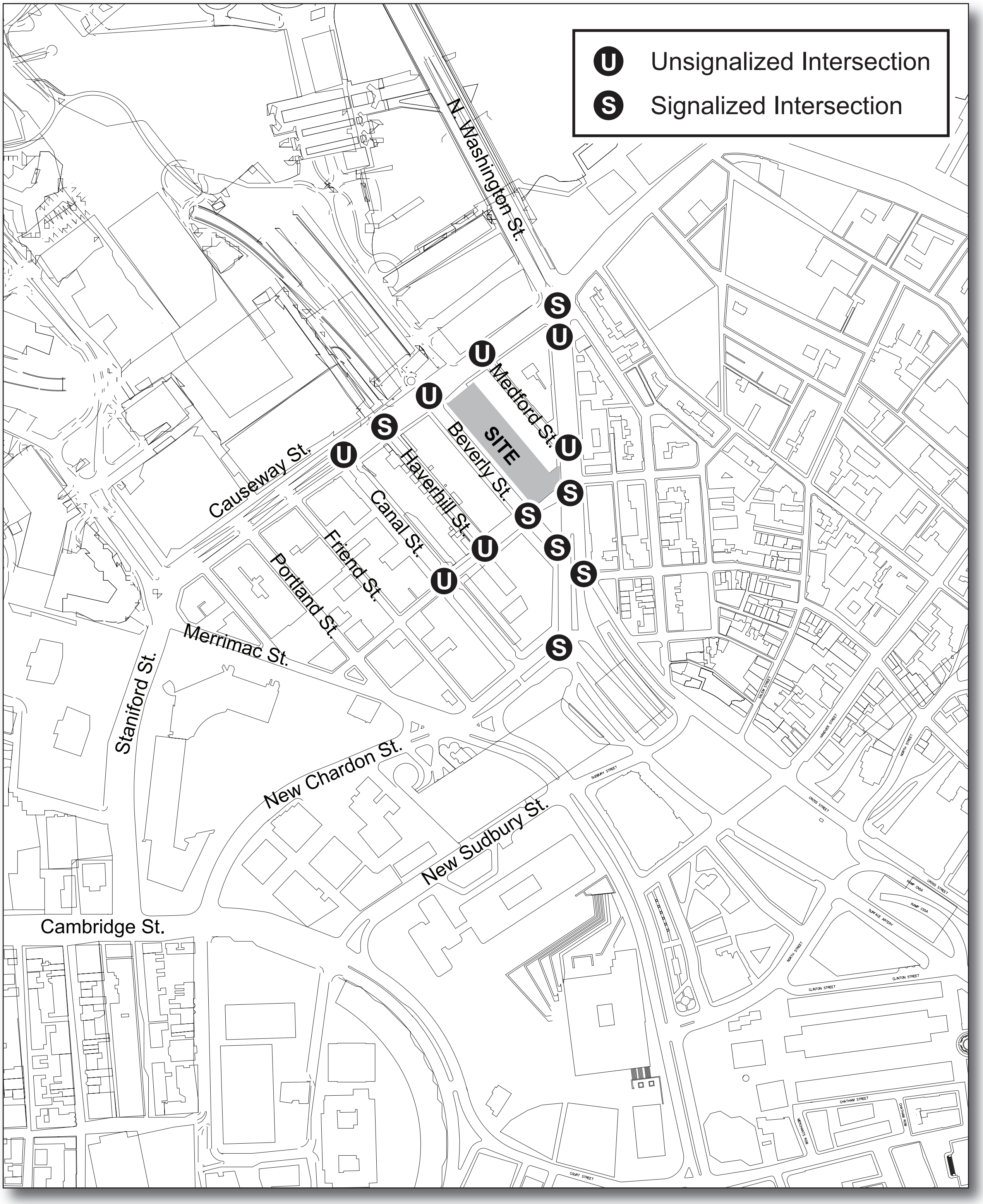
2.1.2 Study Area

As determined by BTD and the Project team, the study area is generally bounded by Canal Street to the west, Causeway Street to the north, North Washington Street to the east, and Valenti Way to the south. The study area infrastructure, including roadways, sidewalks, and intersections, is undergoing a significant transformation with the final work on the Central Artery/Tunnel (CA/T) project. Several roadways in the study area are not yet open to traffic, while others will have traffic circulation changes. For this reason, the study team analyzed 14 study area intersections for this Project — some under current conditions and all under future conditions. As shown in Figure 2-2, the intersections analyzed, by condition, include:

- North Washington Street/Causeway Street (Keany Square) (all conditions);

- North Washington Street/Valenti Way/Thacher Street (all conditions);

- North Washington Street/Beverly Street (all conditions);



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HOWARD/STEIN-HUDSON ASSOCIATES

Figure 2-2
Study Area Intersections

- North Washington Street/Cross Street/Cooper Street/Sumner Tunnel Off-ramp (all conditions);
- New Chardon Street/Surface Artery/I-93 Southbound and Callahan Tunnel On-ramp and Sumner Tunnel Off-ramp (all conditions);
- Causeway Street/Haverhill Street/Legends Way (all conditions);
- North Washington Street/Endicott Street (all conditions);
- North Washington Street/Medford Street (all conditions);
- Causeway Street/Canal Street (all conditions);
- Causeway Street/Medford Street (all conditions);
- Canal Street/Valenti Way (all conditions);
- Valenti Way/Beverly Street (No-Build and Build);
- Causeway Street/Beverly Street (No-Build and Build); and
- Valenti Way/Haverhill Street (No-Build and Build).

2.2 Existing Transportation Conditions

This section describes existing study area roadway geometry, intersection traffic control, peak-hour vehicular and pedestrian volumes, transit availability, parking supply, and loading conditions. Several roadways in the Bulfinch Triangle that serve the Project, including Beverly Street, Haverhill Street, and portions of Valenti Way, are not yet open to traffic. Other streets have planned traffic circulation changes.

The study area roadways and intersections examined under Existing, No-Build, and Build Conditions are described below. New roadways and intersections, or those with circulation changes as a result of final CA/T improvements in the area, are described in the section on No-Build Conditions.

2.2.1 Existing Roadway Conditions

The study area includes the following roadways, which are categorized according to the Massachusetts Executive Office of Transportation Office of Transportation Planning (EOT-OTP) functional classifications:

North Washington Street, an urban principal arterial, runs north–south from the Cooper Street/Cross Street/Sumner Tunnel ramps to Charlestown. In the study area, North Washington Street is two-way, with two travel lanes in each direction. Parking is not allowed between the ramps and Cooper Street, but is allowed on both sides from Thacher Street/Valenti Way north to Causeway Street.

Causeway Street, an urban minor arterial, runs east–west from Merrimac Street to Prince Street. West of the intersection with Canal Street, Causeway Street has two travel lanes in each direction and a 10-foot raised median. East of Canal Street, Causeway Street has three travel lanes in each direction. Taxi stands are located on the north and south sides of Causeway Street west of Canal Street. Parking is not allowed east of Canal Street, though shuttle bus stops are located on both sides of the roadway.

Valenti Way, a local street, runs east–west from Merrimac Street to North Washington Street, but the segment between Canal Street and Beverly Street is not open to traffic. West of Canal Street, Valenti Way is one-way eastbound, with one travel lane and parking on the north side. Between North Washington Street and Beverly Street, Valenti Way is one-way westbound with three travel lanes, with no parking allowed along the roadway.

Thacher Street, a local street, runs eastbound from North Washington Street to Prince Street in the North End. In the study area, Thacher Street is one-way eastbound, with one travel lane. Parking is provided on both sides of the street.

Beverly Street, a local street, runs one-way southbound from Causeway Street to North Washington Street. Similar to Haverhill Street, Beverly Street is fully constructed but is currently closed to vehicular traffic between Causeway Street and Valenti Way. Parking is not allowed along Beverly Street.

Cross Street, an urban principal arterial, runs north–south from Atlantic Avenue to North Washington Street. Cross Street provides direct access from I-93 northbound to the study area. Within the study area, Cross Street has two northbound travel lanes and a sidewalk on the east side, with no parking allowed along the roadway.

Cooper Street, a local street, runs westbound from Salem Street in the North End and ends at Cross Street. In the study area, Cooper Street is one-way westbound, with one travel lane. Parking is provided on both sides of the street.

New Chardon Street, an urban principal arterial, runs east–west from Cambridge Street to North Washington Street. New Chardon Street westbound consists of three travel lanes; New Chardon Street eastbound consists of two travel lanes. No parking is allowed on either side of the roadway.

The ***Surface Artery***, an urban principal arterial, runs one-way southbound as a continuation of North Washington Street from New Chardon Street to Kneeland Street. Within the study area, the Surface Artery consists of two travel lanes, with some parking allowed on the west side of the roadway.

Haverhill Street, a local street, runs one-way northbound from Valenti Way to Causeway Street. The roadway is completely constructed but remains closed to vehicular traffic. Parking is prohibited on Haverhill Street.

Legends Way, a private way, serves as an access and service driveway to the rear of the TD Banknorth Garden.

Endicott Street, a local street, is one-way northbound between Cross Street and North Washington Street. Parking is allowed on both sides of this one-lane roadway.

Medford Street, a local street, runs one-way northbound from North Washington Street to Causeway Street. Medford Street has one travel lane; parking is allowed on both sides of the roadway.

Canal Street, an urban minor arterial, runs north–south between Causeway Street and New Chardon Street. It has one travel lane in each direction, with metered parking on both sides of the street.

2.2.2 Existing Intersection Conditions

The following descriptions of the study area intersections include geometry, pedestrian facilities, and intersection traffic control. The intersections analyzed under Existing Conditions were selected in coordination with BTD.

2.2.2.1 Signalized Intersections

North Washington Street/Causeway Street (Keany Square). This four-way intersection is signalized. The North Washington Street northbound approach consists of a 10-foot, shared left-turn/through lane and an 11-foot, shared through/right-turn lane. Left turns are not allowed during peak periods (7:00–10:00 a.m. and 3:30–6:30 p.m.). The North Washington Street southbound approach over the Charlestown Bridge consists of a 10-foot, exclusive left-turn lane; a 10-foot, exclusive through lane; a 10-foot, shared through/right-turn lane; and an 11-foot, exclusive right-turn lane. The Causeway Street eastbound approach comprises three travel lanes: an exclusive left-turn lane, a shared left-turn/through lane, and an exclusive right-turn lane. The Causeway Street westbound approach consists of a shared left-turn/through lane, an exclusive through lane, and a channelized right-turn lane. Crosswalks and handicapped ramps are provided across all approaches. Boston's Freedom Trail crosses Causeway Street at this intersection. Pedestrian phases are concurrent with vehicular movements.

North Washington Street/Valenti Way/Thacher Street is a four-way signalized intersection, with Valenti Way and Thacher Way operating one-way away from North Washington Street. The North Washington Street northbound approach comprises two travel lanes: one exclusive left-turn lane and one shared through/right-turn lane. The North Washington Street southbound approach has two lanes: one shared left-turn/through lane and one shared through/right-turn lane. Thacher Street is one-way eastbound, with one receiving lane. Valenti Way is one-way westbound and has three receiving lanes. Crosswalks and handicapped ramps are provided across Thacher Street, North Washington Street, and Valenti Way. Pedestrian phases are concurrent with vehicular movements.

North Washington Street/Beverly Street is a signalized T intersection with two approaches. The Beverly Street southeast-bound approach provides three right-turn travel lanes; the North Washington Street southbound approach provides three through travel lanes. Crosswalks and handicapped ramps are provided across both approaches. The pedestrian signal phases are concurrent with vehicular movements.

North Washington Street/Cross Street/Cooper Street/Sumner Tunnel Off-ramp is a signalized intersection with all approaches operating one-way onto North Washington Street. The Cooper Street westbound approach operates with one right-turn lane. Cross Street northbound operates with two through lanes. Vehicles exiting Sumner Tunnel travel northeast on the off-ramp and utilize two through lanes. North Washington Street comprises two receiving lanes for these roadways. Crosswalks and handicapped ramps are provided across Cross Street, Cooper Street, and the off-ramp. Pedestrian phases are concurrent with vehicular movements.

New Chardon Street/Surface Road/I-93 Southbound and Callahan Tunnel On-ramp and Sumner Tunnel Off-ramp is a signalized intersection with four legs but only three approaches. The westbound approach at this intersection accommodates vehicles exiting the Sumner Tunnel to the Surface Road or New Chardon Street, and comprises two 17- foot lanes. New Chardon Street eastbound consists of two through lanes to the on-ramp and a 50-foot long, right-turn storage lane for vehicles turning onto Surface Road southbound. Surface Road is one-way southbound at this intersection and comprises four travel lanes: two left-turn lanes, one through lane, and one shared through/right-turn lane. Left-turning vehicles use the on-ramp to access Logan International Airport or I-93 South, while vehicles traveling through continue on Surface Road, and vehicles turning right use New Chardon Street. Crosswalks are provided across New Chardon Street and North Washington Street; both provide handicapped ramps. Pedestrian phases are concurrent with vehicular movements.

Causeway Street/Haverhill Street/Legends Way is a signalized intersection currently operating as a T intersection. Haverhill Street is closed to vehicular traffic. The Causeway Street eastbound approach comprises an exclusive left-turn lane and three through lanes. The Causeway Street westbound approach comprises two general travel lanes. The Legends Way southbound approach consists of a driveway for TD Banknorth Garden, with negligible traffic. Crosswalks and handicapped ramps are provided for all approaches. Pedestrian phases are concurrent with vehicular movements.

2.2.2.2 Unsignalized Intersections

North Washington Street/Endicott Street is an unsignalized T intersection. Endicott Street is one-way westbound and intersects with North Washington Street, creating a fifth leg at the signalized intersection of Causeway Street/North Washington Street. Due to the low volumes and location, the westbound Endicott Street approach is stop-controlled. A crosswalk is provided across Endicott Street.

North Washington Street/Medford Street is an unsignalized T intersection, with Medford Street operating one-way northbound away from the intersection. The North Washington Street northbound approach has two travel lanes: a 10-foot, shared left-turn/through lane and a 12-foot, exclusive through lane. The North Washington Street southbound approach has a 10-foot, exclusive through lane and a 12-foot, shared through/right-turn lane. Parking lanes are provided on both sides of North Washington Street. A crosswalk and handicapped ramps are provided across Medford Street.

Causeway Street/Canal Street is an unsignalized, four-way intersection. Causeway Street runs east–west and is divided by a raised median with an opening at Canal Street. The Causeway Street eastbound approach consists of a 15-foot through lane and a 14-foot, shared through/right-turn lane. The Causeway Street westbound approach consists of three 11-foot travel lanes: a shared left-turn/through lane, a through lane, and a shared through/right-turn lane. The Canal Street northbound approach consists of an 11-foot, shared left-turn/through/right-turn travel lane controlled by a stop sign. A driveway to the TD Banknorth Garden parking lot is provided as the southbound approach to this unsignalized intersection. All approaches have sidewalks. Crosswalks are provided across Canal Street and both Causeway Street eastbound approaches.

Causeway Street/Medford Street is an unsignalized T intersection. The Causeway Street eastbound approach consists of three 10-foot through lanes. The Causeway Street westbound approach comprises two 13-foot through lanes. Medford Street is a one-way northbound street, with the northbound approach comprising a single, 11-foot, shared left-turn/ right-turn lane controlled by a stop sign. All approaches have sidewalks; a crosswalk is provided across Medford Street.

Canal Street/Valenti Way is an unsignalized, four-leg intersection. Valenti Way runs one-way eastbound and is controlled by a stop sign. The Valenti Way eastbound approach consists of a nine-foot, shared left-turn/through and a nine-foot, exclusive right-turn lane. The Canal Street northbound approach consists of an 11-foot, shared left-turn/through/ right-turn lane. The Canal Street southbound approach consists of a 12-foot, shared left-turn/through/right-turn lane. The westbound approach consists of an unmarked construction driveway with negligible traffic that is omitted from the analysis. Crosswalks and handicapped ramps are provided for all intersection approaches.

2.2.3 Existing Traffic Conditions

The study team conducted vehicular and pedestrian counts at the study area intersections between September 2006 and September 2007, with the exception of the intersections of Causeway Street/Canal Street and Canal Street/Valenti Way, which were counted in October 2005. In addition, in May 2007 the study team updated the pedestrian counts at the intersection of Causeway Street/Canal Street. Vehicle turning movements and pedestrian volumes were collected on weekdays from 7:00 to 9:00 a.m. and from 4:00 to 6:00 p.m. on days when no events were being held at TD Banknorth Garden. Based on the vehicle counts, the weekday a.m. and p.m. peak hours were identified as 8:00 to 9:00 a.m. and 4:45 to 5:45 p.m., respectively. Traffic volumes were balanced to account for data being collected in varying months. Figure 2-3 and Figure 2-4 show the existing a.m. and p.m. peak-hour turning volumes, respectively, for the study area intersections. Complete traffic count data are provided in Appendix B.

2.2.3.1 Existing Traffic Operations

Traffic operations are determined through an analysis of intersection Level of Service (LOS). The study team analyzed LOS and delay at the intersections using Synchro software developed by Trafficware. Synchro 6 was used to evaluate the effects closely spaced intersections may have on one another. This software is based on the traffic operational analysis methodology of the Transportation Research Board's 2000 *Highway Capacity Manual* (HCM); LOS and delay (in seconds) are determined based on intersection geometry and available traffic data for each intersection. Table 2-1, excerpted from the HCM, provides LOS criteria for signalized and unsignalized intersections. LOS A defines the most favorable condition, with minimum traffic delay. LOS F represents the worst condition (unacceptable), with significant traffic delay. LOS D is generally considered acceptable in an urban environment.

Table 2-1 Intersection Level of Service Criteria (HCM Excerpt)

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

The volume-to-capacity (v/c) ratio is a measure of congestion at an intersection approach. A v/c ratio of 1 or greater indicates that the intersection lane group exceeds capacity.

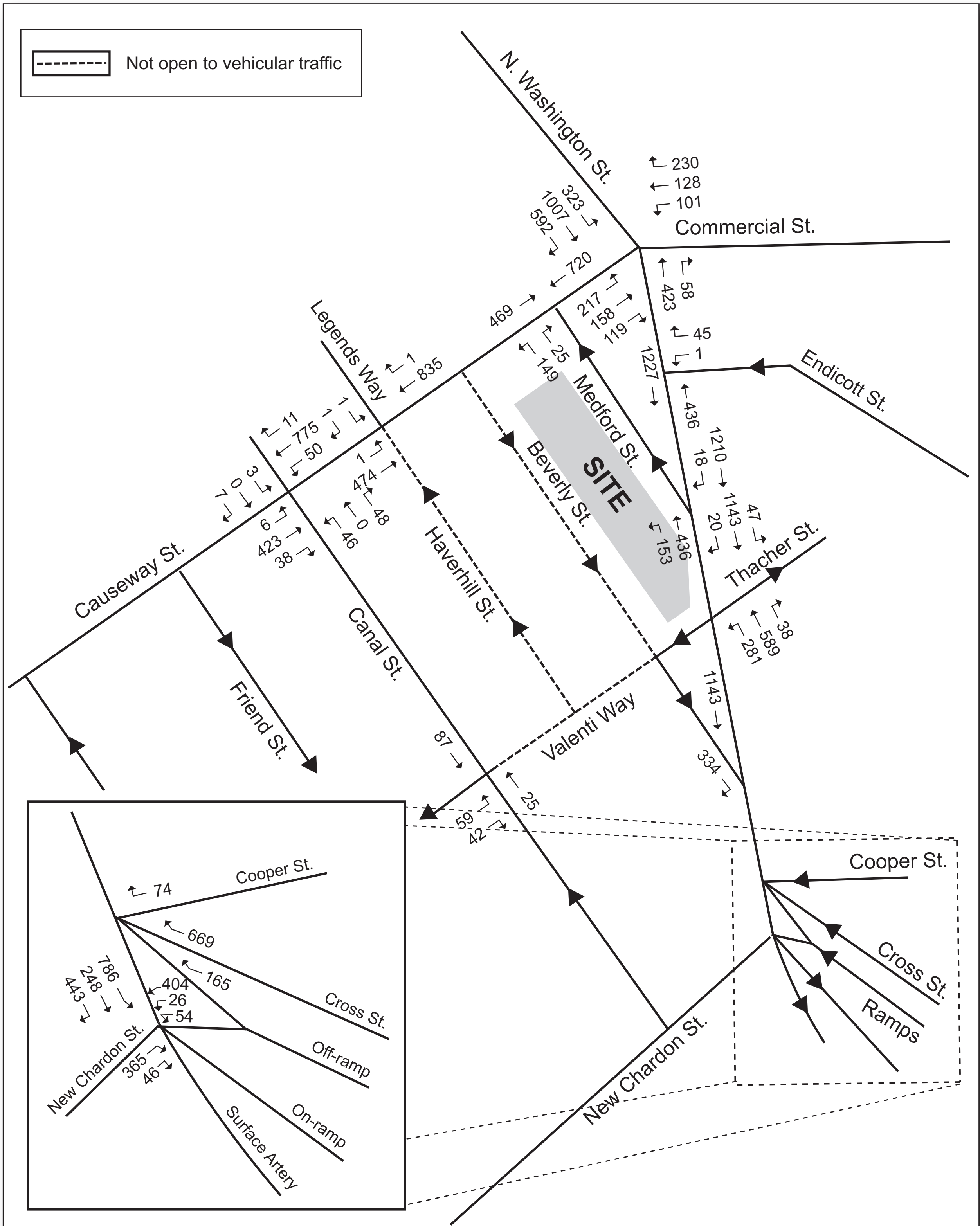

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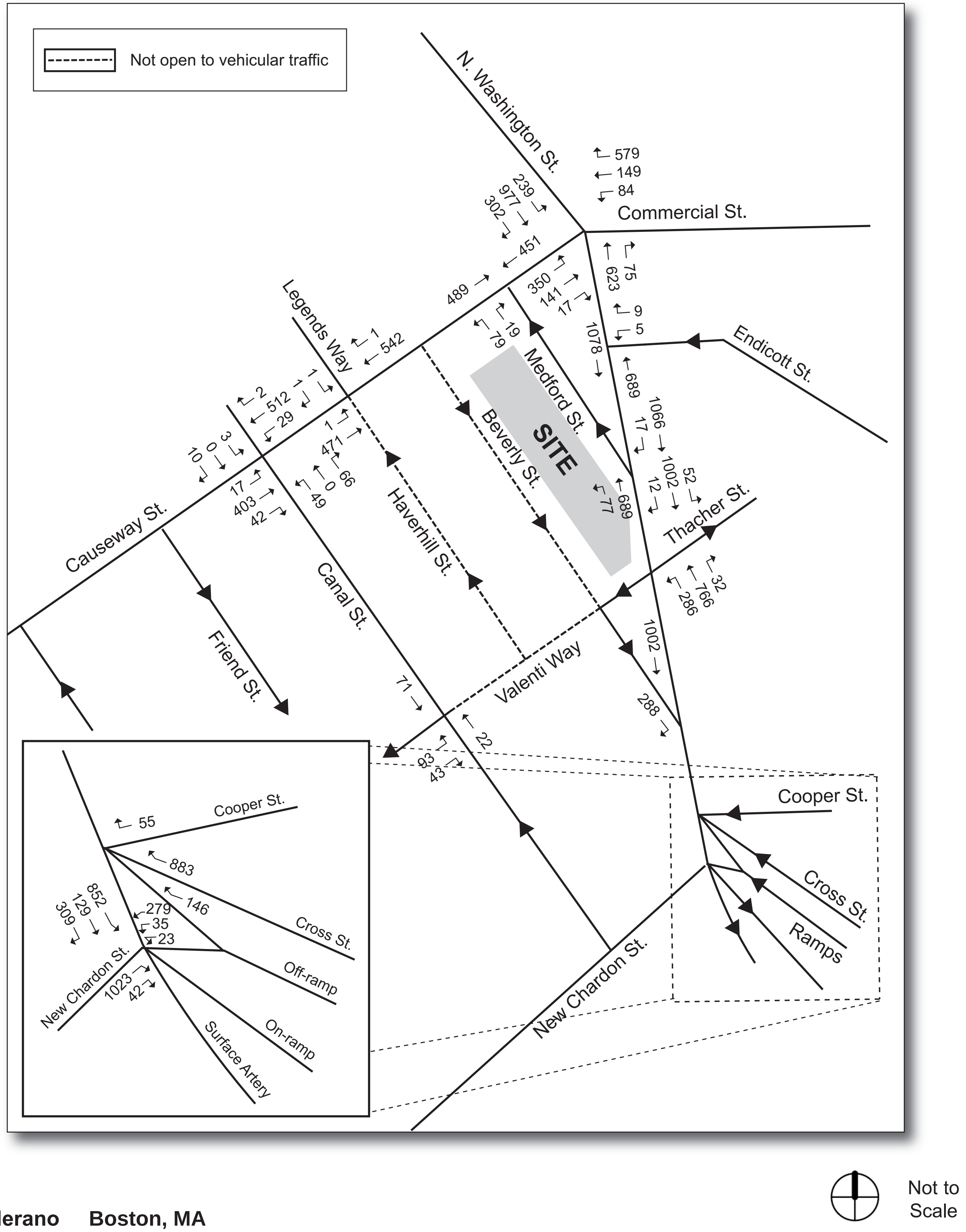
Figure 2-3
Existing Conditions (2008) Turning Movement Volumes, a.m. Peak Hour (8:00–9:00 a.m.)



The Merano **Boston, MA**

Figure 2-4

Existing Conditions (2008) Turning Movement Volumes, p.m. Peak Hour (4:45–5:45 p.m.)

The 95th percentile queue represents the farthest extent of the queue (to the last stopped vehicle) upstream from the stop line over 95% of all cycles. The 95th percentile queue is not seen during every cycle.

To accurately evaluate existing operations, the study team calibrated the Synchro level of service analysis by taking into account field observations of actual queues and delays. The analysis was calibrated to reflect the observed delays. Table 2-2 and Table 2-3 show the existing a.m. and p.m. peak intersection LOS for the Project study area. Complete Synchro reports are provided in Appendix B.

Under Existing Conditions, a majority of study area intersections generally operate at acceptable overall levels of service (LOS D or better) during both the a.m. and the p.m. peak periods; however, a number of intersections and/or approaches operate below LOS D:

North Washington Street/Causeway Street. During the a.m. peak hour, the Causeway Street eastbound left-turn and through approaches operate at LOS F; the Causeway Street westbound left-turn/through approach operates at LOS E. During the p.m. peak hour, the intersection operates at LOS E overall. The Causeway Street eastbound left-turn and through approaches, as well as the Causeway Street westbound left-turn/through approach, operate at LOS E. The Causeway Street westbound right-turn approach operates at LOS F.

North Washington Street/Valenti Way/Thacher Street. The intersection operates at LOS F overall during the a.m. peak hour and LOS E overall during the p.m. peak hour. During both peak hours, the North Washington Street northbound left-turn approach operates at LOS E, while the North Washington Street southbound through/right-right turn approach operates at LOS F.

New Chardon Street/Surface Road/I-93 Southbound and Callahan Tunnel On-ramp/ Sumner Tunnel Off-ramp. During the a.m. peak hour, all of the Surface Road southbound approaches operate at LOS E. During the p.m. peak hour, the intersection operates at LOS F overall. Also during the p.m. peak hour, both the New Chardon Street eastbound bear-right approach and the Surface Road left-turn approach operate at LOS F.

Causeway Street/Medford Street. During the a.m. peak hour, the Medford Street northbound left-turn/right-turn approach operates at LOS F.

Table 2-2 Existing Conditions (2008) Level of Service Summary, a.m. Peak Hour

<table>
<tr><th>Intersection</th><th>LOS</th><th>Delay (seconds)</th><th>V/C Ratio</th><th>95th Percentile Queue</th></tr>
<tr><td colspan="5">Signalized Intersections</td></tr>
<tr><td>North Washington Street/Causeway Street</td><td>D</td><td>38.7</td><td>—</td><td>—</td></tr>
<tr><td>Causeway EB left</td><td>F</td><td>> 80</td><td>0.89</td><td>#286</td></tr>
<tr><td>Causeway EB through</td><td>F</td><td>> 80</td><td>0.90</td><td>#343</td></tr>
<tr><td>Causeway EB right</td><td>B</td><td>14.4</td><td>0.51</td><td>46</td></tr>
<tr><td>Causeway WB left/through</td><td>E</td><td>79.3</td><td>0.78</td><td>161</td></tr>
<tr><td>Causeway WB right</td><td>B</td><td>17.9</td><td>0.39</td><td>137</td></tr>
<tr><td>N. Washington NB through | through/right</td><td>D</td><td>53.3</td><td>0.64</td><td>#385</td></tr>
<tr><td>N. Washington SB left</td><td>C</td><td>27.3</td><td>0.61</td><td>320</td></tr>
<tr><td>N. Washington SB through | through/right</td><td>C</td><td>20.2</td><td>0.67</td><td>532</td></tr>
<tr><td>N. Washington SB right</td><td>C</td><td>22.8</td><td>0.66</td><td>476</td></tr>
<tr><td>North Washington Street/Valenti Way/ Thacher Street</td><td>F</td><td>> 80</td><td>—</td><td>—</td></tr>
<tr><td>N. Washington NB left</td><td>E</td><td>75.7</td><td>0.91</td><td>#351</td></tr>
<tr><td>N. Washington NB through/right</td><td>B</td><td>12.7</td><td>0.57</td><td>472</td></tr>
<tr><td>N. Washington SB left</td><td>A</td><td>6.4</td><td>0.17</td><td>21</td></tr>
<tr><td>N. Washington SB through | through/right</td><td>F</td><td>> 80</td><td>0.70</td><td>322</td></tr>
<tr><td>North Washington Street/Beverly Street</td><td>C</td><td>30.9</td><td>—</td><td>—</td></tr>
<tr><td>N. Washington SB through | through | through</td><td>D</td><td>38.7</td><td>0.86</td><td>367</td></tr>
<tr><td>Beverly SEB right | right | right</td><td>A</td><td>3.2</td><td>0.17</td><td>m54</td></tr>
<tr><td>North Washington Street/Cross Street/ Cooper Street/Sumner Tunnel Off-ramp</td><td>B</td><td>14.2</td><td>—</td><td>—</td></tr>
<tr><td>Cooper WB right</td><td>A</td><td>1.7</td><td>0.25</td><td>0</td></tr>
<tr><td>Cross NB through | through</td><td>A</td><td>4.2</td><td>0.30</td><td>57</td></tr>
<tr><td>Sumner Tunnel NEB left | left</td><td>D</td><td>47.7</td><td>0.61</td><td>81</td></tr>
<tr><td>New Chardon Street/Surface Road/I-93 Southbound & Callahan Tunnel On-ramp/ Sumner Tunnel Off-ramp</td><td>D</td><td>47.5</td><td>—</td><td>—</td></tr>
<tr><td>New Chardon EB right | right</td><td>A</td><td>7.7</td><td>0.35</td><td>153</td></tr>
<tr><td>New Chardon EB hard right</td><td>A</td><td>1.9</td><td>0.10</td><td>0</td></tr>
<tr><td>Sumner Tunnel WB hard left/left</td><td>C</td><td>20.5</td><td>0.14</td><td>68</td></tr>
<tr><td>Sumner Tunnel WB through | through</td><td>C</td><td>21.2</td><td>0.30</td><td>142</td></tr>
<tr><td>Surface SB left | left</td><td>E</td><td>65.1</td><td>0.66</td><td>m351</td></tr>
<tr><td>Surface SB through/right</td><td>E</td><td>69.8</td><td>0.75</td><td>m326</td></tr>
<tr><td>Surface SB right</td><td>E</td><td>71.0</td><td>0.73</td><td>m344</td></tr>
</table>

Intersection	LOS	Delay (seconds)	V/C Ratio	95th Percentile Queue
Causeway Street/Haverhill Street/ Legends Way	A	0.9	—	—
Causeway EB left	A	1.0	0.00	m0
Causeway EB through | through | through	A	0.5	0.12	16
Causeway WB through | through/right	A	1.1	0.34	72
Legends SB left/right	C	31.0	0.01	7
Unsignalized Intersections				
North Washington Street/Endicott Street				
Endicott WB left/right	B	11.6	0.10	9
N. Washington NB through | through	A	0.0	0.15	0
N. Washington SB through | through	A	0.0	0.39	0
North Washington Street/Medford Street				
N. Washington NB left/through	C	15.2	0.45	58
N. Washington NB through	A	0.0	0.19	0
N. Washington SB through	A	0.0	0.53	0
N. Washington SB through/right	A	0.0	0.28	0
Causeway Street/Canal Street/ North Station Driveway				
Causeway EB left/through	A	0.8	0.02	2
Causeway EB through/right	A	0.0	0.17	0
Causeway WB left/through	A	2.2	0.08	6
Causeway WB through/right	A	0.0	0.24	0
Canal NB left/through/right	C	22.6	0.36	39
Driveway SB left/through/right	C	17.0	0.05	4
Causeway Street/Medford Street				
Causeway EB through | through | through	A	0.0	0.11	0
Causeway WB through | through	A	0.0	0.27	0
Medford NB left/right	F	> 80	0.95	219
Canal Street/Valenti Street				
Valenti EB left	A	9.7	0.09	7
Valenti EB right	A	9.1	0.06	5
Canal NB through	A	0.0	0.02	0
Canal SB through	A	0.0	0.07	0

\# 95th percentile volume exceeds capacity. Queue may be longer. Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Table 2-3 Existing Conditions (2008) Level of Service Summary, p.m. Peak Hour

Intersection	LOS	Delay (seconds)	v/c Ratio	95th Percentile Queue
Signalized Intersections				
North Washington Street/Causeway Street	E	69.1	—	—
Causeway EB left	E	72.3	0.81	343
Causeway EB through	E	74.1	0.83	#446
Causeway EB right	B	12.8	0.13	0
Causeway WB left/through	E	74.5	0.74	183
Causeway WB right	F	> 80	> 1	#825
N. Washington NB through | through/right	D	50.1	0.74	440
N. Washington SB left	C	30.5	0.62	241
N. Washington SB through | through/right	C	27.1	0.70	447
N. Washington SB right	C	25.8	0.58	281
North Washington Street/Valenti Way/ Thacher Street	E	62.1	—	—
N. Washington NB left	E	77.4	1.00	#360
N. Washington NB through/right	B	18.1	0.71	355
N. Washington SB left	A	7.3	0.20	28
N. Washington SB through | through/right	F	> 80	0.60	242
North Washington Street/Beverly Street	D	45.0	—	—
N. Washington SB through | through | through	D	54.1	0.83	326
Beverly SEB right | right | right	B	13.0	0.14	m87
North Washington Street/Cross Street/ Cooper Street/Sumner Tunnel Off-ramp	B	11.7	—	—
Cooper WB right	A	1.7	0.24	0
Cross NB through | through	A	4.9	0.40	m99
Sumner Tunnel NEB left | left	D	47.5	0.55	75
New Chardon Street/Surface Road/I-93 Southbound & Callahan Tunnel On-ramp/ Sumner Tunnel Off-ramp	F	> 80	—	—
New Chardon EB right | right	F	> 80	> 1	#657
New Chardon EB hard right	A	1.2	0.06	m0
Sumner Tunnel WB hard left/left	B	17.9	0.15	32
Sumner Tunnel WB through | through	B	17.8	0.20	92
Surface SB left | left	F	> 80	0.82	400
Surface SB through/right	D	45.4	0.55	m213
Surface SB right	D	44.9	0.55	m235

Intersection	LOS	Delay (seconds)	v/c Ratio	95th Percentile Queue
Causeway Street/Haverhill Street/ Legends Way	A	0.5	—	—
Causeway EB left	A	1.0	0.00	m0
Causeway EB through | through | through	A	0.3	0.12	9
Causeway WB through | through/right	A	0.7	0.21	41
Legends SB left/right	C	35.0	0.01	8
Unsignalized Intersections				
North Washington Street/Endicott Street				
Endicott WB left/right	D	25.7	0.12	10
N. Washington NB through | through	A	0.0	0.23	0
N. Washington SB through | through	A	0.0	0.41	0
North Washington Street/Medford Street				
N. Washington NB left/through	A	5.4	0.17	15
N. Washington NB through	A	0.0	0.30	0
N. Washington SB through	A	0.0	0.44	0
N. Washington SB through/right	A	0.0	0.24	0
Causeway Street/Canal Street/ North Station Driveway				
Causeway EB left/through	A	1.3	0.03	2
Causeway EB through/right	A	0.0	0.15	0
Causeway WB left/through	A	1.4	0.04	3
Causeway WB through/right	A	0.0	0.16	0
Canal NB left/through/right	C	23.3	0.49	66
Driveway SB left/through/right	C	16.1	0.07	6
Causeway Street/Medford Street				
Causeway EB through | through | through	A	0.0	0.12	0
Causeway WB through | through	A	0.0	0.17	0
Medford NB left/right	C	23.8	0.42	51
Canal Street/Valenti Street				
Valenti EB left	A	9.8	0.14	12
Valenti EB right	A	9.0	0.06	5
Canal NB through	A	0.0	0.02	0
Canal SB through	A	0.0	0.05	0

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

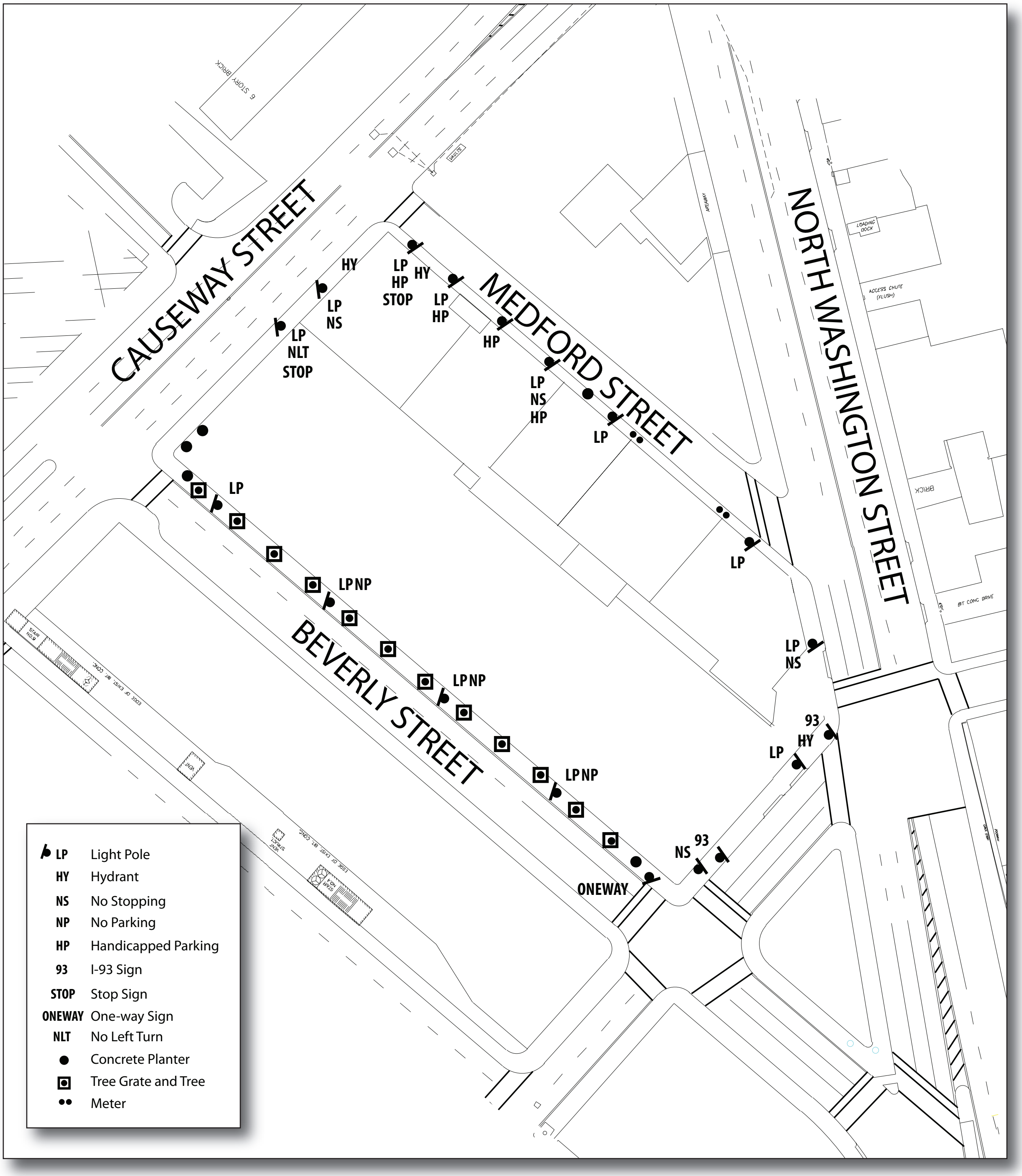
m Volume for 95th percentile queue is metered by upstream signal.

2.2.4 Existing Parking

2.2.4.1 Curbside Inventory and On-street Parking

Figure 2-5 presents an inventory of the existing curb use and parking restrictions in the block immediately surrounding the Project site. The inventory was conducted in June 2008 when Beverly Street was closed to vehicular traffic.

Figure 2-6 presents an inventory of existing curb use and parking restrictions within a quarter-mile, approximately a five-minute walk, of the Project.



Not to Scale

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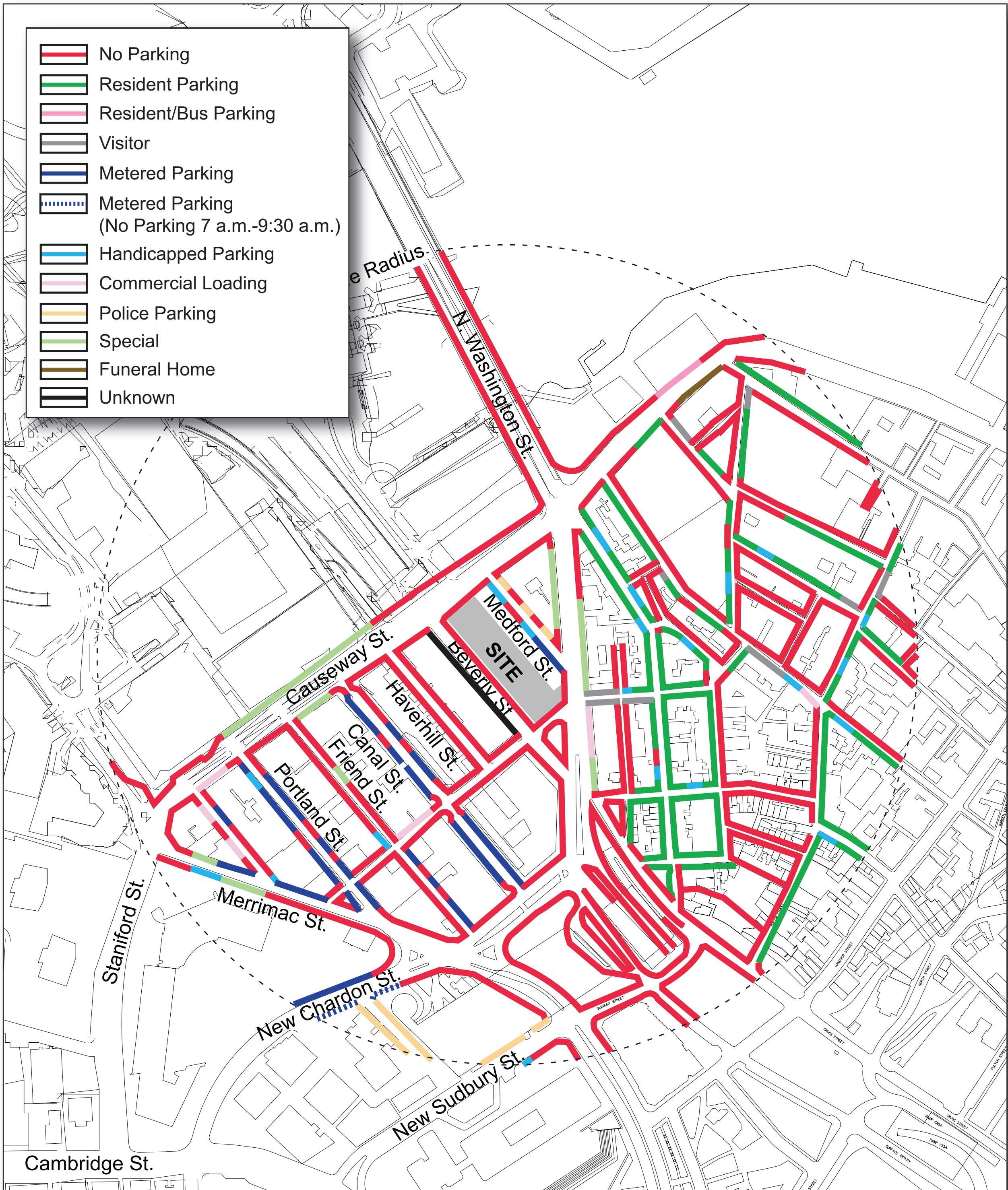
HOWARD/STEIN-HUDSON ASSOCIATES

Figure 2-5
Curbside Inventory



Not to Scale

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Figure 2-6
Existing On-street Parking

2.2.4.2 Off-street Parking

More than 5,600 off-street spaces are provided in garages and lots within a quarter-mile radius of the Project site, as listed in Table 2-4 and shown in Figure 2-7.

Table 2-4 Off-street Parking in the Study Area

Map No.	Facility	Capacity (spaces)
1	Courthouse Parking Garage	2,400
2	Longfellow Place Garage	168
3	Garden Garage	660
4	North Station	1,364
5	LAZ Parking Limited	60
6	Stanhope Garage	70
7	Stanhope Garage	41
8	J&O Parking	75
9	P&P Parking	35
10	Pinstripe Parking	24
11	Logan Park & Co.	9
12	Pinstripe Parking	18
13	Pinstripe Parking	67
14	North End Garage	645
15	Fitz Inn Auto Park	44
Total Off-street Parking		5,680

2.2.5 Existing Public Transportation in the Study Area

2.2.5.1 MBTA Rapid Transit Service in the Study Area

The site location is convenient to the MBTA public transportation system, as illustrated in Figure 2-8. Access to the Orange and Green lines is provided at the MBTA North Station superstation located one block to the west of the Project site. Both lines also serve Haymarket station, less than one-quarter mile south of the site.

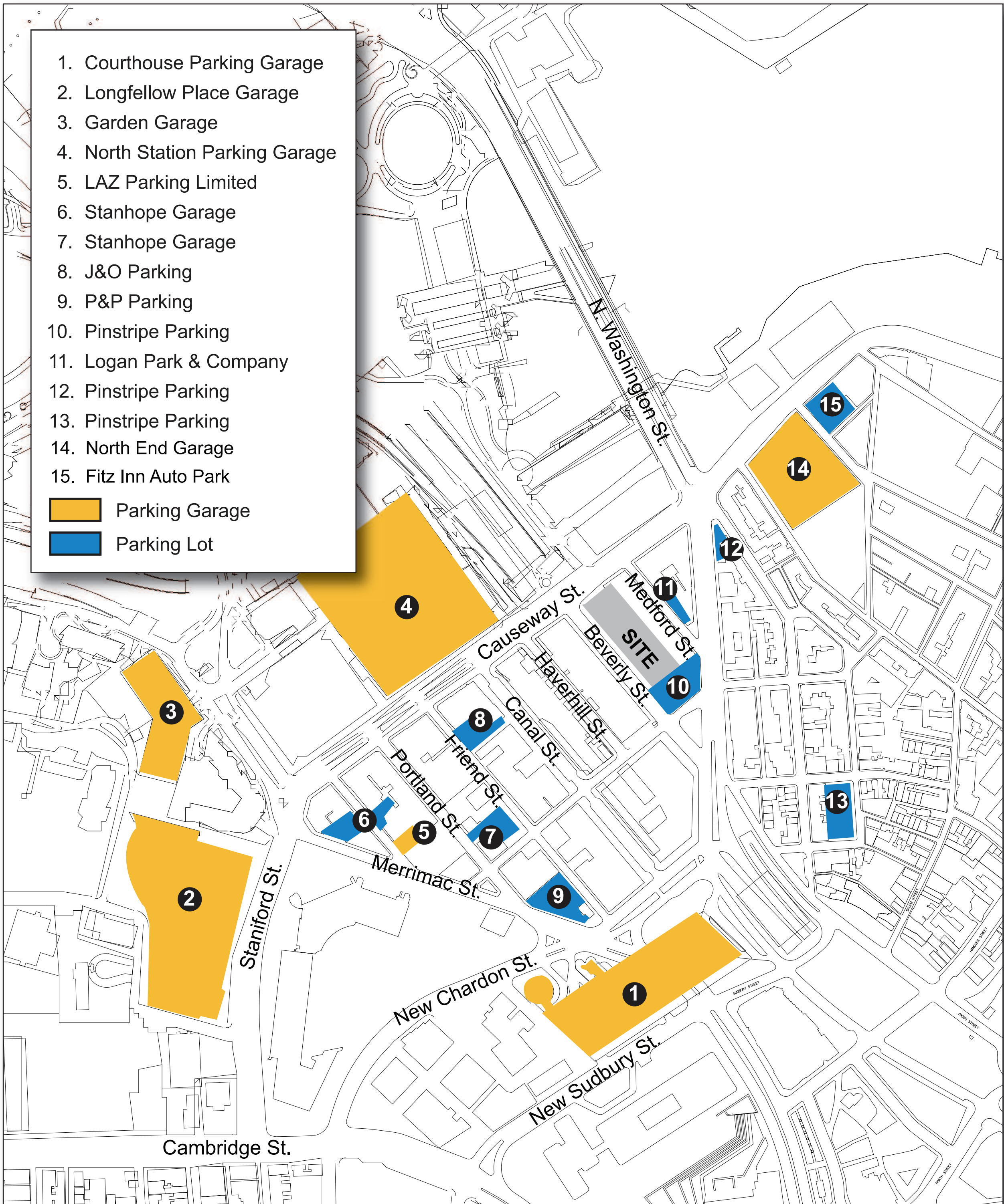

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Figure 2-7
Existing Off-street Parking

Transit riders can transfer to the Red Line from the Orange Line at Downtown Crossing or from the Green Line at Park Street, and to the Blue Line from the Orange Line at State Station or from the Green Line at Government Center. Weekday subway service is provided between approximately 5:00 a.m. and 1:00 a.m. Actual train service times vary by line. Local rapid transit services, including route descriptions, headways, and capacities are summarized in Table 2-5.

Table 2-5 Local MBTA Rapid Transit Service in the Study Area

Line	Origin—Destination	Car Capacity[1]	Cars Per Train	Train Capacity	Trains Per Hour	Hourly 1-way Capacity
Orange Line	Forest Hills–Oak Grove	131	6	786	13	10,218
Green Line	Lechmere–Boston College, Cleveland Circle, Riverside, or Heath Street	101	2	202	21	4,242
Blue Line	Wonderland–Bowdoin or Government Center	95	4	380	16	6,080
Red Line	Alewife–Braintree/Ashmont	167	6	1002	14	16,032

[1] Per MBTA service policy for peak-hour service. "Crush loaded" capacity is; 1,344 for a six-car Orange Line train; 398–538 for a two-car Green Line train; 636 for a four-car Blue Line train; and 1,560–1,662 for a six-car Red Line train.

According to the MBTA's *Ridership and Service Statistics* (Eleventh Edition, 2007), North Station has a weekday average of 16,124 daily subway boardings.

2.2.5.2 MBTA Commuter Rail Service

The Project site is located one block from North Station, a terminal station for five MBTA commuter rail lines. Commuter rail trains at North Station serve the Fitchburg, Haverhill, Lowell, and Rockport/Newburyport lines. Additional commuter rail lines serve South Station, accessible from the Project site through Green Line or Orange Line subway service and a connection to the Red Line at Park Street. The Greenbush, Plymouth/Kingston, Middleborough/Lakeville, Providence/Stoughton, Forge Park-495, Needham, and Framingham/Worcester Lines serve South Station.

2.2.5.3 MBTA Bus Service

Five local bus routes serve stops within one-quarter mile of the Project site. Bus routes #4, #6, #92, #93, and #111 stop at the intersection of North Washington Street/Thacher Street or North Washington Street/Medford Street, both almost adjacent to the Project site. Bus route #4 stops at Causeway Street/Canal Street, adjacent to North Station.

Express bus routes #325, #326, #424, #426, #428, #434, #441, #442, #450, and #455 serve Haymarket Station. Express routes #352, #354, and #355 stop at the intersection of New Sudbury/Congress Street. Route #426 also stops at North Washington Street/Medford Street, adjacent to the Project site.

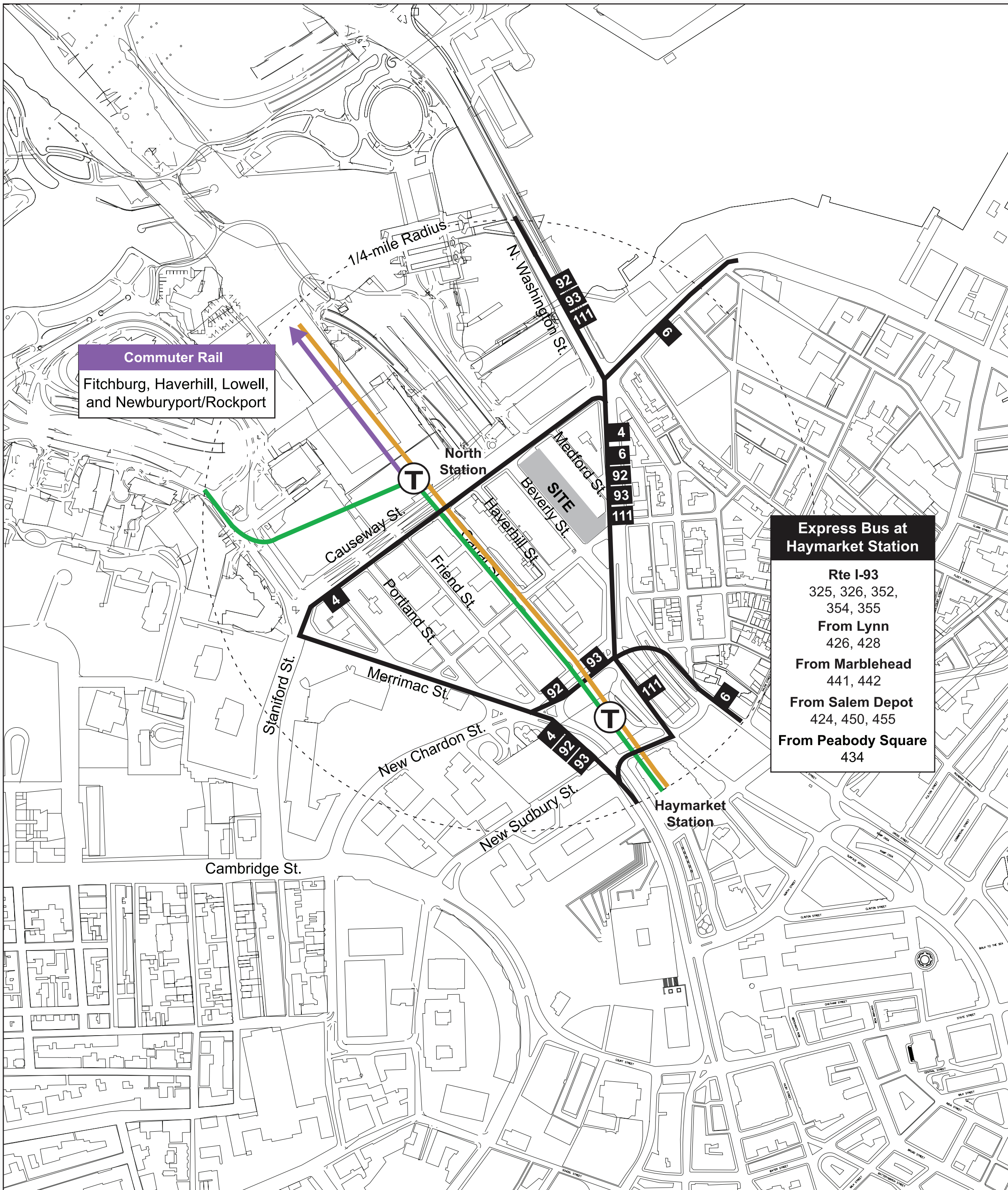

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Figure 2-8

Public Transportation in the Study Area

Bus frequencies and route summaries are shown in Table 2-6.

Table 2-6 MBTA Bus Service in the Study Area

Bus Route	Route Description	Rush-hour Frequency (in minutes)
#4	North Station–World Trade Center	12–16
#6	South Station–Haymarket	35
#92	Assembly Square Mall–Downtown	12
#93	Sullivan Square–Downtown	7–8
#111	Woodlawn or Broadway & Park–Haymarket	4–5
#325	Elm Street & Fellsway West, Medford–Haymarket (Express)	15–20
#326	West Medford–Haymarket (Express)	12–15
#352	Burlington–State Street (Express)	20
#354	Woburn Line–State Street (Express)	15–20
#355	Mishawum Station–Downtown (Express)	Limited
#424/#424W	Eastern & Essex–Wonderland or Haymarket	30
#426	Central Square, Lynn/E. Saugus–Wonderland or Haymarket	Irregular
#428	Oaklandvale–Haymarket	Limited
#434	Peabody Square–Haymarket	Limited
#441	Marblehead–Haymarket	30–60
#442	Marblehead–Haymarket	30–60
#450	Salem–Haymarket	30
#455	Salem–Haymarket or Wonderland	30–60

Source: MBTA's *Ridership and Service Statistics*, 11th Edition, 2007.

2.2.6 Existing Pedestrian Conditions

Sidewalks are provided on all streets within the study area. The following sections describe the sidewalk locations and pedestrian conditions along the Existing Conditions study area roadways.

2.2.6.1 Sidewalk and Crosswalk Conditions

North Washington Street has sidewalks on both sides of the roadway, varying from nine to 19 feet wide. The effective sidewalk width is narrowed due to street furniture such as light poles, traffic signs, and traffic signal equipment. There are pedestrian crosswalks at all intersections and a raised median along some areas of North Washington Street. The Freedom Trail runs along North Washington Street north of the intersection with Causeway Street.

Causeway Street has sidewalks on both sides of the roadway and a centerline median in some sections. Sidewalk widths on the north side are 14 feet, while those on the south side range from 10 to 27 feet. The effective sidewalk width is narrowed due to street furniture such as light poles and traffic signs located adjacent to the roadway. Several crosswalks are provided across Causeway Street within the study area. Additionally, the Freedom Trail runs along the south side of Causeway Street from Hull Street to North Washington Street, where it crosses Causeway Street and continues along North Washington Street. Causeway Street provides access to the MBTA superstation for the Orange and Green lines and to the commuter rail lines at North Station as well as to TD Banknorth Garden.

Valenti Way has sidewalks on both sides of the roadway. The sidewalk width on the north side is seven feet, while on the south side it ranges from seven to nine feet. The effective sidewalk width is narrowed due to street furniture such as parking meters, light poles, and traffic signs located adjacent to the roadway. The crosswalks located across Valenti Way are 10 feet wide. The crosswalks located across Valenti Way at Portland Street and Canal Street are severely worn. Valenti Way provides access to the MBTA superstation for the Orange and Green lines.

Thacher Street has sidewalks on both sides of the roadway, measuring six feet wide. The effective sidewalk width is narrowed due to light poles and traffic signs located adjacent to the roadway. Thacher Street provides pedestrian access to the City's North End district.

Beverly Street has sidewalks on both sides of the roadway. The sidewalk width on the west side is 10 feet, while the sidewalk width on the east side is 12 feet. The effective sidewalk width is narrowed due to trees and poles. The roadway is currently open to pedestrians but not vehicles.

Cross Street has a sidewalk along the east side of the roadway, measuring 12 feet. The sidewalk width is narrowed due to street furniture. No sidewalks are provided on the west side, due to on- and off-ramps providing access to the Thomas P. O'Neill, Jr., Tunnel.

Cooper Street has sidewalks on both sides of the roadway that vary in width from six to 16 feet. The effective sidewalk width is narrowed due to light poles, traffic signs, and other street furniture located adjacent to the roadway. This roadway provides pedestrian access to the City's North End district, which features restaurants, shops, and several tourist attractions.

New Chardon Street has a sidewalk on both sides of the roadway. The sidewalk on the north side is approximately 18 feet wide, but the effective sidewalk width is narrowed due to light poles and traffic signs located adjacent to the roadway. On the south side, a large sidewalk is provided adjacent to the MBTA Haymarket Station. A brick-paved crosswalk is located across New Chardon Street to the west of Canal Street, and a crosswalk is provided across New Chardon Street at the intersection with North Washington Street.

The ***Surface Artery*** has sidewalks on both sides of the roadway north of New Chardon Street within the study area. The sidewalk on the west side is 12 feet, while the sidewalk space within the median near Cooper Street and the off-ramps on the east side is nine feet. The effective widths of these sidewalks are narrowed due to light and signal poles. South of New Chardon Street, a large sidewalk is provided through the MBTA Haymarket Station, but no sidewalks are provided immediately along the roadway to New Sudbury Street.

Haverhill Street has sidewalks on both sides of the roadway, measuring 10 feet, but the road is not open to public travel at this time due to ongoing adjoining development.

Legends Way has sidewalks approximately 20 feet wide on both sides of the roadway. Legends Way provides pedestrian access to TD Banknorth Garden and the commuter rail lines at North Station. A crosswalk is provided at the intersection of Causeway Street/ Haverhill Street/Legends Way.

Endicott Street has sidewalks on both sides of the roadway within the study area. At the intersection of Endicott Street and North Washington Street, the sidewalks are approximately 30 feet, while beyond the intersection, the sidewalks range from six to eight feet. The sidewalks are considerably narrowed due to street furniture as well as adjoining buildings and closely parked vehicles. A crosswalk is provided across Endicott Street at North Washington Street.

Medford Street has sidewalks on both sides of the roadway. The sidewalks on both sides are approximately seven feet wide. The effective sidewalk width is narrowed due to street furniture such as parking meters, light poles, traffic signs, and other furniture located adjacent to the roadway. Crosswalks are provided at both ends of Medford Street.

Canal Street has sidewalks on both sides of the roadway. Sidewalk widths on the west side vary from 25 to 33 feet, while those on the east side range from 10 to 18 feet. The effective sidewalk width is narrowed, due to existing street trees and street furniture such as parking meters, light poles, and traffic signs located adjacent to the roadway. The crosswalks located across Canal Street are 10 feet wide. The crosswalk across southbound Canal Street at the intersection with Valenti Way is severely worn.

2.2.7 Existing Pedestrian Operations

Pedestrian level of service is determined through analysis of crosswalk geometry, signal timing, and pedestrian volumes. The methodology for conducting the LOS analysis is based on the Transportation Research Board's 2000 *Highway Capacity Manual* (HCM). At signalized intersections, pedestrian LOS is based on the waiting time or delay pedestrians experience as they wait to enter the crosswalk (called "delay LOS") and how much crowding exists in the crosswalk (called "space LOS"). According to the HCM, the method for unsignalized intersections does not apply to zebra-striped crosswalks, because pedestrians (by Massachusetts state law) have the right-of-way. Pedestrian LOS at an unsignalized intersection is computed for approaches where pedestrians do not have the right-of-way or any stop control device, and is based on the critical gap, the vehicular flow rate, and the mean vehicle headway.

Pedestrian LOS at an unsignalized intersection is computed for approaches where pedestrians do not have the right-of-way or any stop control device, and is based on the critical gap, the vehicular flow rate, and the mean vehicle headway. The critical gap is the minimum amount of time (in seconds) required for one vehicle to enter the intersection. The vehicular flow rate is the number of vehicles per hour (vph) that move through a particular location. The mean vehicle headway (in seconds) is the average amount of time between vehicles passing a particular point. Input includes pedestrian volumes, vehicular volumes, walking speed, crosswalk width, and street width.

Table 2-7, excerpted from the HCM, provides LOS criteria for delay experienced by pedestrians at signalized and unsignalized intersections. As the delay increases at a signalized intersection, pedestrians are likely to become less compliant. In reality, if traffic volumes are low and delay high, pedestrians will not wait. The delay experienced does not account for pedestrian volumes; it is the average delay experienced by pedestrians waiting to cross, regardless of volume. At unsignalized intersections, the LOS is based on average delay per pedestrian, obtained from the vehicular volumes and potential gaps. LOS A defines the most favorable condition, with minimum delay to cross. LOS F represents the worst condition, with significant delay. Similar to vehicular traffic, LOS D is generally considered acceptable for the urban environments of the study area.

Table 2-7 Level of Service Criteria for Pedestrian Delay at Intersections

LOS	Signalized (seconds/person)	Unsignalized (seconds/person)	Likelihood of Non-compliance
A	<10	<5	Low
B	≥10–20	≥5–10	
C	≥20–30	≥10–20	Moderate
D	≥30–40	≥20–30	
E	≥40–60	≥30–45	High
F	>60	>45	Very High

Figure 2-9 and Table 2-8 show LOS criteria for average flow of pedestrians on crosswalks used to determine the space LOS. Space LOS is calculated only for signalized intersections and does take pedestrian volumes into account. Crosswalk space LOS is derived from pedestrian walking speed, pedestrian start-up time, and pedestrian space requirements. If insignificant hourly pedestrian volumes result in an average of zero pedestrians per cycle, the amount of space yielded per pedestrian is characterized as “unlimited” or “maximized.” LOS A defines the most favorable condition, with maximum crosswalk space per pedestrian. LOS F represents the worst condition, with minimum crosswalk space. LOS D is generally considered acceptable for urban environments of the study area.

Table 2-8 Level of Service Criteria (Space) for Average Flow of Walkways and Sidewalks

LOS	Space (sf/p)*	Flow Rate (p/min/ft)*	Speed (ft/s)*	v/c Ratio
A	>60	≤5	>4.25	≤0.21
B	>40–60	>5–7	>4.17–4.25	>0.21–0.31
C	>24–40	>7–10	>4.00–4.17	>0.31–0.44
D	>15–24	>10–15	>3.75–4.00	>0.44–0.65
E	>8–15	>15–23	>2.50–3.75	>0.65–1.0
F	≤8	Variable	≤2.50	Variable

* sf/p = square feet per person
p/min/ft = persons per minute per linear foot
ft/s = linear feet per second

LEVEL OF SERVICE A

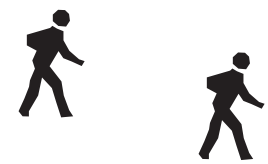
Pedestrian Space: > 60 sq. ft./ped.
Flow Rate: ≤ 5 ped./min./ft.

At walkway LOS A, pedestrians basically move in desired paths without altering their movements in response to other pedestrians. Walking speeds are freely selected, and conflicts between pedestrians are unlikely.

LEVEL OF SERVICE B

Pedestrian Space: > 40-60 sq. ft./ped.
Flow Rate: > 5-7 ped./min./ft.

At LOS B, sufficient area is provided to allow pedestrians to freely select walking speeds, bypass other pedestrians, and avoid crossing conflicts with others. At this level, pedestrians begin to be aware of other pedestrians and respond to their presence in the selection of the walking path.



LEVEL OF SERVICE C

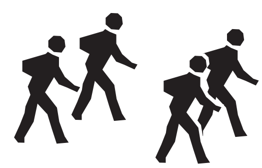
Pedestrian Space: > 24-40 sq. ft./ped.
Flow Rate: > 7-10 ped./min./ft.

At LOS C, sufficient space is available to select normal walking speeds and bypass other pedestrians in primarily unidirectional streams. Where reverse-direction or crossing movements exist, minor conflicts will occur, and speeds and volume will be somewhat lower.

LEVEL OF SERVICE D

Pedestrian Space: > 15-24 sq. ft./ped.
Flow Rate: > 10-15 ped./min./ft.

At LOS D, freedom to select individual walking speed and bypass other pedestrians is restricted. Where crossing or reverse-flow movements exist, the probability of conflict is high, and its avoidance requires frequent changes in speed and position. The LOS provides reasonably fluid flow; however, considerable friction and interaction between pedestrians is likely to occur.



LEVEL OF SERVICE E

Pedestrian Space: >8-15 sq. ft./ped.
Flow Rate: > 15-23 ped./min./ft.

At LOS E, virtually all pedestrians would have their normal walking speed restricted, requiring frequent adjustment of gait. At the lower range of this LOS, forward movement is possible only by "shuffling." Insufficient space is provided for passing of slower pedestrians. Cross- or reverse-flow movements are possible only with extreme difficulty. Design volumes approach the limit of walkway capacity, with resulting stoppages and interruptions to flow.

LEVEL OF SERVICE F

Pedestrian Space: < 8 sq. ft./ped.
Flow Rate: variable ped./min./ft.

At LOS F, all walking speeds are severely restricted, and forward progress is made only by "shuffling." Contact with other pedestrians is frequent and unavoidable. Cross- and reverse-flow movements are virtually impossible. Flow is sporadic and unstable. Space is more characteristic of queued pedestrians than of moving pedestrian streams.

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Figure 2-9
Illustration of Walkway Level of Service

Pedestrian counts at study area intersections were conducted concurrent with vehicle movement counts. Existing peak-hour pedestrian volumes appear in Figure 2-10 and Figure 2-11. These figures also note jaywalking at intersections without crosswalks.

The study team conducted pedestrian LOS analysis to evaluate existing pedestrian delay and space per pedestrian at study area intersections. Table 2-9 summarizes existing a.m. and p.m. peak-hour pedestrian LOS. The analysis worksheets are provided in Appendix B.

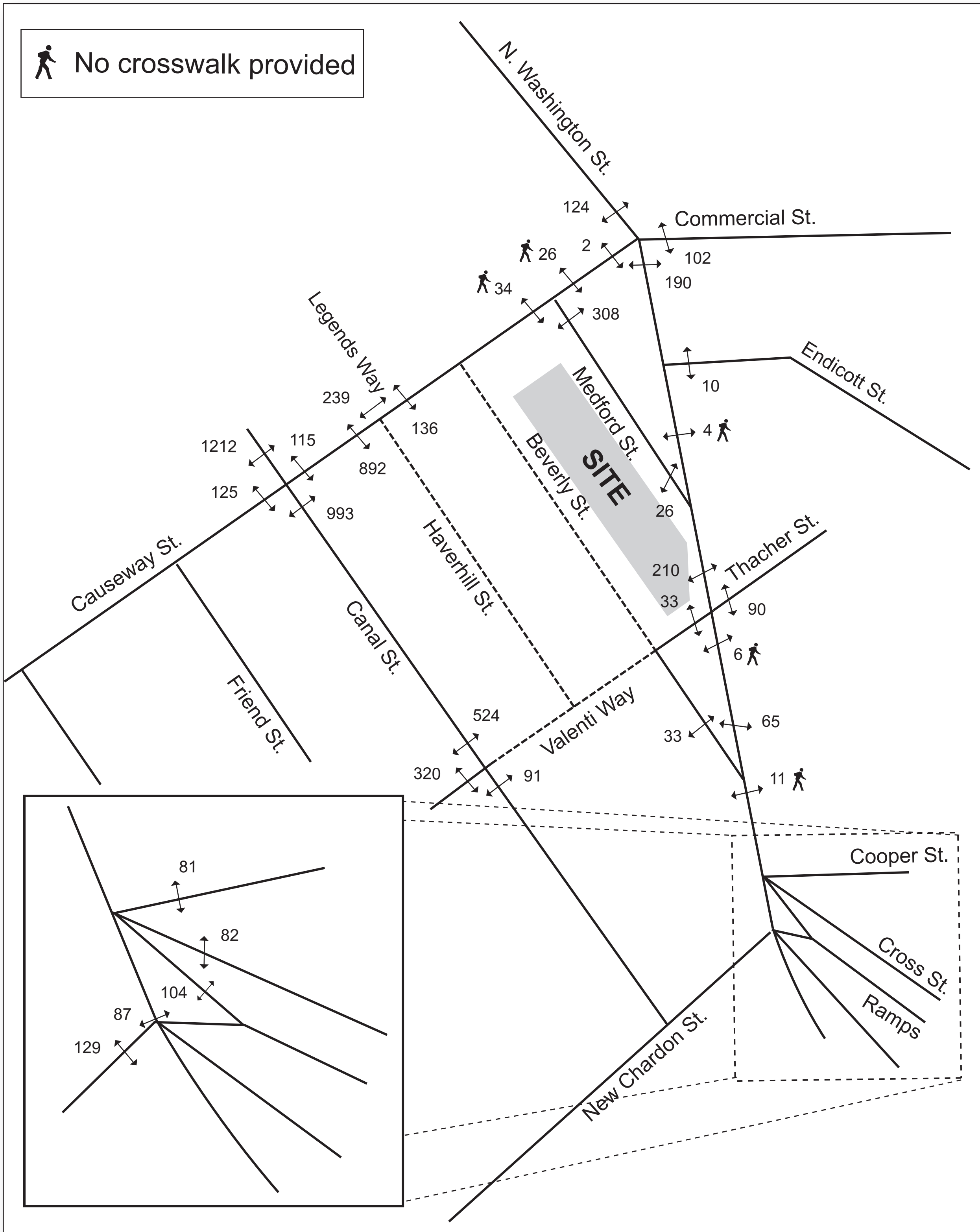

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Figure 2-10

Existing Conditions (2008) Pedestrian Volumes, a.m. Peak Hour (8:00–9:00 a.m.)

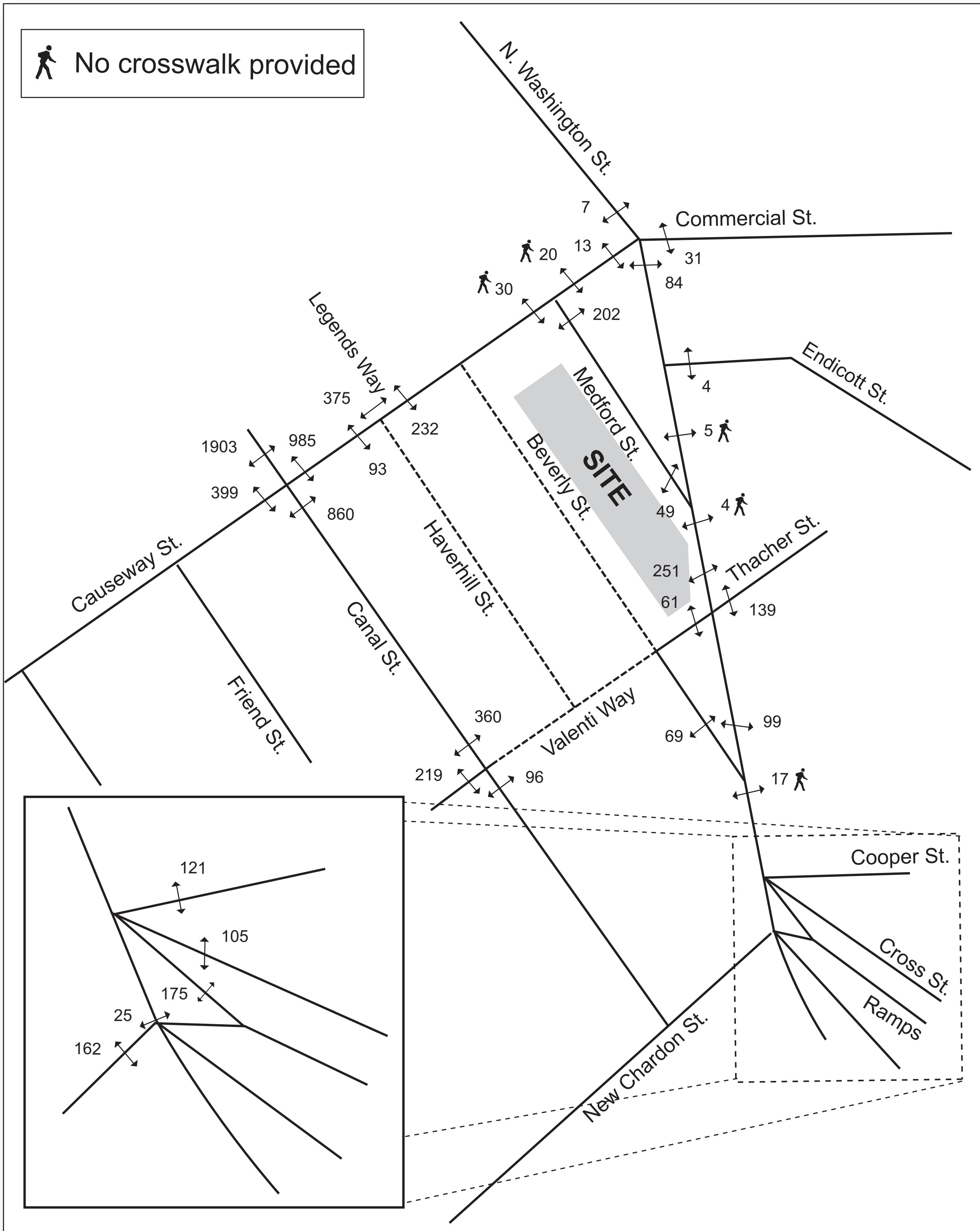

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Figure 2-11
Existing Conditions (2008) Pedestrian Volumes, p.m. Peak Hour (4:45–5:45 p.m.)

Table 2-9 Existing Conditions (2008) Pedestrian Level of Service, Peak Hours

Intersection	Delay LOS		Space LOS	
	a.m.	p.m.	a.m.	p.m.
Signalized Intersections				
North Washington Street/Causeway Street				
Causeway East Crosswalk	B	B	A	A
Causeway West Crosswalk	B	B	A	A
N. Washington North Crosswalk	C	C	A	A
N. Washington South Crosswalk	C	C	A	A
North Washington Street/Valenti Way/Thacher Street				
Thacher East Crosswalk	A	A	A	A
Valenti West Crosswalk	A	A	A	A
N. Washington North Crosswalk	C	C	A	A
North Washington Street/Beverly Street				
Beverly West Crosswalk	A	B	A	A
N. Washington North Crosswalk	B	B	A	A
North Washington Street/Cross Street/Cooper Street/ Sumner Tunnel Off-ramp				
Cooper East Crosswalk	A	A	A	A
Sumner West Crosswalk	A	A	A	A
Cross South Crosswalk	B	B	A	A
New Chardon Street/Surface Road/I-93 Southbound & Callahan Tunnel On-ramp/Sumner Tunnel Off-ramp				
New Chardon West Crosswalk	A	B	A	A
Surface North Crosswalk	A	A	A	A
Causeway Street/Haverhill Street/Legends Way				
Causeway East Crosswalk	B	B	A	A
Causeway West Crosswalk	B	B	B	A
Legends North Crosswalk	A	A	A	A
Unsignalized Intersections				
North Washington Street/Endicott Street				
Endicott East Crosswalk	A	A	—	—
North Washington Street/Medford Street				
Medford West Crosswalk	A	A	—	—
Causeway Street/Canal Street/North Station Driveway				
Causeway East Crosswalk	F	F	—	—
Causeway West Crosswalk	F	F	—	—
Driveway North Crosswalk	C	A	—	—
Canal South Crosswalk	A	A	—	—
Causeway Street/Medford Street				
Medford South Crosswalk	A	A	—	—
Canal Street/Valenti Way				
Valenti West Crosswalk	A	A	—	—
Canal North Crosswalk	A	A	—	—
Canal South Crosswalk	A	A	—	—

Based on the delay and space LOS evaluation at the signalized intersections, all study area intersections operate at acceptable pedestrian LOS (D or better) during both peak hours. For unsignalized intersection delay LOS, all crosswalks operate at acceptable LOS, except the intersection of Causeway Street/Canal Street, where both Causeway Street crosswalks operate at LOS F for delay during the a.m. and p.m. peak hours.

Vehicles in the study area currently yield to pedestrians in crosswalks as required by state law, thereby reducing the delay and LOS experienced by pedestrians. Additionally, pedestrians often cross the street when there is a "critical mass" of pedestrians waiting to cross. Space at each location is ample enough for pedestrians to wait at corners and to walk comfortably along the sidewalks.

2.2.8 Bicycles

The Paul Dudley White Memorial Bikepath along the Charles River is approximately one-half mile from the site. Additionally, North Washington Street, Causeway Street, Cross Street, New Chardon Street, Surface Artery, and Endicott Street all serve as on-street bicycle routes, according to *Boston's Bikemap,* published by Rubel Bike Maps of Cambridge, Massachusetts.

2.2.9 Loading and Service

Currently, no loading or service activities are associated with the site.

2.2.10 Crash History

Due to the ongoing construction of the CA/T project, the study team did not compile motor vehicle crash data at study area intersections. The roadway network has been impacted in various ways throughout the past three years for which crash data would normally have been collected. For accuracy and reliability, motor vehicle crash data should not be analyzed until three years after this major construction effort is complete.

2.3 Evaluation of Long-term Impacts

This section describes and evaluates the 2013 No-Build and Build Conditions. The study area infrastructure, including roadways, sidewalks, and intersections, are undergoing a transformation with the final work on the CA/T project (see the proposed street layout in Figure 2-12). A detailed description of the final changes to the Bulfinch Triangle area is presented in the following sections.

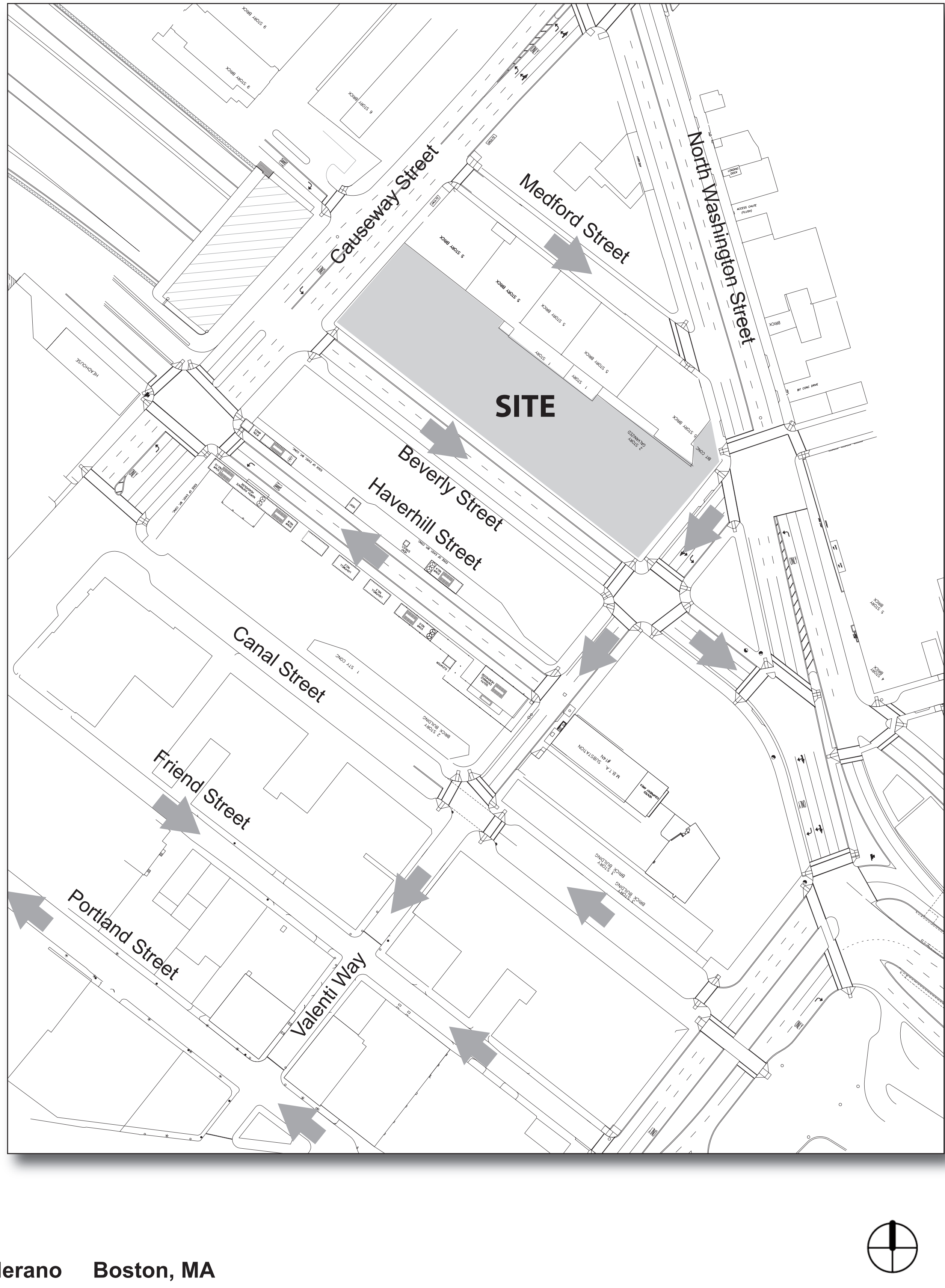

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Figure 2-12
Central Artery/Tunnel Project
Proposed Street Layout

2.3.1 No-Build Conditions

Due to the roadway changes, particularly the new Beverly Street and Haverhill Street and the conversion of Valenti Way from one-way eastbound to one-way westbound, the No-Build and Build study area intersections differ from the Existing Conditions intersections analyzed.

Turning movement counts were conducted at all intersections within and around the Bulfinch Triangle between 2005 and 2007, as part of the *Bulfinch Triangle Transportation Model and Action Plan* (TMAP). The TMAP study team conducted analysis of the future traffic in the Bulfinch Triangle based on rerouting existing traffic volumes to utilize the future roadway configuration. Additionally, background growth rates between 0.25% and 0.5% per year were applied to regional traffic movements ***around*** the Bulfinch Triangle, with no background growth rate applied to local roadways ***within*** the Bulfinch Triangle. In addition to applying the background growth rates, an estimation of the traffic generated by future major developments within and around the Bulfinch Triangle were added to the No-Build traffic volumes.

As part of the City of Boston Crossroads Initiative, Causeway Street is being redesigned and reconstructed. The study area for the Causeway Street Crossroads Initiative is along Causeway Street between Lomasney Way/Merrimac Street to the west and Prince Street to the east. Key goals of that project are to transform Causeway Street into a "great pedestrian-oriented boulevard," make it the "anchor" for the Bulfinch Triangle/North Station business and entertainment district, reconnect the West End and North End neighborhoods, and transform the Bulfinch Triangle/North Station area into a vibrant, more pedestrian-friendly place. Additionally, the Causeway Street project will improve intersection operations at Lowell and Keany squares and through the corridor. Currently, the reconstruction project is in the conceptual design stage; therefore the redesign is unknown.

The additional traffic generated by the projects listed below and shown in Figure 2-13, was incorporated into the No-Build analysis for the weekday a.m. and p.m. peak hours.

Battery Wharf. This project is currently under construction on Commercial Street's waterfront in Boston's North End. It will consist of 42,000 sf of retail space, 155,000 sf of hotel, and 103 residential units. Approximately 375 parking spaces will be provided on-site.

Avenir (Canal Place). This proposed project includes construction of 241 residential apartment units and approximately 31,000 sf of ground floor retail use. A two-level parking garage with 116 parking spaces will be provided for residents. The existing MBTA superstation for the Orange and Green lines will be incorporated into the project.

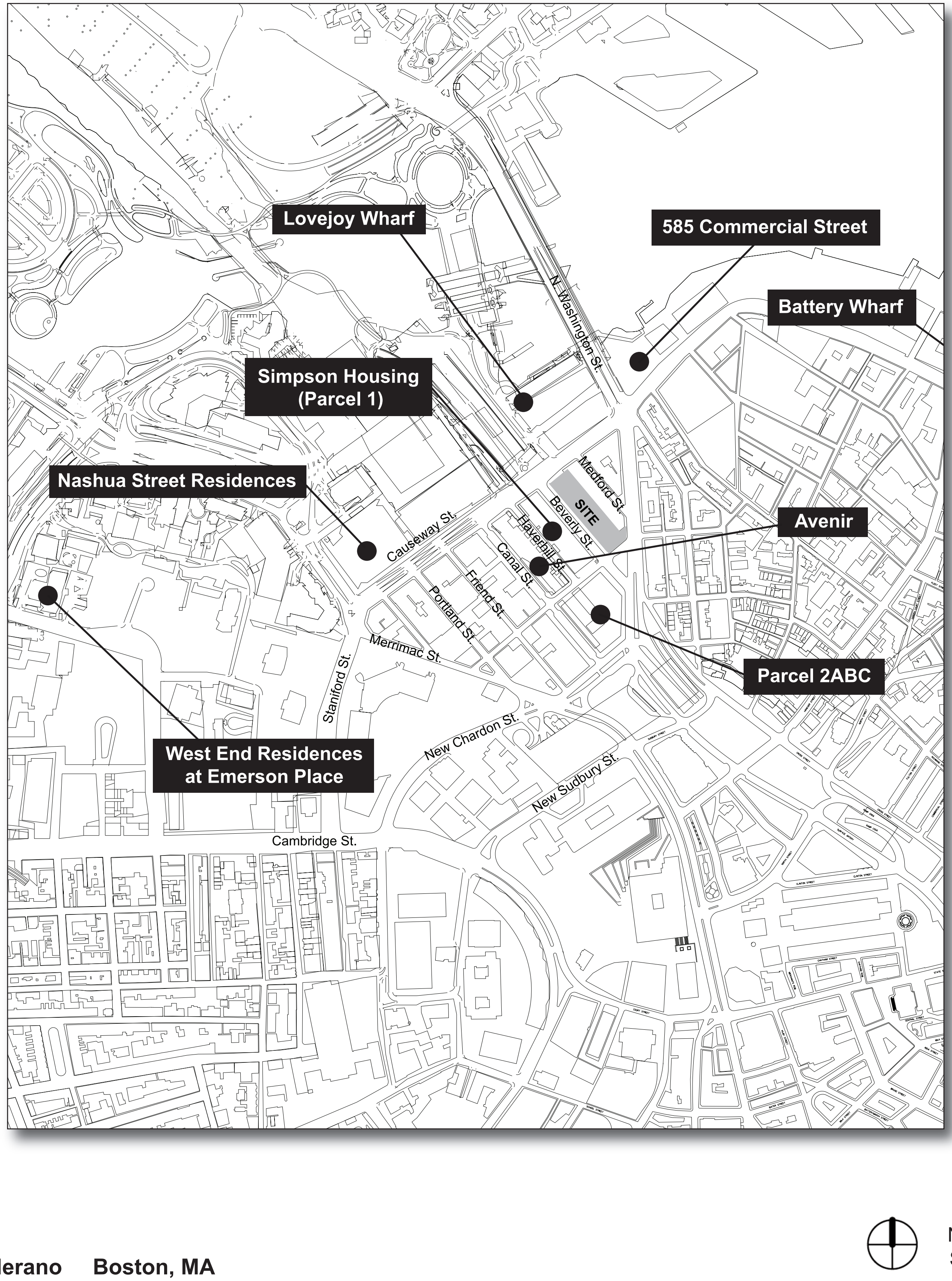

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Figure 2-13
Area Projects

Nashua Street Residences at the Fleet Center. This proposed project includes construction of 373 residential units on Nashua Street adjacent to TD Banknorth Garden. The ground floor will include approximately 8,000 sf of retail space. Parking on-site will be available for 244 vehicles in an above-grade parking structure. Access to the garage will be provided from Nashua Street and Red Auerbach Way.

Lovejoy Wharf. This proposed project includes approximately 250 residential units and 36,400 sf of first-floor retail and restaurant uses in a rehabilitated historic structure at 160 North Washington Street. It also includes a new, two-story pavilion adjacent to the site, with a public elevator to provide access from the street to the wharf and the visitors' center.

585 Commercial Street (Land Swap Scheme). This proposed project is located on Commercial Street in the North End. The Draft Project Impact Report/Draft Environmental Impact Report provides three redevelopment schemes: Environmental Notification Form/ Project Notification Form, Land Swap, and Municipal Harbor Plan (MHP). The preferred scheme is the MHP; however, to provide a conservative estimate, the Land Swap scheme was used for the analysis, since it was the worst case for traffic. The Land Swap scheme consists of 88 residential condominiums, 2,300 sf of café space, 6,000 sf of fitness/spa space, 4 inn rooms, and 24 marina slips. Additionally, 147 parking spaces will be provided on-site.

West End Residences at Emerson Place. This proposed project includes construction of 341 residential units (323 net new units) within four buildings. Parking on-site will be increased from 354 to 677 parking spaces (323 net new spaces): 557 spaces in the garage beneath Building A and 120 spaces in the garage beneath Building C.

Simpson Housing (Parcel 1). This proposed project includes construction of 284 residential apartments, 2,970 sf of ground floor retail, and 11,940 sf of restaurant space. Approximately 142 parking spaces will be provided on-site.

The Bulfinch Triangle Project (Parcels 2ABC). This proposed project includes construction of 5,000 sf of ground floor retail space, 53,000 sf of grocery store space, and 269,000 sf of office space. An above-ground parking lot will be provided with approximately 233 parking spaces.

2.3.1.1 No-Build Roadway Conditions

A number of study area roadway modifications are planned for implementation within the next several years with the completion of the CA/T project:

Causeway Street, an urban minor arterial, runs east–west from Merrimac Street/Lomasney Way to Prince Street. Causeway Street is part of the City's Crossroads Initiative, which will seek to enhance Causeway Street through various infrastructure improvements that are not yet defined.

Valenti Way, a local street, currently runs one-way eastbound from Merrimac Street to Canal Street and one-way westbound from North Washington Street to Beverly Street. A roadway connecting the two segments between Canal Street and Beverly Street has been constructed but is not open to traffic. However, with the completion of the CA/T construction and adjoining development projects, this connection will be opened; the entire length of Valenti Way will then be converted to one-way westbound traffic flow.

Beverly Street, a new local street, is currently open only between Valenti Way and North Washington Street. The remaining segment, running one-way southbound from Causeway Street to North Washington Street, has been constructed but is not yet open to traffic, pending completion of CA/T construction and adjoining development projects. Parking will be allowed on the west side of the street.

Haverhill Street, a new local street, is constructed but not yet open to traffic. When it opens, it will run one-way northbound from Valenti Way to Causeway Street. No parking will be allowed on Haverhill Street. The North Station superstation is located on the east side of the street.

Legends Way currently serves as an access and service driveway to the rear of TD Banknorth Garden. In the future, the MBTA North Station garage will connect to Legends Way.

Canal Street, a local street, currently runs two-way between Causeway Street and New Chardon Street. With completion of the CA/T improvements, Canal Street between New Chardon Street and Valenti Way will run one-way northbound, while the section between Causeway Street and Valenti Way will remain two-way. Parking is provided on both sides of Canal Street.

Medford Street, a local street, currently runs one-way northbound from North Washington Street to Causeway Street and is planned to reverse direction and run southbound under the final CA/T configuration. Parking is provided on both sides of the roadway.

2.3.1.2 No-Build Intersection Conditions

The CA/T project included completion of several new intersections; however, several are not yet open to traffic, and/or final traffic controls are not yet operational. However, in five years, the new configurations and control will be completed and operational.

Signalized Intersections

Causeway Street/Haverhill Street/Legends Way will be a signalized, four-way intersection once the Haverhill Street approach is opened to traffic. The Causeway Street eastbound approach comprises an exclusive left-turn lane and three through travel lanes, while the westbound approach has two general travel lanes. Haverhill Street northbound has an exclusive left-turn lane and a shared through/right-turn lane. The Legends Way southbound approach has one general travel lane. Crosswalks and handicapped ramps are provided for all approaches. Pedestrian phases are concurrent with vehicular movements.

Beverly Street/Valenti Way is a four-way intersection that will be signalized, with Valenti Way operating westbound and Beverly Street southbound. The Valenti Way westbound approach will provide an exclusive left-turn lane, a shared left-turn/through lane, and an exclusive through lane. The Beverly Street southbound approach will consist of three general travel lanes. An exclusive pedestrian phase will be provided. Crosswalks and handicapped ramps are provided for all approaches.

Unsignalized Intersections

North Washington Street/Medford Street will be an unsignalized T intersection once the direction of Medford Street is reversed. The North Washington Street northbound approach will comprise two general travel lanes, while the North Washington Street southbound approach will comprise two general travel lanes. Medford Street southeast-bound will consist of one shared left/right travel lane. A crosswalk and handicapped ramps are provided across Medford Street.

Causeway Street/Medford Street is an unsignalized T intersection. The Causeway Street eastbound approach comprises three general travel lanes, while the Causeway Street westbound approach consists of two general travel lanes. Medford Street's direction will be reversed to provide one-way access to the southeast. A crosswalk and handicapped ramps are provided across Medford Street.

Canal Street/Valenti Street is currently configured as a T intersection with stop control on Valenti Way. The intersection control will be changed to all-way stop-control (AWSC), and the direction of Valenti Way will be reversed. Valenti Way currently operates as one-way eastbound, but it will operate as one-way westbound in the future. The Valenti Way westbound approach will comprise two travel lanes: an exclusive through lane and a shared through/right-turn lane. Canal Street northbound will consist of an exclusive left-turn lane and an exclusive through travel lane. The Canal Street southbound approach will be changed to consist of a right-turn-only lane. Crosswalks and handicapped ramps are provided across all approaches.

Causeway Street/Beverly Street will be an unsignalized T intersection. Causeway Street eastbound comprises three general travel lanes, while Causeway Street westbound consists of an exclusive left-turn lane and two travel lanes. Beverly Street, which is not yet open, will be one-way southbound from Causeway Street, with two travel lanes. A crosswalk and handicapped ramps are provided across Beverly Street. No traffic control devices are provided at the intersection.

Valenti Way/Haverhill Street will be an unsignalized T intersection with only one approach due to one-way configurations. The Valenti Way westbound approach will consist of two general travel lanes. Haverhill Street will be one-way northbound from Valenti Way and comprise two travel lanes. A crosswalk and handicapped ramps will be provided across Haverhill Street. No traffic control devices will be provided at the intersection.

2.3.1.3 No-Build Traffic Operations

The No-Build morning and evening peak-hour traffic volumes are presented in Figure 2-14 and Figure 2-15. The resulting intersection operations are shown in Table 2-10 and Table 2-11. Complete Synchro reports are provided in Appendix B.

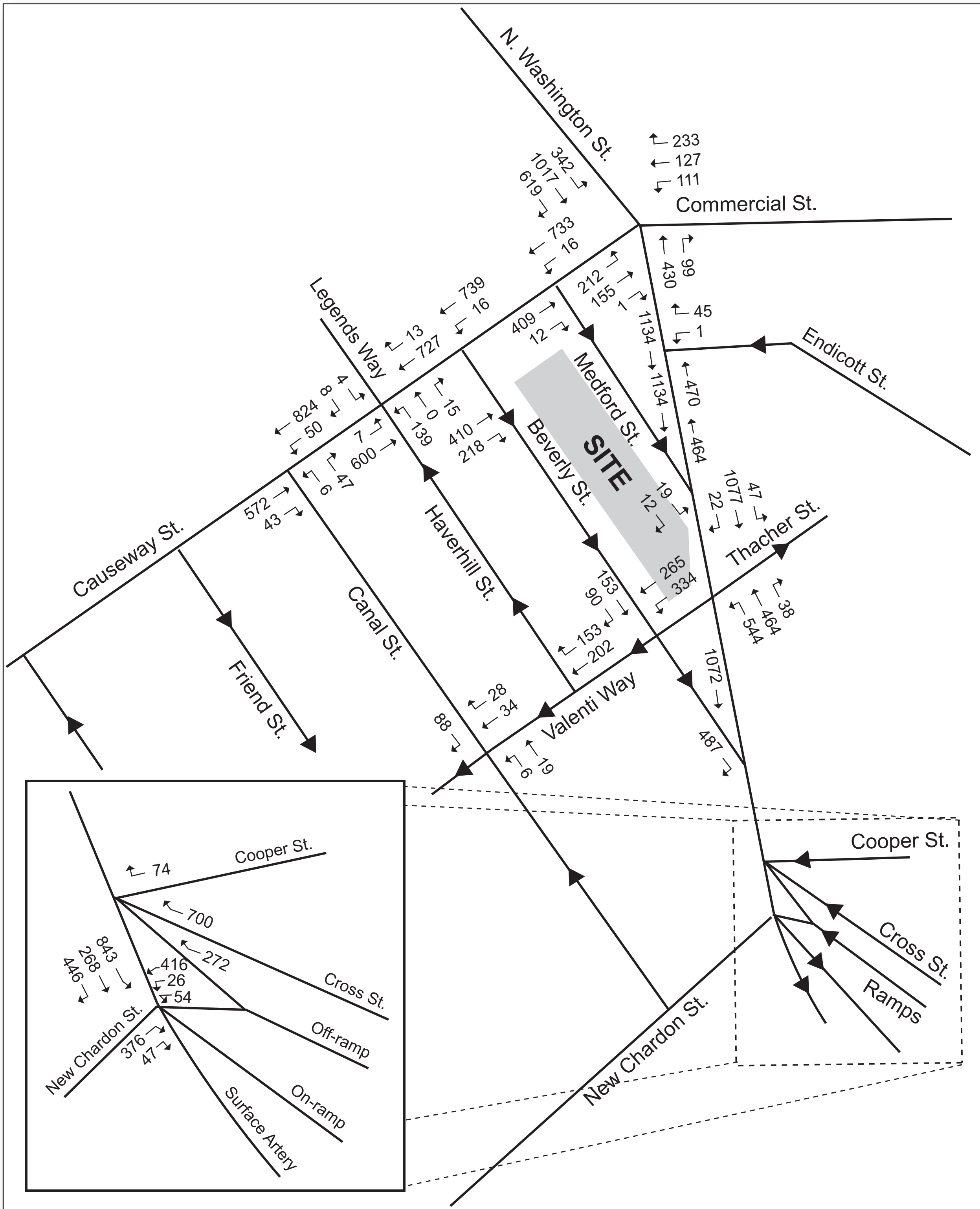

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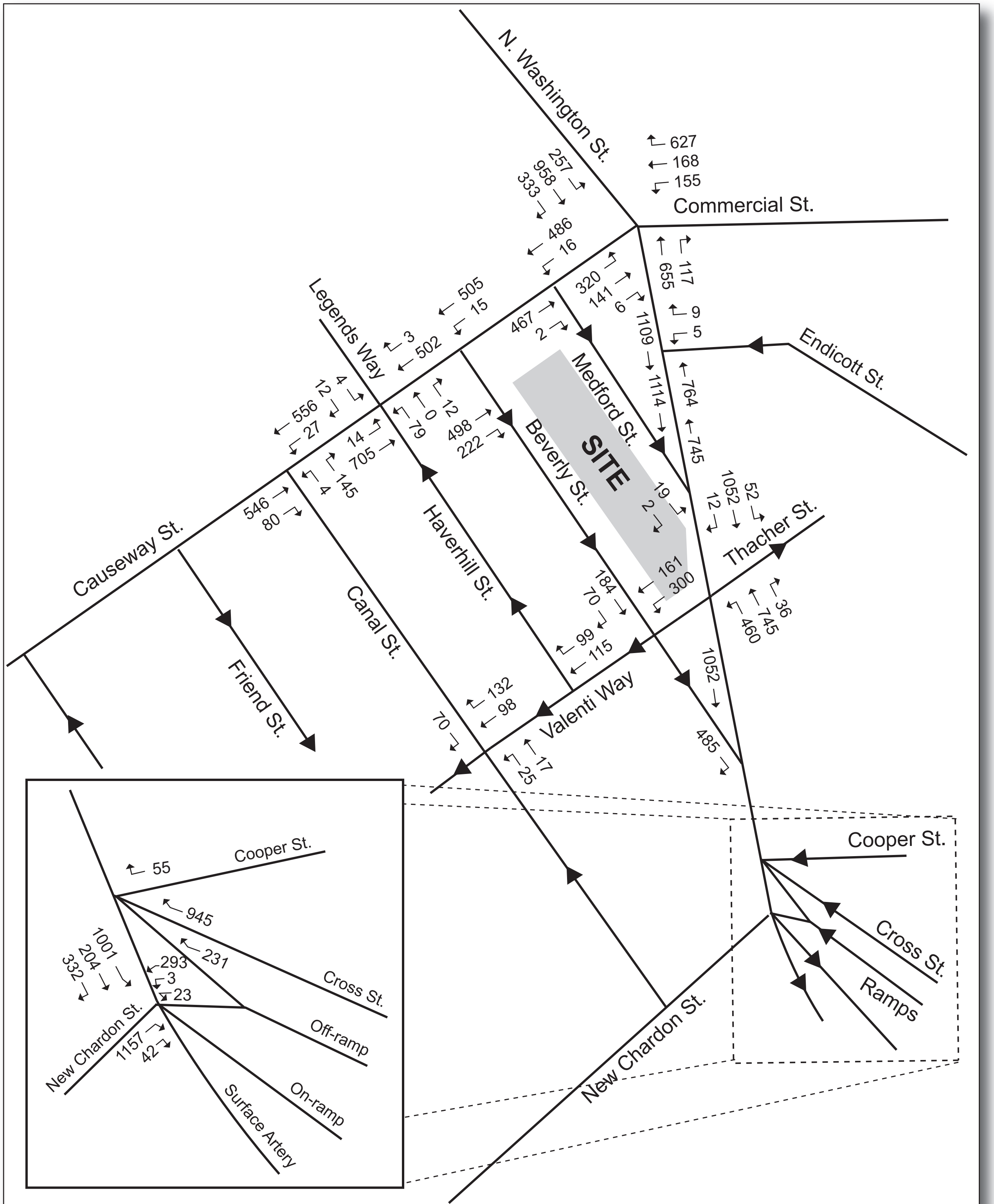
Figure 2-14
No-Build Conditions (2013) Turning Movement Volumes, a.m. Peak Hour



The Merano   Boston, MA

Figure 2-15
No-Build Conditions (2013) Turning Movement Volumes, p.m. Peak Hour

Table 2-10 No-Build Conditions (2013) Level of Service Summary, a.m. Peak Hour

Intersection	LOS	Delay (seconds)	v/c Ratio	95th Percentile Queue
Signalized Intersections				
North Washington Street/Causeway Street	D	40.6	—	—
Causeway EB left	F	> 80	0.87	276
Causeway EB through	F	> 80	0.89	#337
Causeway EB right	D	38.0	0.01	5
Causeway WB left/through	F	> 80	0.80	167
Causeway WB right	B	17.1	0.39	138
N. Washington NB through | through/right	E	57.2	0.76	#457
N. Washington SB left	C	30.6	0.64	352
N. Washington SB through | through/right	C	20.9	0.68	557
N. Washington SB right	C	23.6	0.67	495
North Washington Street/Valenti Way/ Thacher Street	F	> 80	—	—
N. Washington NB left	F	> 80	> 1	#750
N. Washington NB through/right	B	14.5	0.49	229
N. Washington SB left	A	7.3	0.16	24
N. Washington SB through | through/right	C	30.4	0.69	333
North Washington Street/Beverly Street	C	33.2	—	—
N. Washington SB through | through | through	D	44.4	0.90	291
Beverly SEB right | right | right	A	7.7	0.24	67
North Washington Street/Cross Street/ Cooper Street/Sumner Tunnel Off-ramp	B	18.6	—	—
Cooper WB right	A	3.8	0.30	0
Cross NB through | through	A	5.1	0.34	57
Sumner Tunnel NEB left | left	D	47.0	0.73	119
New Chardon Street/Surface Road/I-93 Southbound & Callahan Tunnel On-ramp/ Sumner Tunnel Off-ramp	D	48.6	—	—
New Chardon EB right | right	A	8.1	0.40	159
New Chardon EB hard right	A	2.3	0.11	0
Sumner Tunnel WB hard left/left	C	21.2	0.16	68
Sumner Tunnel WB through | through	C	22.9	0.34	146
Surface SB left | left	E	67.4	0.71	m363
Surface SB through/right	E	68.5	0.77	m329
Surface SB right	E	70.1	0.76	m349

Intersection	LOS	Delay (seconds)	v/c Ratio	95th Percentile Queue
Causeway Street/Haverhill Street/ Legends Way	A	7.7	—	—
Causeway EB left	A	2.4	0.02	m2
Causeway EB through | through | through	A	2.2	0.20	24
Causeway WB through | through/right	A	4.7	0.38	112
Haverhill NB left	D	52.8	0.70	136
Haverhill NB through/right	A	0.1	0.03	0
Legends SB left/through/right	B	19.4	0.05	17
Valenti Way/Beverly Street	B	12.9	—	—
Valenti WB left	A	4.3	0.25	41
Valenti WB left/through | through	B	14.2	0.25	95
Beverly SB through | through/right	B	18.1	0.26	74
Unsignalized Intersections				
North Washington Street/Endicott Street				
Endicott WB left/right	B	11.7	0.11	9
N. Washington NB through | through	A	0.0	0.16	0
N. Washington SB through | through	A	0.0	0.36	0
North Washington Street/Medford Street				
N. Washington NB through | through	A	0.0	0.15	0
N. Washington SB through | through	A	0.0	0.37	0
Medford SEB left/right	D	33.9	0.21	19
Causeway Street/Canal Street				
Causeway EB through	A	0.0	0.25	0
Causeway EB through/right	A	0.0	0.16	0
Causeway WB left/through	A	2.8	0.09	7
Causeway WB through	A	0.0	0.33	0
Canal NB left/right	B	11.8	0.11	9
Causeway Street/Medford Street				
Causeway EB through | through	A	0.0	0.12	0
Causeway EB through/right	A	0.0	0.07	0
Causeway WB left/through	A	0.7	0.02	2
Causeway WB through	A	0.0	0.37	0
Canal Street/Valenti Street	A	7.1	–	–
Valenti WB through	A	6.7	0.03	–
Valenti WB through/right	A	6.3	0.05	–
Canal NB left	A	7.1	0.01	–
Canal NB through	A	6.8	0.03	–
Canal SB right	A	7.6	0.11	–
Causeway Street/Beverly Street				
Causeway EB through | through	A	0.0	0.10	0
Causeway EB through/right	A	0.0	0.19	0
Causeway WB left	B	10.2	0.02	2
Causeway through | through	A	0.0	0.24	0

Intersection	LOS	Delay (seconds)	v/c Ratio	95th Percentile Queue
Valenti Way/Haverhill Street				
Haverhill WB through	A	0.0	0.09	0
Haverhill WB through/right	A	0.0	0.14	0

95th percentile volume exceeds capacity. Queue may be longer. Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.
Shading indicates LOS has worsened from Existing Conditions.

Table 2-11 No-Build Conditions (2013) Level of Service Summary, p.m. Peak Hour

Intersection	LOS	Delay (seconds)	v/c Ratio	95th Percentile Queue
Signalized Intersections				
North Washington Street/Causeway Street	F	> 80	—	—
Causeway EB left	E	68.2	0.76	320
Causeway EB through	E	69.3	0.78	392
Causeway EB right	B	18.2	0.05	2
Causeway WB left*	F	> 80	> 1	#351
Causeway WB through	E	78.7	0.73	#281
Causeway WB right	F	> 80	> 1	#932
N. Washington NB through | through/right	E	55.2	0.84	506
N. Washington SB left	D	44.1	0.71	305
N. Washington SB through | through/right	C	26.7	0.69	435
N. Washington SB right	C	27.9	0.64	317
North Washington Street/Valenti Way/ Thacher Street	F	> 80	—	—
N. Washington NB left	F	> 80	> 1	#670
N. Washington NB through/right	B	15.8	0.70	356
N. Washington SB left	A	7.1	0.20	27
N. Washington SB through | through/right	F	> 80	0.63	263
North Washington Street/Beverly Street	D	38.4	—	—
N. Washington SB through | through | through	D	54.7	0.84	341
Beverly SEB right | right | right	A	3.2	0.24	22
North Washington Street/Cross Street/ Cooper Street/Sumner Tunnel Off-ramp	B	17.4	—	—
Cooper WB right	A	5.6	0.30	0
Cross NB through | through	A	8.8	0.45	m188
Sumner Tunnel NEB left | left	D	47.6	0.68	107
New Chardon Street/Surface Road/I-93 Southbound & Callahan Tunnel On-ramp/ Sumner Tunnel Off-ramp	F	> 80	—	—
New Chardon EB right | right	F	> 80	> 1	m#736
New Chardon EB hard right	A	2.1	0.07	m0
Sumner Tunnel WB hard left/left	B	17.5	0.05	14
Sumner Tunnel WB through | through	B	19.2	0.23	96
Surface SB left | left	F	> 80	0.97	#485
Surface SB through/right	D	45.2	0.67	m228
Surface SB right	D	43.3	0.67	m252

Intersection	LOS	Delay (seconds)	v/c Ratio	95th Percentile Queue
Causeway Street/Haverhill Street/ Legends Way	A	4.7	—	—
Causeway EB left	A	1.5	0.02	m3
Causeway EB through | through | through	A	1.3	0.21	25
Causeway WB through | through/right	A	2.5	0.22	56
Haverhill NB left	E	56.3	0.52	102
Haverhill NB through/right	A	0.2	0.04	1
Legends SB left/through/right	C	22.1	0.09	22
Valenti Way/Beverly Street	C	34.0	—	—
Valenti WB left	C	31.8	0.21	m41
Valenti WB left/through | through	D	39.1	0.21	m54
Beverly SB through | through/right	C	29.2	0.24	92
Unsignalized Intersections				
North Washington Street/Endicott Street				
Endicott WB left/right	D	31.0	0.15	13
N. Washington NB through | through	A	0.0	0.26	0
N. Washington SB through | through	A	0.0	0.42	0
North Washington Street/Medford Street				
N. Washington NB through | through	A	0.0	0.24	0
N. Washington SB through | through	A	0.0	0.35	0
Medford SEB left/right	F	> 50	0.23	21
Causeway Street/Canal Street				
Causeway EB through	A	0.0	0.22	0
Causeway EB through/right	A	0.0	0.17	0
Causeway WB left/through	A	1.8	0.04	3
Causeway WB through	A	0.0	0.23	0
Canal NB left/right	B	13.0	0.34	37
Causeway Street/Medford Street				
Causeway EB through | through	A	0.0	0.14	0
Causeway EB through/right	A	0.0	0.07	0
Causeway WB left/through	A	0.9	0.02	2
Causeway WB through	A	0.0	0.25	0
Canal Street/Valenti Street	A	7.4	–	–
Valenti WB through	A	7.1	0.09	–
Valenti WB through/right	A	7.2	0.21	–
Canal NB left	A	7.7	0.04	–
Canal NB through	A	7.1	0.04	–
Canal SB right	A	8.0	0.10	–

Intersection	LOS	Delay (seconds)	v/c Ratio	95th Percentile Queue
Causeway Street/Beverly Street				
Causeway EB through | through	A	0.0	0.13	0
Causeway EB through/right	A	0.0	0.21	0
Causeway WB left	B	10.1	0.02	2
Causeway through | through	A	0.0	0.16	0
Valenti Way/Haverhill Street				
Haverhill WB through	A	0.0	0.05	0
Haverhill WB through/right	A	0.0	0.09	0

* *De facto* left turn.
\# 95th percentile volume exceeds capacity. Queue may be longer. Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.
Shading indicates LOS has worsened from Existing Conditions.

The following intersections and/or approaches experience a worsening in LOS from Existing Conditions to No-Build Conditions:

North Washington Street/Causeway Street. This intersection continues to operate at LOS D during the a.m. peak hour, but will worsen from LOS E to LOS F overall during the p.m. peak hour. During the a.m. peak hour, the Causeway Street eastbound right-turn approach will worsen to LOS D; the Causeway Street westbound left-turn/through approach will worsen to LOS F. During both peak hours, the North Washington Street northbound through/right-turn approach will worsen to LOS E; during the p.m. peak hour, the North Washington Street left-turn approach will worsen to LOS D.

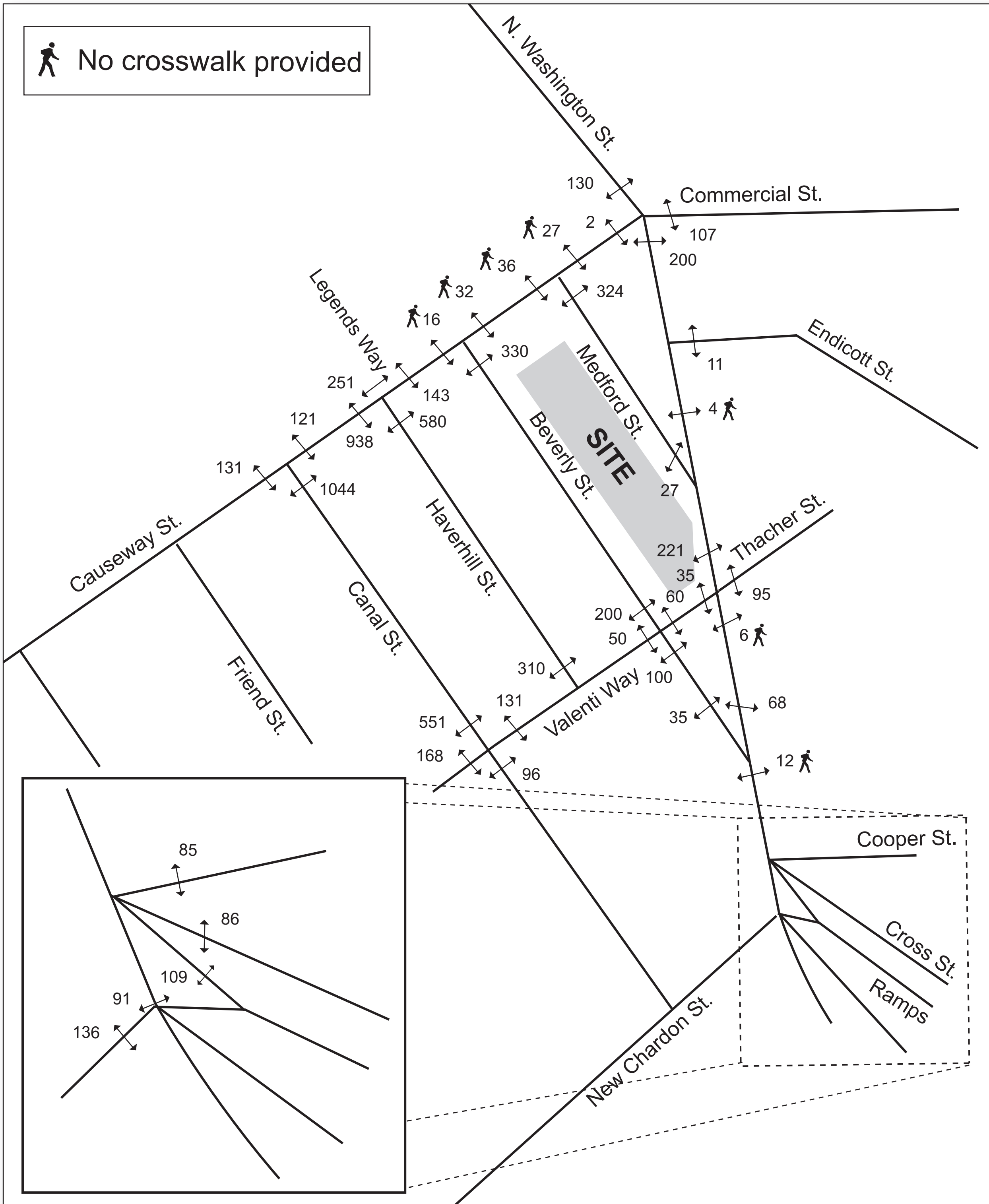
North Washington Street/Valenti Way/Thacher Street. During the p.m. peak hour, operations at this intersection will worsen from LOS E to LOS F. During both the a.m. and the p.m. peak hours, the North Washington Street northbound left-turn approach will worsen to LOS F.

Causeway Street/Beverly Street. During the p.m. peak hour, the Causeway Street westbound left-turn approach operates at LOS B.

All other intersections and intersection approaches under No-Build Conditions continue to operate at the same LOS or better LOS as under Existing Conditions.

2.3.1.4 No-Build Pedestrian Operations

Applying a background growth rate of 1% per year to existing pedestrian volumes, the study team calculated No-Build pedestrian level of service. Results are shown in Figure 2-16, Figure 2-17, and Table 2-12.



Not to Scale

HOWARD/STEIN-HUDSON ASSOCIATES

Figure 2-16

No-Build Conditions (2013) Pedestrian Volumes, a.m. Peak Hour

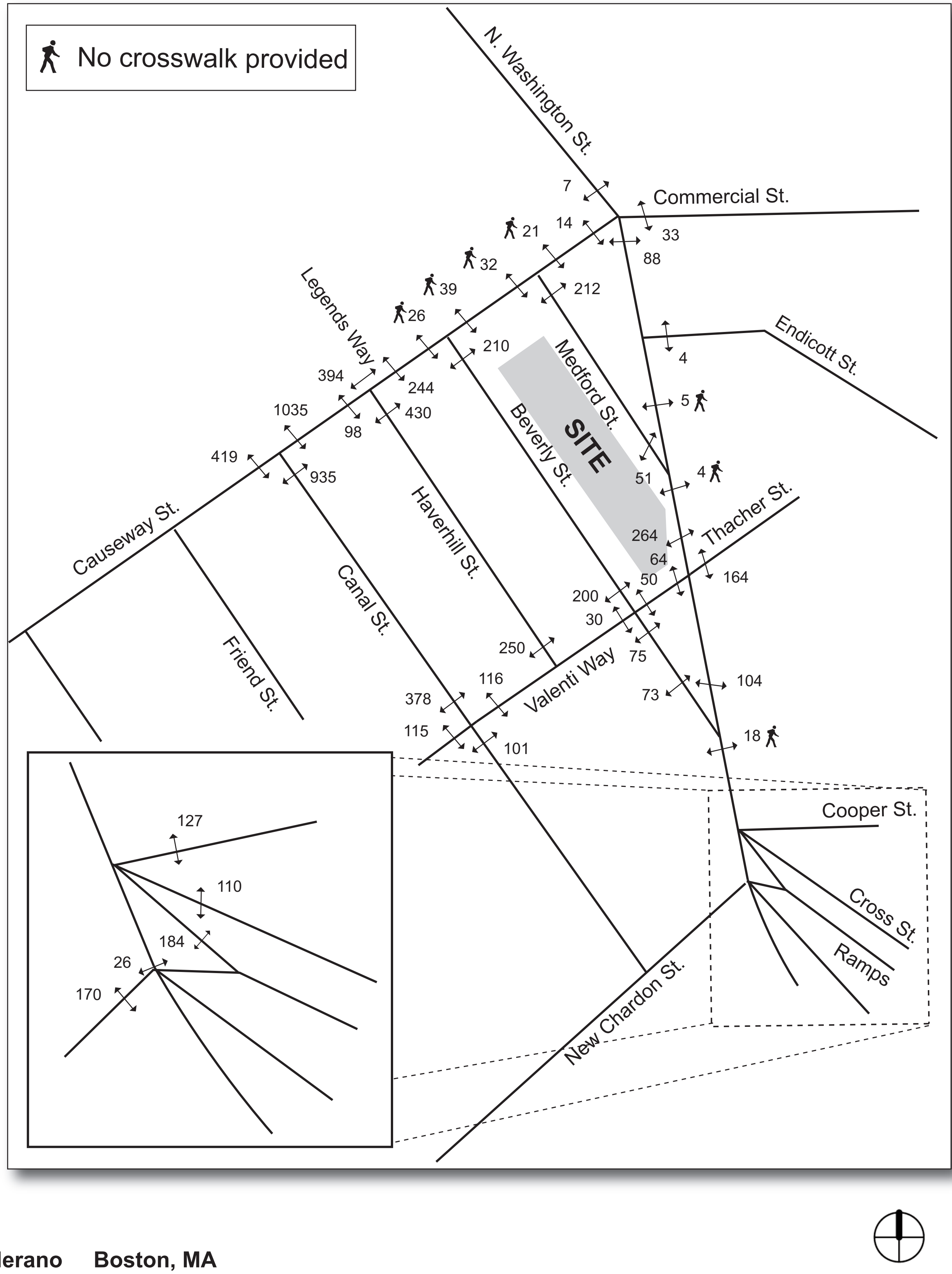


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Figure 2-17
No-Build Conditions (2013) Pedestrian Volumes, p.m. Peak Hour

Table 2-12 No-Build Conditions (2013) Pedestrian Level of Service, Peak Hours

Intersection	Delay LOS		Space LOS	
	a.m.	p.m.	a.m.	p.m.
Signalized Intersections				
North Washington Street/Causeway Street				
Causeway East Crosswalk	B	B	A	A
Causeway West Crosswalk	B	B	A	A
N. Washington North Crosswalk	C	C	A	A
N. Washington South Crosswalk	C	C	A	A
North Washington Street/Valenti Way/Thacher Street				
Thacher East Crosswalk	A	A	A	A
Valenti West Crosswalk	A	A	A	A
N. Washington North Crosswalk	C	C	A	A
North Washington Street/Beverly Street				
Beverly North Crosswalk	A	B	A	A
N. Washington North Crosswalk	B	B	A	A
North Washington Street/Cross Street/Cooper Street/ Sumner Tunnel Off-ramp				
Cooper East Crosswalk	A	A	A	A
Sumner West Crosswalk	A	A	A	A
Cross South Crosswalk	B	B	A	A
New Chardon Street/Surface Road/I-93 Southbound & Callahan Tunnel On-ramp/Sumner Tunnel Off-ramp				
New Chardon West Crosswalk	A	B	A	A
Surface North Crosswalk	A	A	A	A
Causeway Street/Haverhill Street/Legends Way				
Causeway East Crosswalk	B	B	A	A
Causeway West Crosswalk	B	B	B	A
Legends North Crosswalk	A	A	A	A
Haverhill South Crosswalk	A	A	A	A
Beverly Street/Valenti Way				
Valenti East Crosswalk	B	B	A	A
Valenti West Crosswalk	B	B	A	A
Beverly North Crosswalk	A	A	A	A
Beverly South Crosswalk	D	D	A	A

Unsignalized Intersections				
	Delay LOS		Space LOS	
Intersection	a.m.	p.m.	a.m.	p.m.
North Washington Street/Endicott Street				
Endicott East Crosswalk	A	A	—	—
North Washington Street/Medford Street				
Medford West Crosswalk	A	A	—	—
Causeway Street/Canal Street				
Causeway East Crosswalk	F	F	—	—
Causeway West Crosswalk	F	F	—	—
Canal South Crosswalk	A	A	—	—
Causeway Street/Medford Street				
Medford South Crosswalk	A	A	—	—
Canal Street/Valenti Way				
Valenti East Crosswalk	A	A	—	—
Valenti West Crosswalk	A	A	—	—
Canal North Crosswalk	A	A	—	—
Canal South Crosswalk	A	A	—	—
Causeway Street/Beverly Street				
Beverly South Crosswalk	B	A	—	—
Valenti Way/Haverhill Street				
Haverhill North Crosswalk	A	A	—	—

None of the crosswalks within the study area worsen to operate at unacceptable delay or space LOS under No-Build Conditions.

2.3.2 Build Conditions

The proposed Project includes a 153-room, short-term stay hotel; a 121-room, long-term stay hotel; 213,000 sf of office space; 19,000 sf of retail space; and 17,000 sf of restaurant space. The Project also includes 226 above-ground stacked parking spaces in the second floor of the building.

2.3.2.1 Site Access and Circulation

Vehicular Access

The West Site Driveway at Beverly Street and the South Site Driveway at Valenti Way will both provide two-way vehicular access to and from the site, as shown in Figure 2-18. Ramps to the parking level will connect to both driveways.

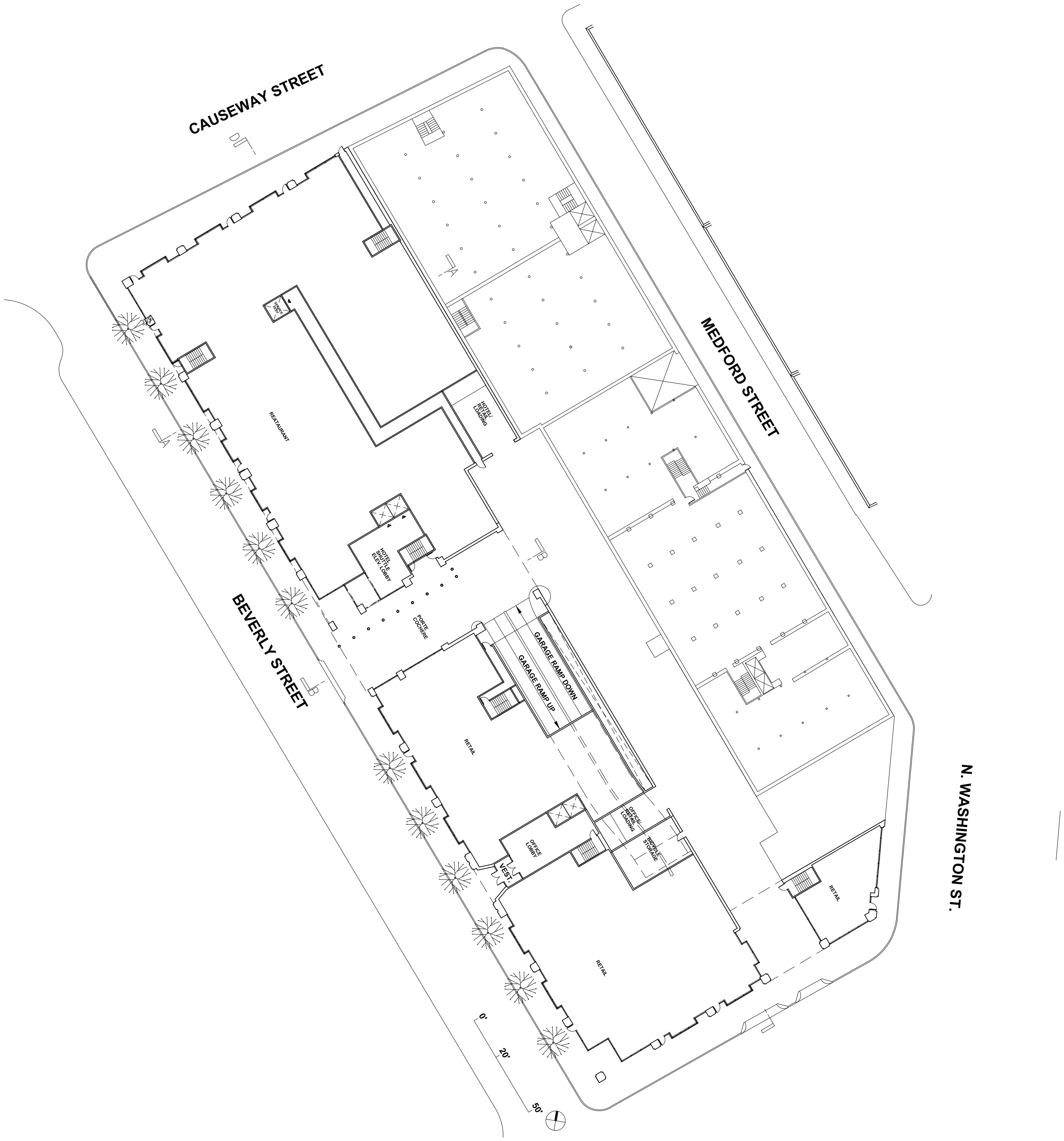

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Figure 2-18
Site Plan

Passenger vehicles associated with the hotels will primarily use the West Site Driveway to reach the *porte cochère,* the main hotel entrance. Valets will take guest vehicles from the *porte cochère* into the parking garage. Passenger vehicles of office, retail, and restaurant employees will enter and exit the site through either driveway. Delivery vehicles as well as trash and recycling vehicles will use the South Site Driveway to reach the internal loading and service areas. The largest vehicle expected to use the loading docks is an SU-35, similar in size to a heavy garbage truck. Truck maneuvers into and out of the loading and service areas are presented in Appendix B.

Pedestrian Access

The hotel lobby will be located off Beverly Street, adjacent to the *porte cochère*. The office lobby will also be located off Beverly Street. The restaurant spaces will have multiple doorways located along Causeway Street and along Beverly Street. Retail spaces will have doorways along Beverly Street, Valenti Way, and North Washington Street. Figure 2-18, above, illustrates the various pedestrian access locations.

2.3.2.2 Trip Generation and Mode Split

Trip generation estimates for the Project use rates were derived from Institute of Transportation Engineers' (ITE) *Trip Generation* (7th edition, 2003) fitted curve equations and average trip rates. The following ITE land use codes (LUCs) were used to develop the new Project-related trips:

Land Use Code 310 — Hotel. A hotel is defined as a place of lodging that provides sleeping accommodations and supporting facilities, including restaurants, cocktail lounges, meeting and banquet rooms or convention facilities, limited recreational facilities, or other retail and service shops. Calculations of the number of vehicle trips use ITE's average rate per room.

Land Use Code 710 — General Office. General office is defined as an office building containing multiple tenants. An office building typically contains a mixture of professional services. Calculations of the number of vehicle trips use ITE's average rate per 1,000 square feet.

Land Use Code 820 — Shopping Center. A shopping center is defined as an integrated group of commercial establishments that is planned, developed, owned, and managed as a unit. A shopping center's composition is related to its market area in terms of size, location, and type of store. Due to the Project's Bulfinch Triangle location, the retail activity is expected to exhibit the trip generation characteristics of a portion of a shopping district. Therefore, LUC 820 is the most comparable category for trip generation. Calculations of the number of vehicle trips use ITE's fitted curve equation.

LUC 931 — Quality Restaurant. A quality restaurant has a turnover rate of at least one hour or longer. Typically, the restaurant is open for lunch and dinner and is not part of a chain restaurant. Calculations of the number of vehicle trips use ITE's average rate per 1,000 sf.

2.3.2.3 Internal Trips

Some trips to and from the ground floor retail and restaurant uses are expected to be internal trips, or trips that are made between locations within the Project, not making use of the adjacent transportation facilities. ITE has found that "a key characteristic of a multi-use development is that trips among the various land uses can be made on-site and that these internal trips are not made on the major street system."

ITE provides a methodology for estimating internal capture rates, percentage reductions that are applied to trip generation estimates to account for internal trips. Capture rates based on previous studies of multi-use sites are published for various land use pairings by ITE. These rates are then applied to the unadjusted vehicle trips generated by the different uses at the project being studied, and the lower resulting capture from each land use pair is used.

For the Project, the study team applied capture rates determined through the ITE methodology for daily and p.m. peak-hour trips for the proposed uses at the site. No capture was assumed during the a.m. peak hour.

2.3.2.4 Mode Split

Mode split data were based on BTD guidelines for Area 1. National and local vehicle occupancy rates (VOR) were derived from 2000 U.S. Census Journey to Work Data and the Nationwide Personal Transportation Survey. These values are summarized in Table 2-13.

Table 2-13 Mode Split Assumptions

Time Period		Walk/Bike Share	Transit Share	Auto Share	Local Vehicle Occupancy Rate
Daily					
Hotel or Retail	In	54%	15%	31%	1.8
	Out	54%	15%	31%	1.8
Office	In	27%	30%	43%	1.2
	Out	27%	30%	43%	1.2
Restaurant	In	54%	15%	31%	2.1
	Out	54%	15%	31%	2.1
a.m. Peak Hour					
Hotel or Retail	In	57%	16%	27%	1.8
	Out	60%	13%	27%	1.8
Office	In	29%	33%	38%	1.2
	Out	33%	29%	38%	1.2
Restaurant	In	57%	16%	27%	2.1
	Out	60%	13%	27%	2.1
p.m. Peak Hour					
Hotel or Retail	In	60%	13%	27%	1.8
	Out	57%	16%	27%	1.8
Office	In	33%	29%	38%	1.2
	Out	29%	33%	38%	1.2
Restaurant	In	60%	13%	27%	2.1
	Out	57%	16%	27%	2.1

The new vehicle trips generated by the proposed development appear in Table 2-14. Detailed trip generation data for the Project are provided in Appendix BE.

Table 2-14 Vehicle Trip Generation

Time Period	Hotel	Office	Retail	Restaurant	Total
Daily					
In	283	480	241	136	1,140
Out	283	480	241	136	1,140
a.m. Peak Hour					
In	25	110	10	3	148
Out	16	15	6	1	38
p.m. Peak Hour					
In	18	19	22	16	75
Out	16	99	20	7	142

The Project is expected to add 2,280 new vehicle trips per day to local streets — 1,140 entering vehicles and 1,140 exiting vehicles. During the weekday a.m. peak hour, the Project will generate 148 entering and 38 exiting vehicle trips; during the weekday p.m. peak hour, 75 entering and 142 exiting vehicle trips will be generated.

2.3.2.5 Trip Distribution

The study team developed vehicular trip distribution data based on BTD guidelines, using origin destination characteristics for Area 1, an area defined by BTD for mode split and trip distribution. The trip distribution for the Project appears in Figure 2-19. Figure 2-20 and Figure 2-21 show Project trips added to the study area intersections.

2.3.2.6 Build Conditions Traffic Operations

Build traffic volumes are shown in Figure 2-22 and Figure 2-23. The resulting Build traffic operations in the 2013 Build year are presented in Table 2-15 and Table 2-16. Full Synchro analysis reports are provided in Appendix B.

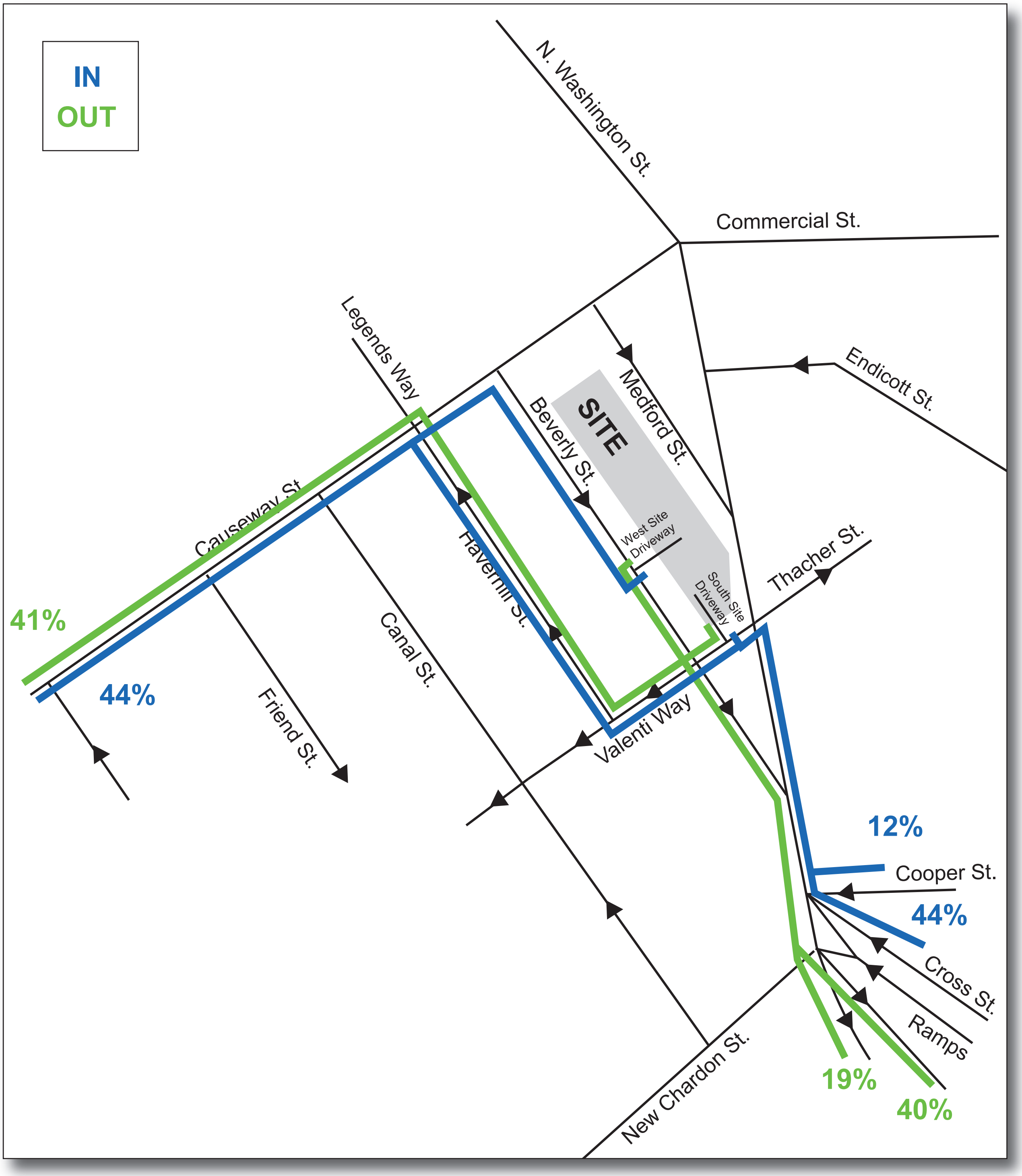

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Figure 2-19
Vehicular Trip Distribution

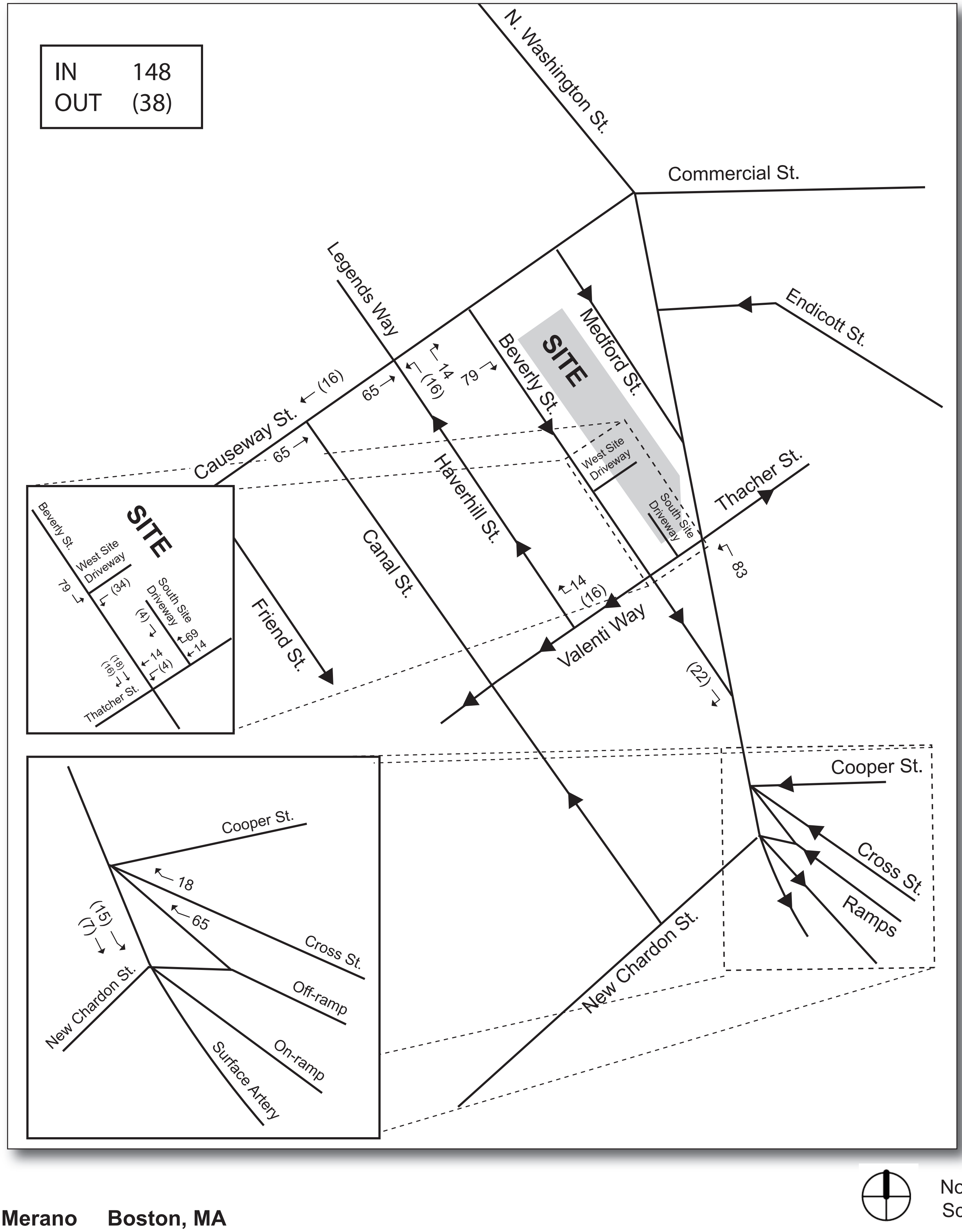

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Figure 2-20

Project-generated Vehicle Trips, a.m. Peak Hour

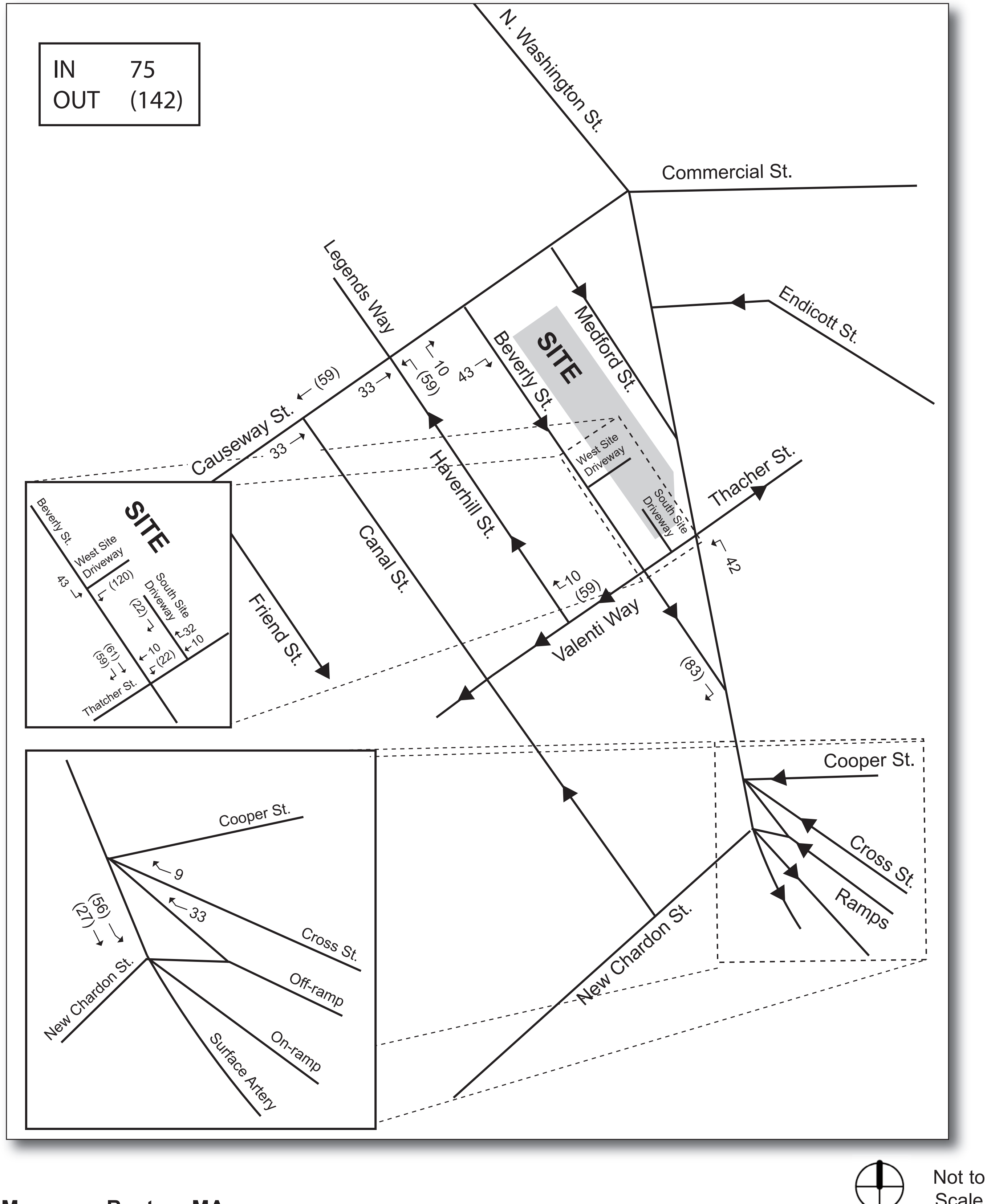

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Figure 2-21

Project-generated Vehicle Trips, p.m. Peak Hour

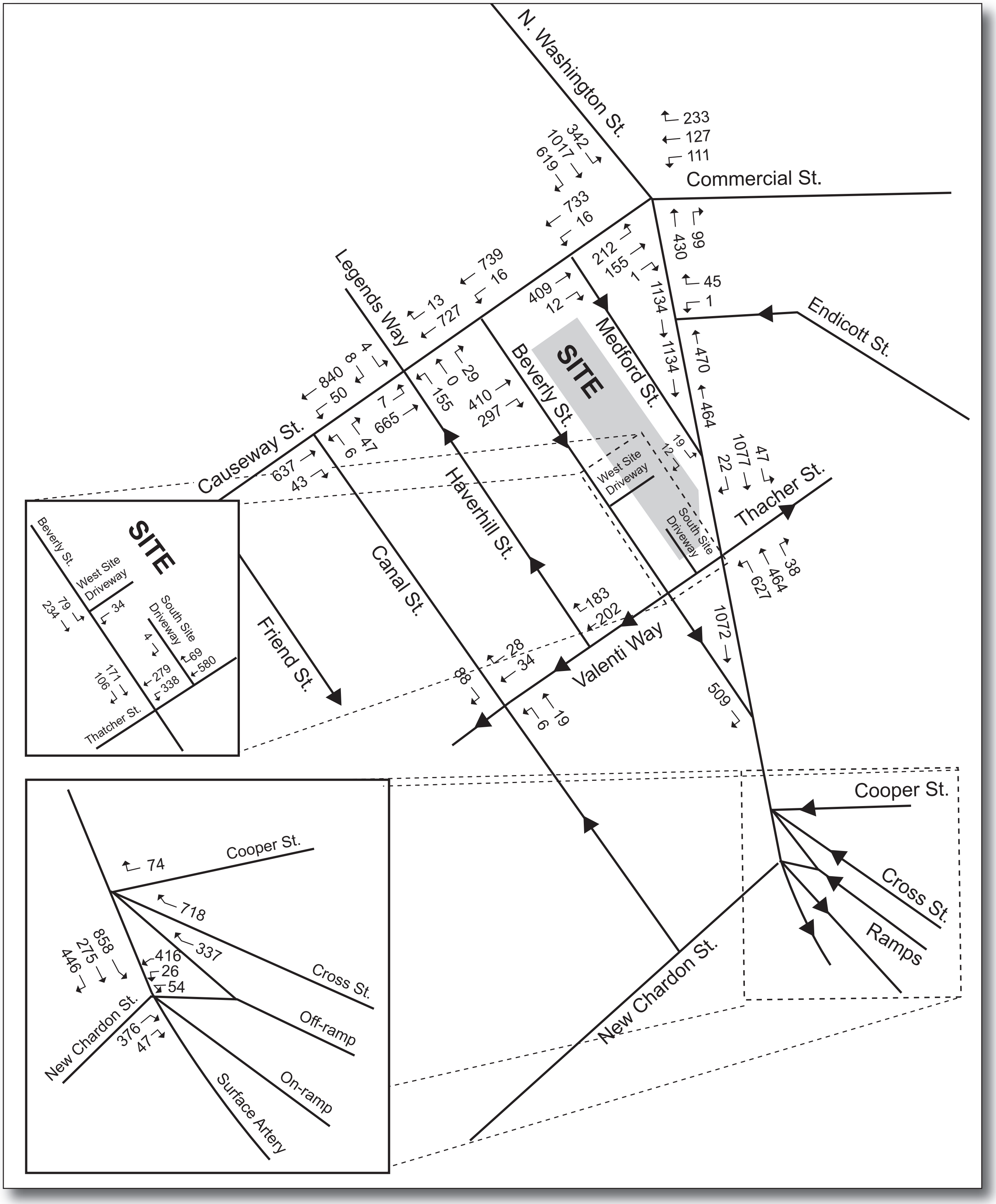

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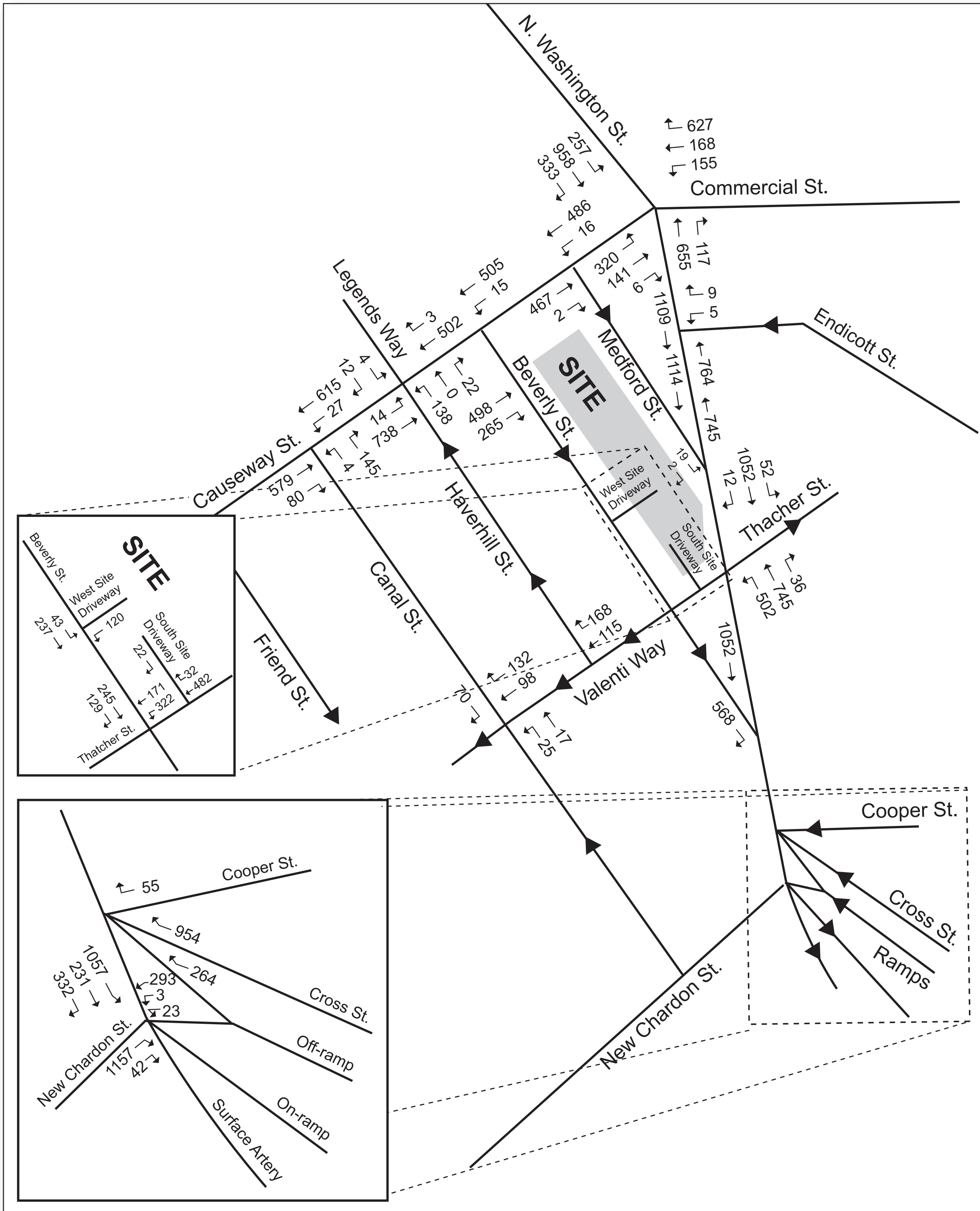
Figure 2-22

Build Conditions (2013) Turning Movement Counts, a.m. Peak Hour



Not to Scale

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Figure 2-23

Build Conditions (2013) Turning Movement Counts, p.m. Peak Hour

Table 2-15 Build Conditions (2013) Level of Service Summary, a.m. Peak Hour

Intersection	LOS	Delay (seconds)	v/c Ratio	95th Percentile Queue
Signalized Intersections				
North Washington Street/Causeway Street	**D**	**40.6**	—	—
Causeway EB left	F	> 80	0.87	276
Causeway EB through	F	> 80	0.89	#337
Causeway EB right	D	38.0	0.01	5
Causeway WB left/through	F	> 80	0.80	167
Causeway WB right	B	17.2	0.39	138
N. Washington NB through | through/right	E	57.2	0.76	#457
N. Washington SB left	C	30.6	0.64	352
N. Washington SB through | through/right	C	20.9	0.68	557
N. Washington SB right	C	23.6	0.67	495
North Washington Street/Valenti Way/ Thacher Street	**F**	**> 80**	—	—
N. Washington NB left	F	> 80	> 1	#880
N. Washington NB through/right	B	14.5	0.49	229
N. Washington SB left	A	7.3	0.16	24
N. Washington SB through | through/right	C	30.4	0.69	333
North Washington Street/Beverly Street	**C**	**33.0**	—	—
N. Washington SB through | through | through	D	44.4	0.90	291
Beverly SEB right | right | right	A	8.1	0.25	72
North Washington Street/Cross Street/ Cooper Street/Sumner Tunnel Off-ramp	**C**	**21.1**	—	—
Cooper WB right	A	6.6	0.32	13
Cross NB through | through	A	5.9	0.36	65
Sumner Tunnel NEB left | left	D	46.8	0.77	140
New Chardon Street/Surface Road/I-93 Southbound & Callahan Tunnel On-ramp/ Sumner Tunnel Off-ramp	**D**	**49.8**	—	—
New Chardon EB right | right	A	8.1	0.40	159
New Chardon EB hard right	A	2.3	0.11	0
Sumner Tunnel WB hard left/left	C	21.2	0.16	68
Sumner Tunnel WB through | through	C	22.9	0.34	146
Surface SB left | left	E	70.2	0.72	m371
Surface SB through/right	E	68.7	0.77	m334
Surface SB right	E	70.6	0.76	m352

Intersection	LOS	Delay (seconds)	v/c Ratio	95th Percentile Queue
Causeway Street/Haverhill Street/ Legends Way	A	8.0	—	—
Causeway EB left	A	2.6	0.02	m2
Causeway EB through | through | through	A	2.3	0.22	26
Causeway WB through | through/right	A	5.1	0.39	117
Haverhill NB left	D	53.3	0.73	148
Haverhill NB through/right	A	0.3	0.07	0
Legends SB left/through/right	B	18.8	0.05	17
Valenti Way/Beverly Street	B	13.4	—	—
Valenti WB left	A	4.4	0.26	42
Valenti WB left/through | through	B	15.0	0.26	101
Beverly SB through | through/right	B	18.0	0.30	83
Unsignalized Intersections				
North Washington Street/Endicott Street				
Endicott WB left/right	B	11.7	0.11	9
N. Washington NB through | through	A	0.0	0.16	0
N. Washington SB through | through	A	0.0	0.36	0
North Washington Street/Medford Street				
N. Washington NB through | through	A	0.0	0.15	0
N. Washington SB through | through	A	0.0	0.37	0
Medford SEB left/right	D	33.9	0.21	19
Causeway Street/Canal Street				
Causeway EB through	A	0.0	0.27	0
Causeway EB through/right	A	0.0	0.17	0
Causeway WB left/through	A	2.9	0.09	8
Causeway WB through	A	0.0	0.34	0
Canal NB left/right	B	12.4	0.12	10
Causeway Street/Medford Street				
Causeway EB through | through	A	0.0	0.12	0
Causeway EB through/right	A	0.0	0.07	0
Causeway WB left/through	A	0.7	0.02	2
Causeway WB through	A	0.0	0.37	0
Canal Street/Valenti Street	A	7.1	—	—
Valenti WB through	A	6.7	0.03	—
Valenti WB through/right	A	6.3	0.05	—
Canal NB left	A	7.1	0.01	—
Canal NB through	A	6.8	0.03	—
Canal SB right	A	7.6	0.11	—
Causeway Street/Beverly Street				
Causeway EB through | through	A	0.0	0.10	0
Causeway EB through/right	A	0.0	0.24	0
Causeway WB left	B	10.6	0.03	2
Causeway through | through	A	0.0	0.24	0

Intersection	LOS	Delay (seconds)	v/c Ratio	95th Percentile Queue
Valenti Way/Haverhill Street				
Haverhill WB through	A	0.0	0.09	0
Haverhill WB through/right	A	0.0	0.16	0
Beverly Street/West Site Driveway				
Driveway WB left	B	11.0	0.06	5
Beverly SB left/through	A	3.9	0.05	4
Beverly SB through	A	0.0	0.10	0
Valenti Way/South Site Driveway				
Valenti WB through | through	A	0.0	0.15	0
Valenti WB through/right	A	0.0	0.12	0
Driveway SB right	A	9.8	0.01	0

95th percentile volume exceeds capacity. Queue may be longer. Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.
Shading indicates LOS has worsened from No-Build Conditions.

Table 2-16 Build Conditions (2013) Level of Service Summary, p.m. Peak Hour

Intersection	LOS	Delay (seconds)	v/c Ratio	95th Percentile Queue
Signalized Intersections				
North Washington Street/Causeway Street	F	> 80	—	—
Causeway EB left	E	68.2	0.76	320
Causeway EB through	E	69.3	0.78	392
Causeway EB right	B	18.2	0.05	2
Causeway WB left*	F	> 80	> 1	#351
Causeway WB through	E	78.7	0.73	#281
Causeway WB right	F	> 80	> 1	#932
N. Washington NB through | through/right	E	55.2	0.84	506
N. Washington SB left	D	44.1	0.71	305
N. Washington SB through | through/right	C	26.7	0.69	435
N. Washington SB right	C	27.9	0.64	317
North Washington Street/Valenti Way/ Thacher Street	F	> 80	—	—
N. Washington NB left	F	> 80	> 1	#739
N. Washington NB through/right	B	15.6	0.70	362
N. Washington SB left	A	7.1	0.20	27
N. Washington SB through | through/right	F	> 80	0.63	263
North Washington Street/Beverly Street	D	36.7	—	—
N. Washington SB through | through | through	D	54.7	0.84	341
Beverly SEB right | right | right	A	3.4	0.28	29
North Washington Street/Cross Street/ Cooper Street/Sumner Tunnel Off-ramp	B	19.1	—	—
Cooper WB right	A	8.5	0.32	5
Cross NB through | through	A	10.0	0.46	m218
Sumner Tunnel NEB left | left	D	47.3	0.71	118
New Chardon Street/Surface Road/I-93 Southbound & Callahan Tunnel On-ramp/ Sumner Tunnel Off-ramp	F	> 80	—	—
New Chardon EB right | right	F	> 80	> 1	m#736
New Chardon EB hard right	A	2.1	0.07	m0
Sumner Tunnel WB hard left/left	B	17.5	0.05	14
Sumner Tunnel WB through | through	B	19.2	0.23	96
Surface SB left | left	F	>80	> 1	#528
Surface SB through/right	D	51.7	0.70	m240
Surface SB right	D	43.7	0.70	m265

Intersection	LOS	Delay (seconds)	v/c Ratio	95th Percentile Queue
Causeway Street/Haverhill Street/ Legends Way	A	7.9	—	—
Causeway EB left	A	2.2	0.03	m4
Causeway EB through | through | through	A	2.1	0.24	34
Causeway WB through | through/right	A	4.0	0.24	73
Haverhill NB left	E	62.4	0.69	156
Haverhill NB through/right	A	0.5	0.06	2
Legends SB left/through/right	B	19.1	0.07	20
Valenti Way/Beverly Street	C	32.1	—	—
Valenti WB left	C	31.3	0.22	m40
Valenti WB left/through | through	D	38.8	0.22	m53
Beverly SB through | through/right	C	26.6	0.35	120
Unsignalized Intersections				
North Washington Street/Endicott Street				
Endicott WB left/right	D	31.0	0.15	13
N. Washington NB through | through	A	0.0	0.26	0
N. Washington SB through | through	A	0.0	0.42	0
North Washington Street/Medford Street				
N. Washington NB through | through	A	0.0	0.24	0
N. Washington SB through | through	A	0.0	0.35	0
Medford SEB left/right	F	> 50	0.23	21
Causeway Street/Canal Street				
Causeway EB through	A	0.0	0.24	0
Causeway EB through/right	A	0.0	0.17	0
Causeway WB left/through	A	1.7	0.04	3
Causeway WB through	A	0.0	0.25	0
Canal NB left/right	B	13.2	0.34	38
Causeway Street/Medford Street				
Causeway EB through | through	A	0.0	0.14	0
Causeway EB through/right	A	0.0	0.07	0
Causeway WB left/through	A	0.9	0.02	2
Causeway WB through	A	0.0	0.25	0
Canal Street/Valenti Street	A	7.4	—	—
Valenti WB through	A	7.1	0.09	—
Valenti WB through/right	A	7.2	0.21	—
Canal NB left	A	7.7	0.04	—
Canal NB through	A	7.1	0.04	—
Canal SB right	A	8.0	0.10	—

Intersection	LOS	Delay (seconds)	v/c Ratio	95th Percentile Queue
Causeway Street/Beverly Street				
Causeway EB through | through	A	0.0	0.13	0
Causeway EB through/right	A	0.0	0.23	0
Causeway WB left	B	10.3	0.02	2
Causeway through | through	A	0.0	0.16	0
Valenti Way/Haverhill Street				
Haverhill WB through	A	0.0	0.05	0
Haverhill WB through/right	A	0.0	0.13	0
Beverly Street/West Site Driveway				
Driveway WB left	B	11.0	0.18	16
Beverly SB left/through	A	2.7	0.03	2
Beverly SB through	A	0.0	0.10	0
Valenti Way/South Site Driveway				
Valenti WB through | through	A	0.0	0.12	0
Valenti WB through/right	A	0.0	0.08	0
Driveway SB right	A	9.5	0.03	2

* *De facto* left turn.
\# 95th percentile volume exceeds capacity. Queue may be longer. Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.
Shading indicates LOS has worsened from No-Build Conditions.

Under Build Conditions, all intersections and approaches operate at the same LOS as under No-Build Conditions during peak hours, with the exception of North Washington Street/Cross Street/Cooper Street during the a.m. peak hour, which worsens from overall LOS B to overall LOS C. This would still be an acceptable LOS during peak hours for this area.

Intersections for both Project driveways will operate at either LOS A or LOS B during both peak hours.

2.3.2.7 Parking

The Project will construct 226 new parking spaces on-site. The parking garage will employ stackers, and 10 spaces will be configured in tandem. Spaces will be provided for hotel guests as well as for employees of offices, retail uses, and restaurants, and hotel guests.

2.3.2.8 Public Transportation

Based on the trip generation calculations, the Project is expected to generate 1,992 (996 boarding and 996 alighting) transit trips each weekday. The Project will add 190 transit trips (34 boarding and 156 alighting) during the a.m. peak hour and 219 transit trips (150 boarding and 69 alighting) during the p.m. peak hour (see Table 2-17). These trips will be dispersed on the various inbound and outbound transit lines in the study area.

Table 2-17 Transit Trip Generation

Time Period	Hotel	Office	Retail	Restaurant	Total
Daily					
In	246	402	210	138	996
Out	246	402	210	138	996
a.m. Peak Hour					
In	27	115	10	4	156
Out	14	14	5	1	34
p.m. Peak Hour					
In	16	18	19	16	69
Out	16	103	22	9	150

The rapid transit station providing the most convenient access to the Project site is the MBTA North Station superstation for the Orange and Green lines, located just one block west of the site. Some transit trips associated with the Project are also expected to use commuter rail services at North Station and bus services both at Haymarket Station and along North Washington Street. The future capacity of MBTA rapid transit service in the vicinity of the site is shown in Table 2-18. According to 2007 MBTA *Ridership and Service Statistics*, the reserve capacity is sufficient to accommodate the additional trips generated by the Project.

Table 2-18 Build Conditions Public Transportation

Line	Origin—Destination	Car Capacity[1]	Cars Per Train[2]	Train Capacity[2]	Trains Per Hour	Hourly 1-way Capacity[3]
Orange Line	Forest Hills–Oak Grove	131	6	786	15	11,790
Green Line	Lechmere–Boston College, Cleveland Circle, Riverside, Heath	90	2/3	180/270	18	4,320
Blue Line	Wonderland–Bowdoin	95	6	570	15	8,550
Red Line	Alewife–Braintree/Ashmont	167	6	1,002	16	16,032

1 Per MBTA service policy for peak-hour service. "Crush loaded" capacity is 1,344 for a six-car Orange Line train and 538 for a two-car Green Line train.
2 The Riverside Branch has three three-car trains in service.
3 Per MBTA, by 2008: three-car, low-floor Green Line trains on D Branch; six-car Blue Line trains (2005).

2.3.2.9 Build Conditions Pedestrian Operations

The Project is expected to generate 5,004 daily walk trips, as shown in Table 2-19, and an additional 1,992 daily transit trips that require a walk trip to or from the site, totaling an additional 6,996 pedestrian trips per day. During the a.m. peak hour, the Project will result in 355 new pedestrian trips along with 190 transit trips. During the p.m. peak hour, the Project will result in 516 new pedestrian trips along with 219 transit trips. This correlates with an average of approximately 11 new pedestrian trips per minute during all peak-hour periods.

Table 2-19 Pedestrian Trip Generation

Time Period	Hotel	Office	Retail	Restaurant	Total
Daily					
In	886	362	755	499	2,502
Out	886	362	755	499	2,502
a.m. Peak Hour					
In	96	101	36	14	247
Out	65	16	24	3	108
p.m. Peak Hour					
In	71	20	88	74	253
Out	61	91	78	33	263

Pedestrian trips associated with the Project were distributed to the existing pedestrian network in the study area. Pedestrians associated with the restaurant and retail areas were distributed among the multiple entryways. The total Build Conditions pedestrian volumes are shown in Figure 2-24 and Figure 2-25. Pedestrian level of service results are shown in Table 2-20.

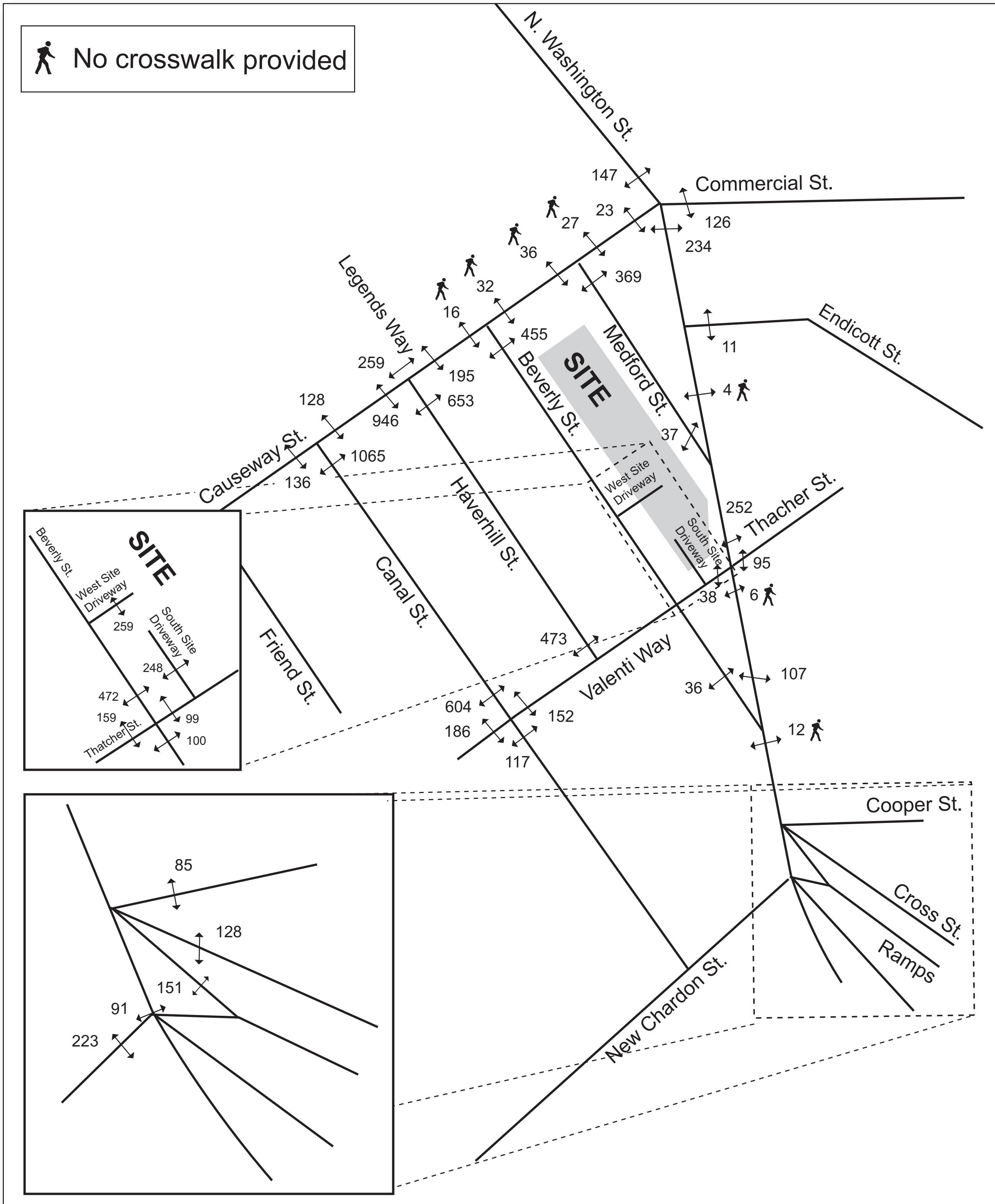

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Figure 2-24
Build Conditions (2013) Pedestrian Volumes, a.m. Peak Hour

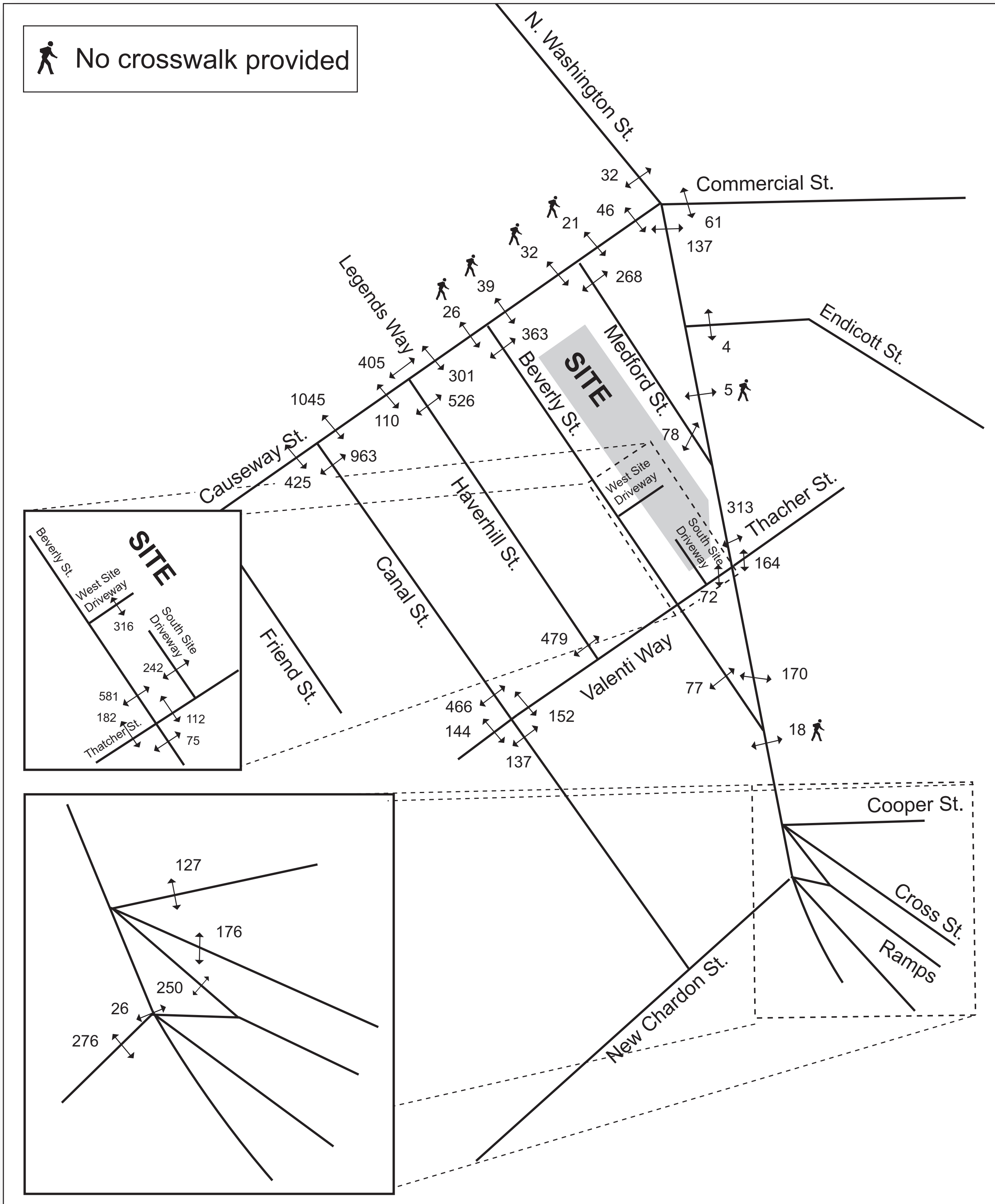

Figure 2-25
Build Conditions (2013) Pedestrian Volumes, p.m. Peak Hour

Table 2-20 Build Conditions (2013) Pedestrian Level of Service

Intersection	Delay LOS		Space LOS	
	a.m.	p.m.	a.m.	p.m.
Signalized Intersections				
North Washington Street/Causeway Street				
Causeway East Crosswalk	B	B	A	A
Causeway West Crosswalk	B	B	A	A
N. Washington North Crosswalk	C	C	A	A
N. Washington South Crosswalk	C	C	A	A
North Washington Street/Valenti Way/Thacher Street				
Thacher East Crosswalk	A	A	A	A
Valenti West Crosswalk	A	A	A	A
N. Washington North Crosswalk	C	C	A	A
North Washington Street/Beverly Street				
Beverly North Crosswalk	A	B	A	A
N. Washington North Crosswalk	B	B	A	A
North Washington Street/Cross Street/Cooper Street/ Sumner Tunnel Off-ramp				
Cooper East Crosswalk	A	A	A	A
Sumner West Crosswalk	A	A	A	A
Cross South Crosswalk	B	B	A	A
New Chardon Street/Surface Road/I-93 Southbound & Callahan Tunnel On-ramp/Sumner Tunnel Off-ramp				
New Chardon West Crosswalk	A	B	A	A
Surface North Crosswalk	A	A	A	A
Causeway Street/Haverhill Street/Legends Way				
Causeway East Crosswalk	B	B	A	A
Causeway West Crosswalk	B	B	B	A
Legends North Crosswalk	A	A	A	A
Haverhill South Crosswalk	A	A	A	A
Beverly Street/Valenti Way				
Valenti East Crosswalk	B	B	A	A
Valenti West Crosswalk	B	B	A	A
Beverly North Crosswalk	A	A	A	A
Beverly South Crosswalk	D	D	A	A

Unsignalized Intersections				
	Delay LOS		Space LOS	
Intersection	a.m.	p.m.	a.m.	p.m.
North Washington Street/Endicott Street				
Endicott East Crosswalk	A	A	—	—
North Washington Street/Medford Street				
Medford West Crosswalk	A	A	—	—
Causeway Street/Canal Street				
Causeway East Crosswalk	F	F	—	—
Causeway West Crosswalk	F	F	—	—
Canal South Crosswalk	A	B	—	—
Causeway Street/Medford Street				
Medford South Crosswalk	A	A	—	—
Canal Street/Valenti Way				
Valenti East Crosswalk	A	B	—	—
Valenti West Crosswalk	A	A	—	—
Canal North Crosswalk	A	B	—	—
Canal South Crosswalk	A	A	—	—
Causeway Street/Beverly Street				
Beverly South Crosswalk	C	B	—	—
Valenti Way/Haverhill Street				
Haverhill North Crosswalk	A	A	—	—
Beverly Street/West Site Driveway				
Driveway East Crosswalk	A	A	—	—
Valenti Way/South Site Driveway				
Driveway North Crosswalk	A	A	—	—

Four crosswalks at unsignalized intersections within the study area worsen in delay LOS but remain at delay LOS C or better under Build Conditions:

Causeway Street/Canal Street. The crosswalk on the south side of the intersection across Canal Street worsens from delay LOS A to delay LOS B during the p.m. peak hour, remaining at an acceptable level of service.

Canal Street/Valenti Way. The crosswalk on the east side of the intersection across Valenti Way and the crosswalk on the north side of the intersection across Canal Street both worsen from delay LOS A to delay LOS B during the p.m. peak hour, remaining at an acceptable level of service.

Causeway Street/Beverly Street. The crosswalk on the south side of the intersection across Beverly Street worsens from delay LOS B to delay LOS C during the a.m. peak hour and from delay LOS A to delay LOS B during the p.m. peak hour, remaining at an acceptable level of service.

2.3.2.10 Bicycle Accommodations

Secure bicycle storage will be made available to office tenants and visitors to encourage bicycling as an alternative mode of transportation. Consistent with zoning guidelines for the retail space, eight bicycle spaces will be provided in the garage. Bicycle racks for the office use will be sited in safe, secure locations, and in quantities necessary to meet the demand.

2.3.2.11 Loading and Service Accommodations

The Project includes two internal loading docks and service areas located as previously depicted in Figure 2-18. The northern loading and service area will serve the hotels and restaurants, while the southern loading and service area will serve the retail and office tenants. The northern loading dock is designed to accommodate three single-unit trucks, each of up to 35 feet in length. The southern loading dock provides spaces for one single-unit truck of up to 35 feet in length. Trash and recycling activity can be handled through the internal loading and service areas.

Vehicular access to the internal loading and service areas will be provided from the South Site Driveway from Valenti Way. Single-unit box trucks of up to SU-35 in size will be able to enter and exit both loading docks through this driveway. Truck turning diagrams for the proposed loading and service areas are presented in Appendix B.

An on-site loading dock manager will manage all service and loading operations. Whenever possible, loading and service activities will be scheduled to occur during off-peak hours. All loading and service areas will post permanent "no idling" signs.

2.3.2.12 Shared Car Service

The Project will work with Zipcar™ or another shared car service to determine the feasibility of reserving one or more shared-car spaces within the parking garage. Zipcar locations in the immediate area (within a five-minute walk) include:

- Longfellow Garage, Staniford Street (three cars);
- Government Center Garage, New Chardon Street (four cars); and
- Langone's Funeral Home, Commercial Street (four cars).

2.3.3 Transportation Mitigation Measures

The Proponent has developed a physical design and future management program for the Project that emphasizes transit, bicycle, and walking connections to reduce auto dependency. The Proponent is committed to continuing to work with the City to foster sustainable development that balances the needs of the various transportation modes and to implement infrastructure and management improvements that will mitigate the impact of development on the surrounding transportation system.

2.3.3.1 Pedestrian Mitigation

New sidewalks will be installed adjacent to the Project site, consistent with the parameters of the *Bulfinch Triangle Design and Development Guidelines.*

2.3.4 Transportation Demand Management

The Proponent is committed to implementing Travel Demand Management (TDM) measures to reduce parking demand and dependence on autos. TDM measures that will be implemented during the construction phase will be outlined in the Construction Management Plan. TDM will be facilitated by both the nature and the location of the proposed Project by the site's proximity to workplaces, shopping, tourist destinations, and transit. The Proponent is committed to implementing a TDM program that supports the City's efforts to reduce dependency on the automobile by encouraging travelers to use alternatives to driving alone, especially during peak time periods.

The Proponent is prepared to take advantage of the site's pedestrian and transit access to future visitors and employees. On-site management will provide a transportation coordinator to coordinate transportation services during the leasing process and afterwards as part ofPproject management, including provision of transit information (schedules, maps, fare information) in the building lobby. The transportation coordinator will also work with hotel staff to raise awareness of public transportation alternatives. The Proponent will encourage the hotel operators to offer MBTA passes to employees through payroll deduction and to subsidize the monthly pass costs through a direct percentage subsidy or a pre-tax payment plan.

The Transportation Access Plan Agreement (TAPA) will confirm the TDM commitments outlined in the Article 80 Review of the Project. These TDM measures may include:

Limited Parking: The Project will provide 226 parking spaces for hotel guests and employees of the various site tenants. The Project parking spaces are allocated as follows:

Table 2-20 Project Parking Space Allocation

Land Use	Amount	Parking Spaces	Parking Ratio	BTD Parking Ratio
Hotel	274 keys	82	0.3/room	0.4/room
Office	213,000 sf	100	0.47/1,000 sf	0.4/1,000 sf
Retail/ Restaurant	36,000	44	1.2/1,000 sf	Not given

Orientation Packets: The Proponent will provide orientation packets to tenants containing information on the available transportation choices, including transit routes and schedules.

Transportation Coordinator: The Proponent will designate a full-time employee in the hotel staff as transportation coordinator to manage loading and service activities and provide alternative transportation materials to visitors and tenants.

Bicycle Racks: The Proponent will provide bicycle racks in secure, sheltered areas within the garage for tenants and visitors. Consistent with BTD's bicycle parking guidelines, which require one bicycle parking space per 10 vehicle spaces for retail, or one bicycle parking space per 10,000 sf of retail space, whichever is greater; four bicycle spaces will be provided in the garage. Bicycle racks for the building uses will be in safe, secure locations, and in quantities necessary to meet the demand.

2.4 Evaluation of Short-term/Construction Impacts

Most construction activities will be accommodated within current site boundaries. Details of the construction schedule, working hours, number of construction workers, worker transportation and parking, number of construction vehicles, and transportation routes are described in Section 3.11 of this PNF and will be addressed in greater detail in a Construction Management Plan to be filed with BTD in accordance with the City's transportation maintenance plan requirements.

To minimize transportation impacts during the construction period, measures included in the Construction Management Plan may include the following:

- Establishment of detailed construction trucking routes to and from the site;
- Provision of limited construction worker parking on-site, and encouragement of worker carpooling;
- Consideration of a subsidy for MBTA passes for full-time employees; and
- Provision of secure spaces on-site for workers' supplies and tools to limit tool delivery.

Chapter 3.0

Environmental Protection Component

3.0 ENVIRONMENTAL PROTECTION COMPONENT

3.1 Pedestrian Level Winds

Pedestrian level wind (PLW) studies for projects in the vicinity of the Merano Project, including the Bulfinch Triangle Project, Simpson Parcel 1 and Canal Place (now known as Avenir), showed that the projects would generally improve the pedestrian level wind conditions in the area. For all three projects, none of the locations evaluated for either existing or build conditions is estimated to have PLWs that exceed the BRA guideline wind speed of 31 mph more often than once in 100 hours. In addition, none of the studied locations for the three projects was predicted to exceed the Pedestrian Level Wind Category of 3, Comfortable for Walking. Based on these results, impacts from the proposed Project are anticipated to be insignificant, similar to those of other proposed projects in the area. A qualitative wind analysis will be performed if one is requested by the BRA.

3.2 Shadow Impacts

3.2.1 Introduction and Methodology

As is 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 the winter solstice (December 21). Due to the change in legislation regarding Daylight Saving Time, the shadow impacts from the vernal equinox (March 21) and the autumnal equinox would be virtually the same. For this study, the vernal equinox shadow impacts are studied as if March 21 was still in Standard Time, meaning they are studied during the time periods of 10:00 a.m., 1:00 p.m., and 4:00 p.m. 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 net new shadow from the buildings, as well as the existing shadow, and illustrates the incremental impact of the Project. The analysis focuses on public open spaces, major pedestrian areas, bus and subway stops, and the sidewalks adjacent to and in the vicinity of the Project site. Shadows have been determined using the applicable Altitude and Azimuth data for Boston, shown in Table 3.2-1, as is typically requested by the BRA.

Table 3.2-1 Azimuth and Altitude Data

Date	Local Time	Solar Position	
		Altitude	Azimuth
March 21	10:00 a.m. DST	33.0	125.7
	1:00 p.m. DST	48.0	-176.9
	4:00 p.m. DST	30.5	-121.8
June 21	9:00 a.m. DST	39.9	93.5
	12:00 p.m. DST	68.8	149.4
	3:00 p.m. DST	56.5	-113.7
	6:00 p.m. DST	23.9	-79.3
September 21	9:00 a.m. DST	25.9	115.3
	12:00 p.m. DST	47.4	166.0
	3:00 p.m. DST	37.4	-132.9
	6:00 p.m. DST	7.3	-96.0
December 21	9:00 a.m. EST	14.2	141.9
	12:00 p.m. EST	24.1	-175.6
	3:00 p.m. EST	10.0	-135.1

3.2.2 Vernal Equinox (March 21)

At 10:00 a.m. during the vernal equinox, new shadow from the Project will be cast in a northwesterly direction. Shadow will be cast across a minor portion of Causeway Street and its sidewalks, Beverly Street and its sidewalks, and a portion of I-93. New shadow will also be cast onto a portion of Portal Park.

At 1:00 p.m., new shadow will be cast in a northerly direction. Shadow will be cast onto a minor portion of Causeway Street and its sidewalks, and a minor portion of North Washington Street's western sidewalk.

At 4:00 p.m., new shadow will be cast in a northeasterly direction onto a minor portion of North Washington Street and its sidewalks, and onto a portion of Valenti Way's northern sidewalk.

New shadow created on the vernal equinox is illustrated in Figures 3.2-1 through 3.2-3.

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Figure 3.2-1

Shadow Analysis, March 21 - 10 AM

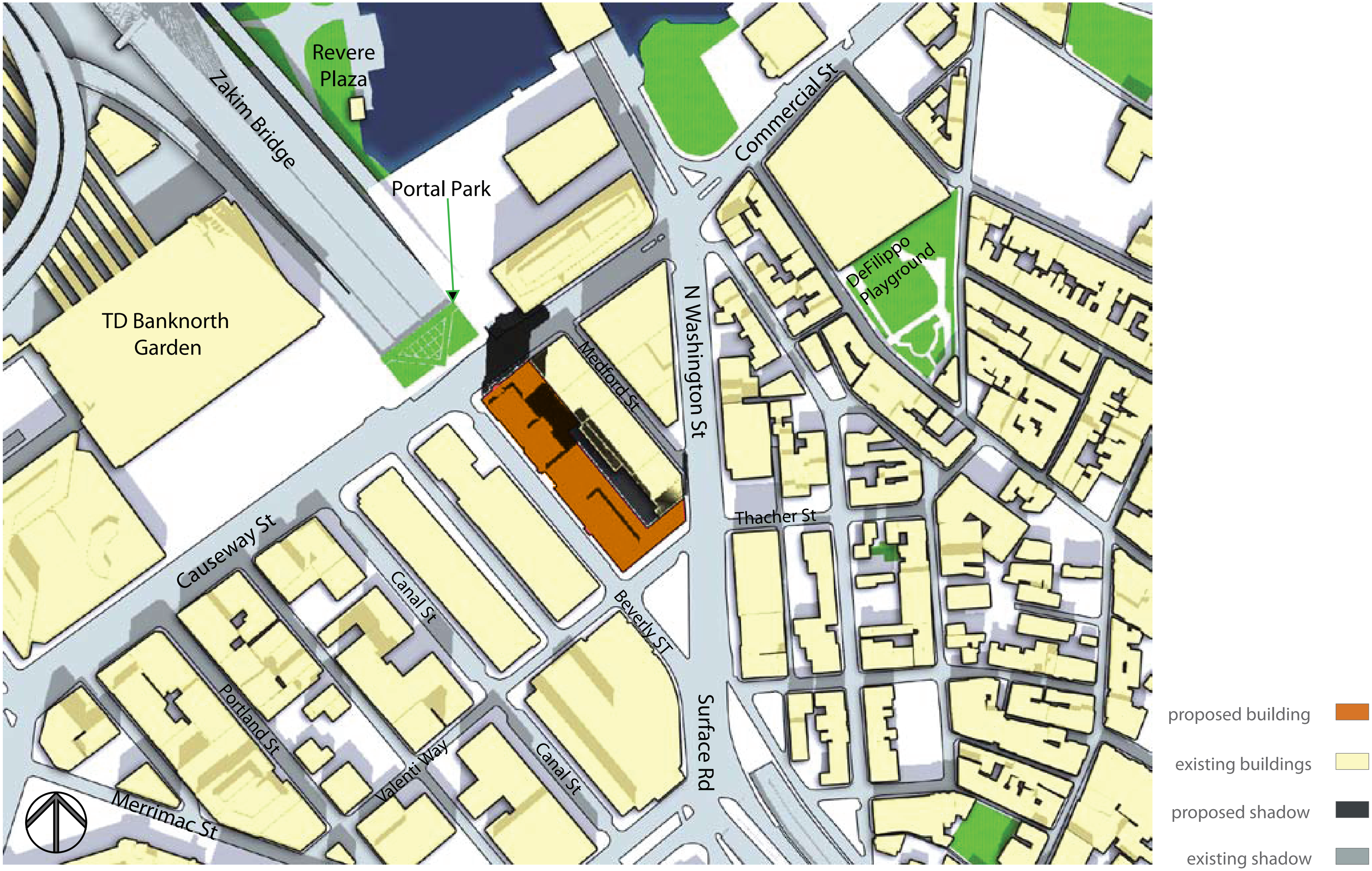

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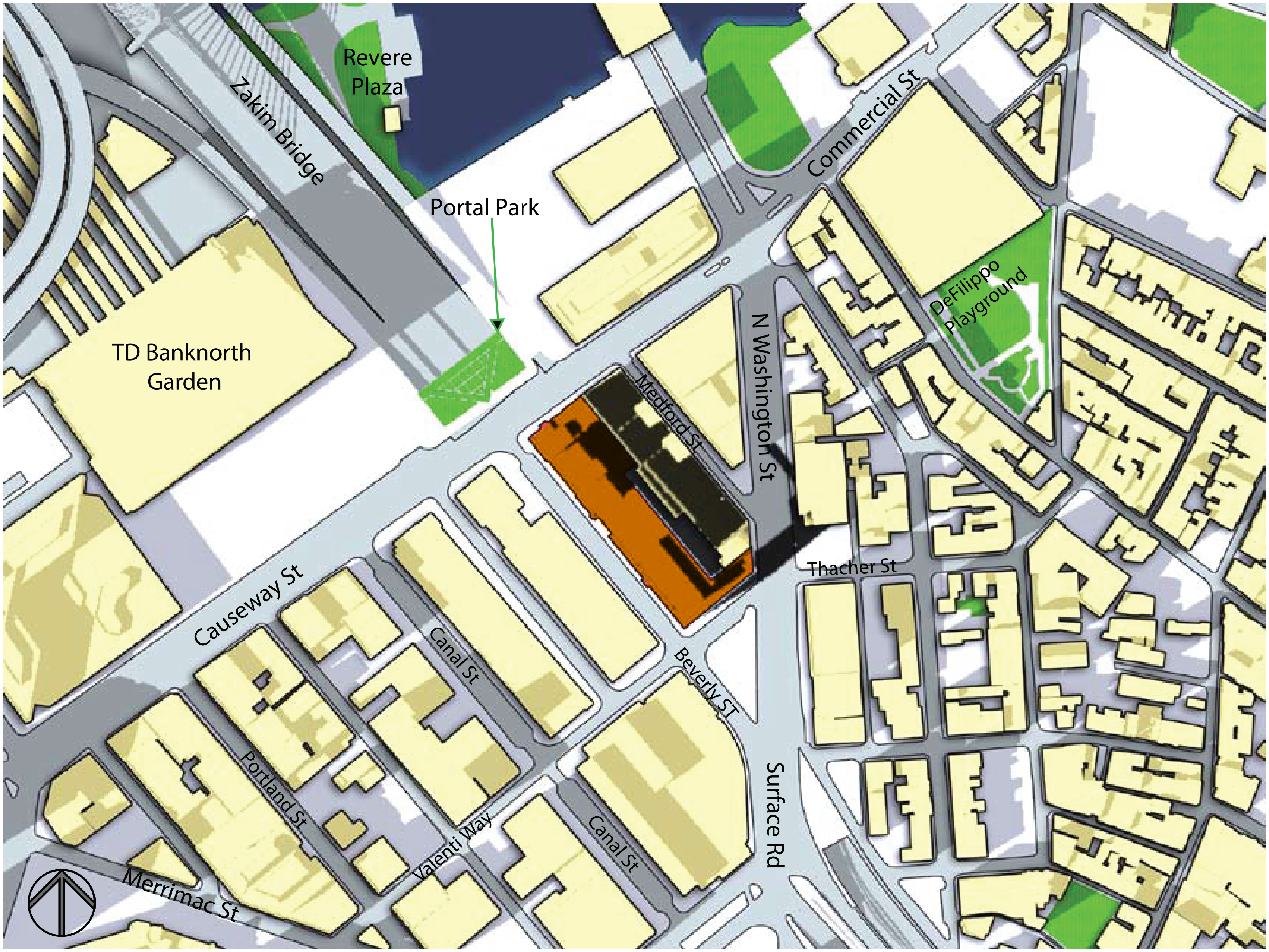
Figure 3.2-2

Shadow Analysis, March 21 - 1 PM



proposed building

existing buildings

proposed shadow

existing shadow

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cbt

Figure 3.2-3

Shadow Analysis, March 21 - 4 PM

3.2.3 Summer Solstice (June 21)

At 9:00 a.m. during the summer solstice, new shadow from the Project will be cast in a westerly direction. Shadow will be cast onto Beverly Street and its sidewalks and a portion of Causeway Street and its sidewalks. New shadow will also be cast onto a small portion of Portal Park.

At 12:00 p.m., new shadow will be cast in a northwesterly direction. Shadow will be cast onto a minor portion of Causeway Street and its southern sidewalk.

At 3:00 p.m., new shadow will be cast in a northeasterly direction onto a minor portion of North Washington Street and its western sidewalk, and onto a portion of Valenti Way's northern sidewalk.

At 6:00 p.m., new shadow will be cast in a southeasterly direction across a portion of North Washington Street and its sidewalks, and a portion of Thacher Street and its sidewalks.

New shadow created on the summer solstice is illustrated in Figures 3.2-4 through 3.2-7.

3.2.4 Autumnal Equinox (September 21)

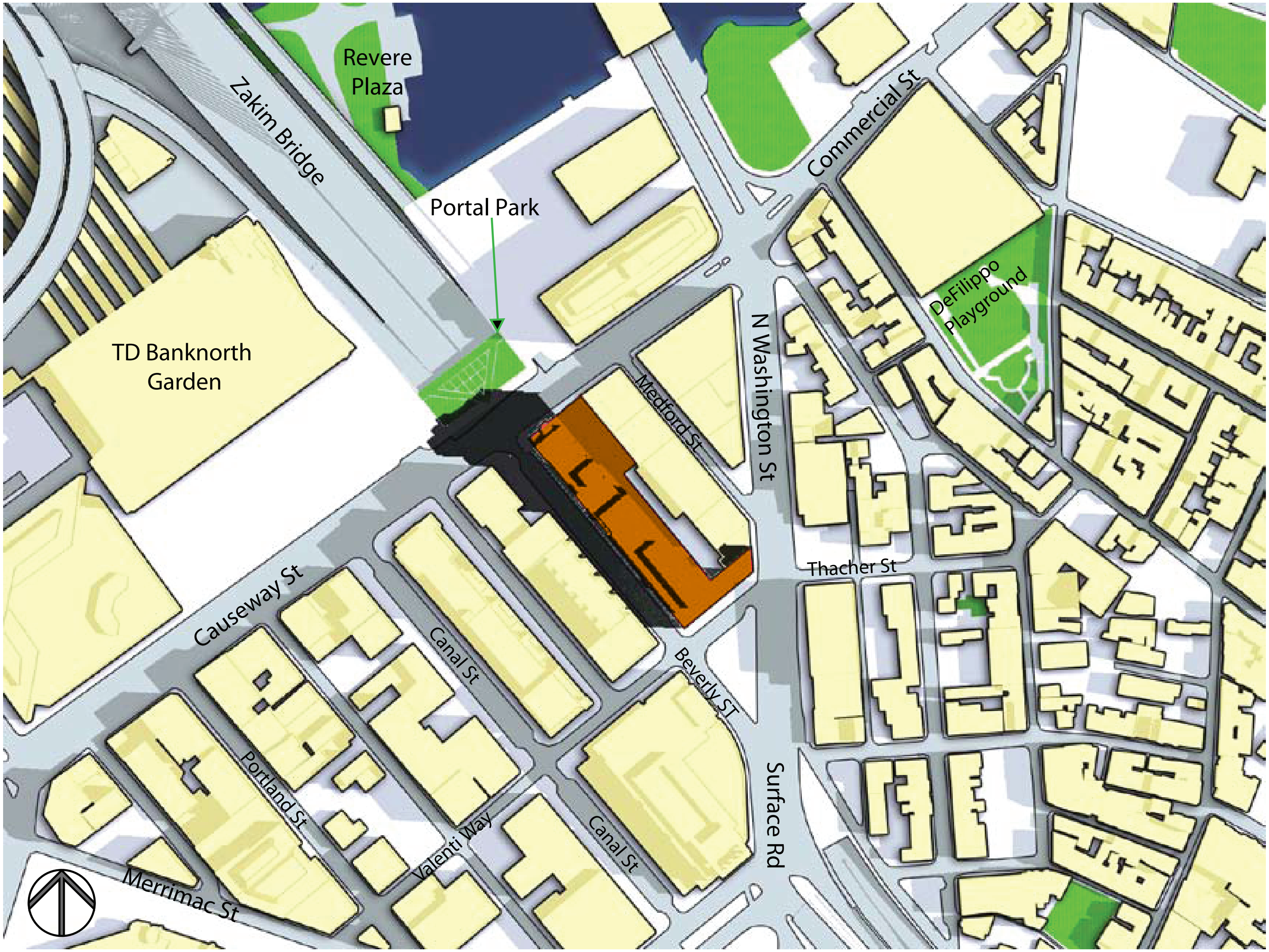
At 9:00 a.m. during the autumnal equinox, new shadow from the Project will be cast in a northwesterly direction onto Beverly Street and its sidewalks, a portion of Causeway Street and its sidewalks, a portion of I-93 South and one of its ramps. In addition, new shadow will be cast onto a portion of Portal Park.

At 12:00 p.m., shadow will be cast northerly onto a portion of Causeway Street and its sidewalks and a minor portion of the existing Beverly Street (north of Causeway Street). In addition, by noon, new shadow on Portal Park is limited to the southeast corner of the Park.

At 3:00 p.m., shadow will be cast northeasterly across minor a portion of Causeway Street and its southern sidewalk, and a minor portion of North Washington Street and its sidewalks.

At 6:00 p.m., much of the area is in shadow and new shadow from the Project will be cast in an easterly direction. New shadow will only be cast on rooftops of two nearby buildings.

New shadow created on the autumnal equinox is illustrated in Figures 3.2-8 through 3.2-11.



proposed building

existing buildings

proposed shadow

existing shadow

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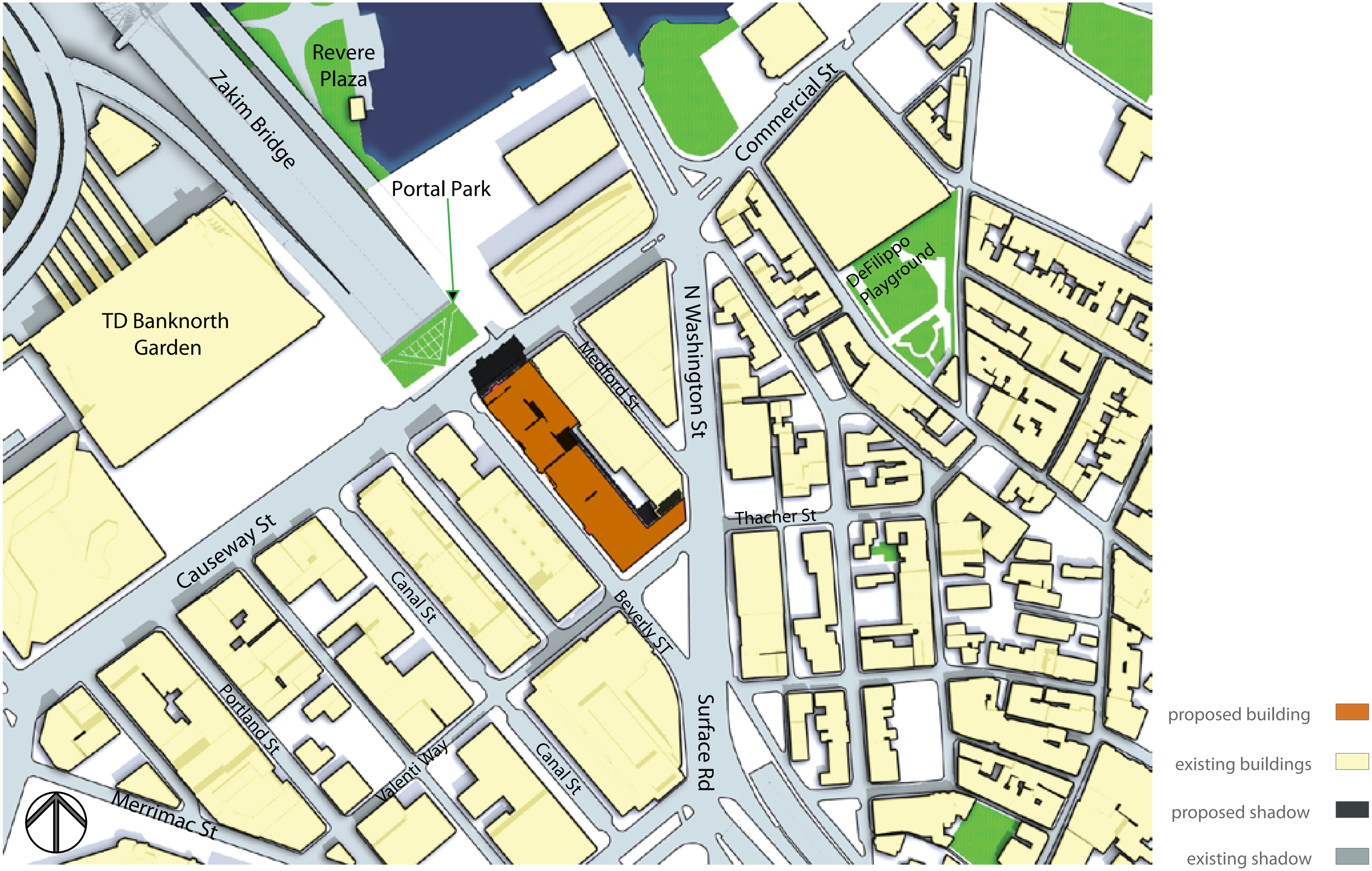
cbt

Figure 3.2-4

Shadow Analysis, June 21 - 9 AM

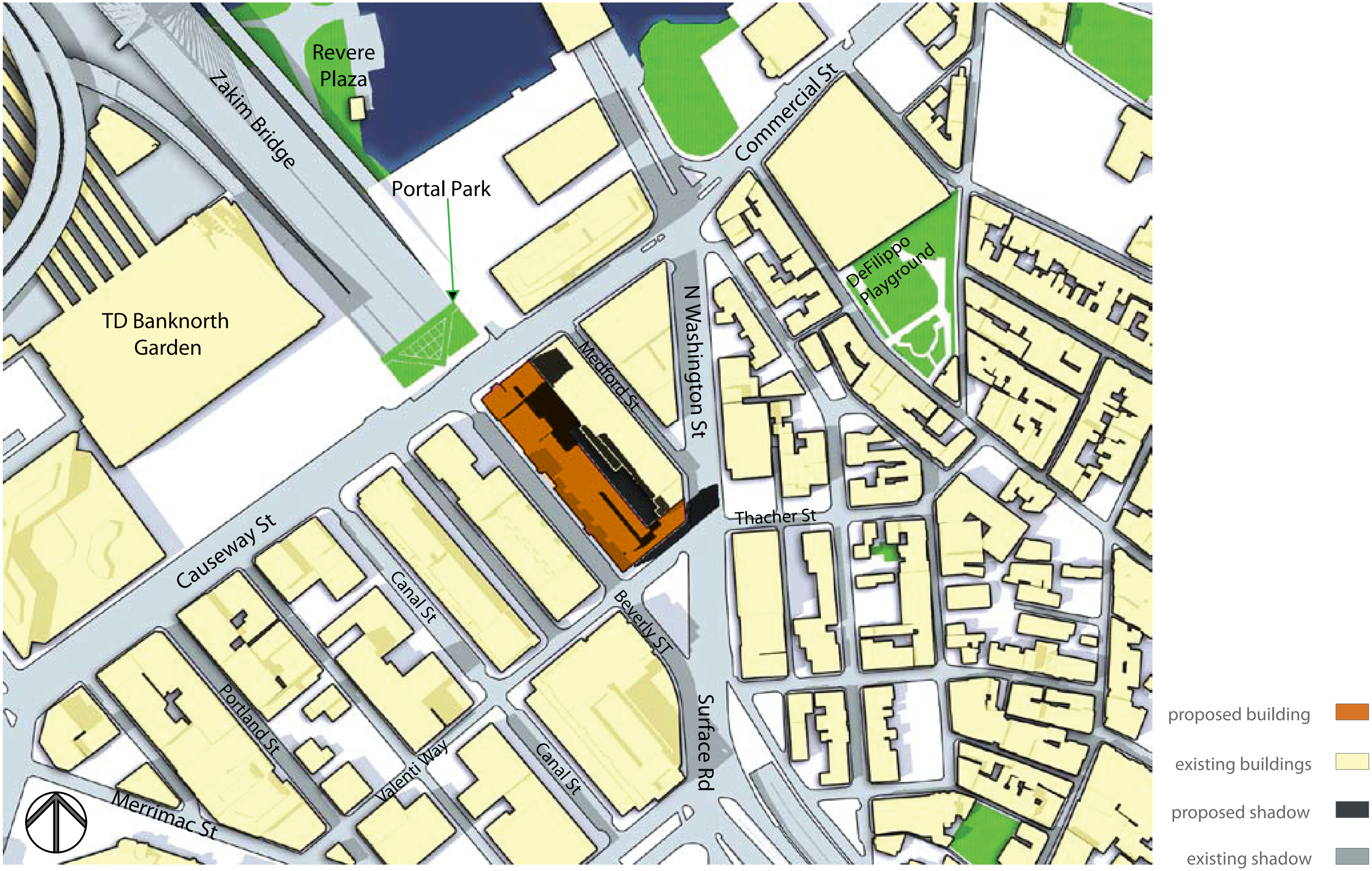


The Merano **Boston, MA**

cbt

Figure 3.2-5

Shadow Analysis, June 21 - 12 PM



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cbt

Figure 3.2-6

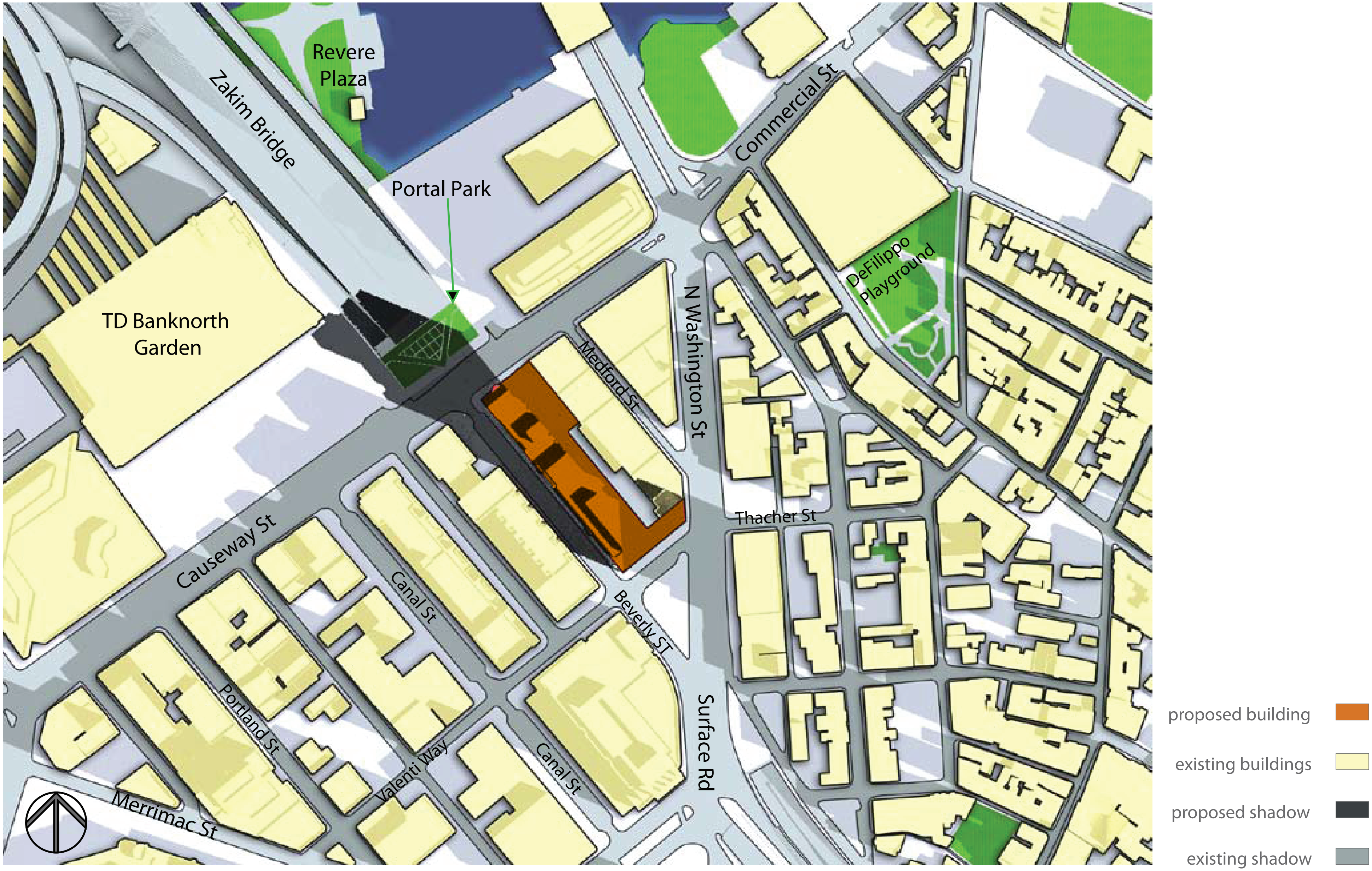
Shadow Analysis, June 21 - 3 PM

The Merano **Boston, MA**

cbt

Figure 3.2-7

Shadow Analysis, June 21 - 6 PM

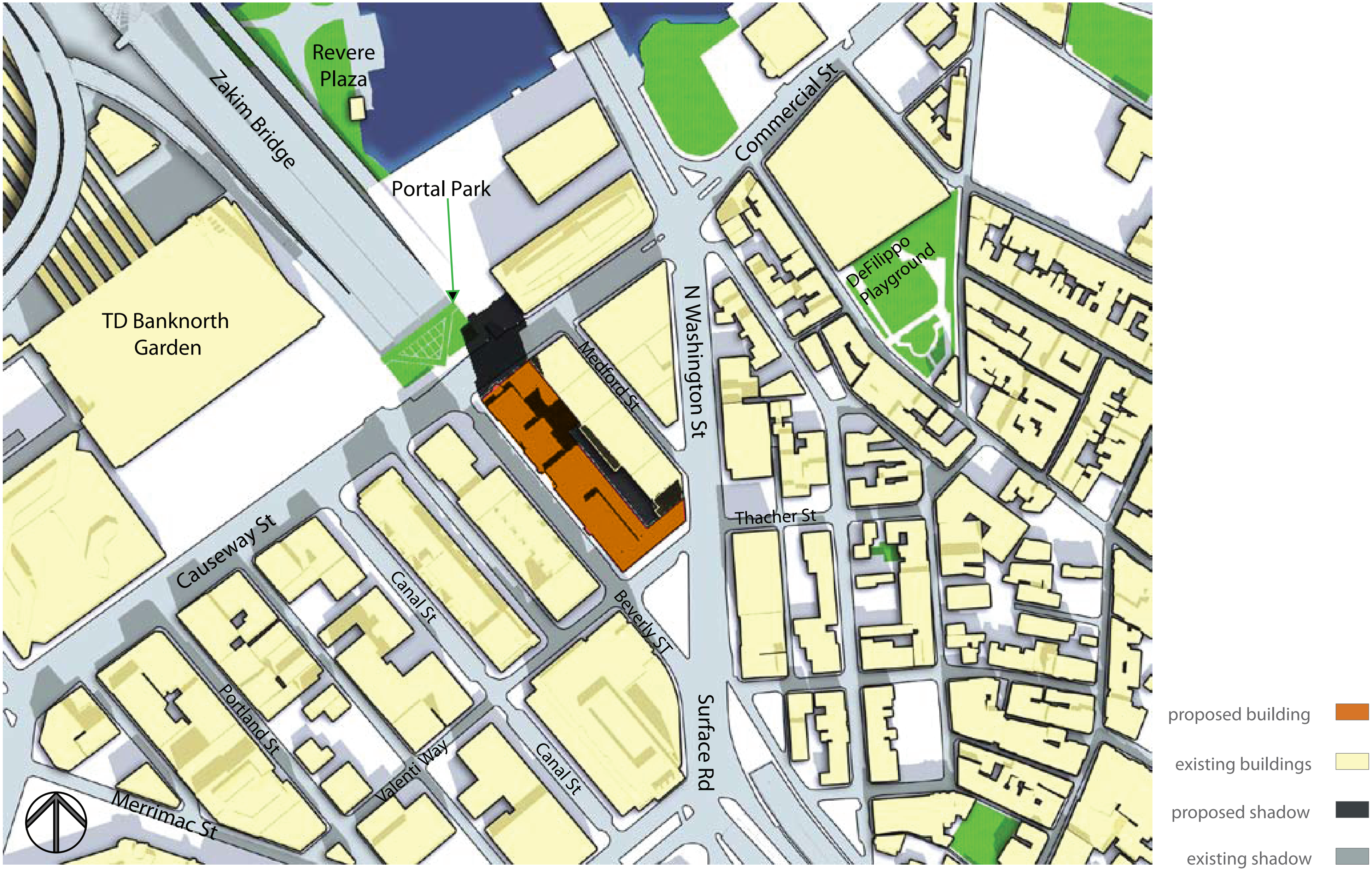


The Merano **Boston, MA**

cbt

Figure 3.2-8

Shadow Analysis, September 21 - 9 AM

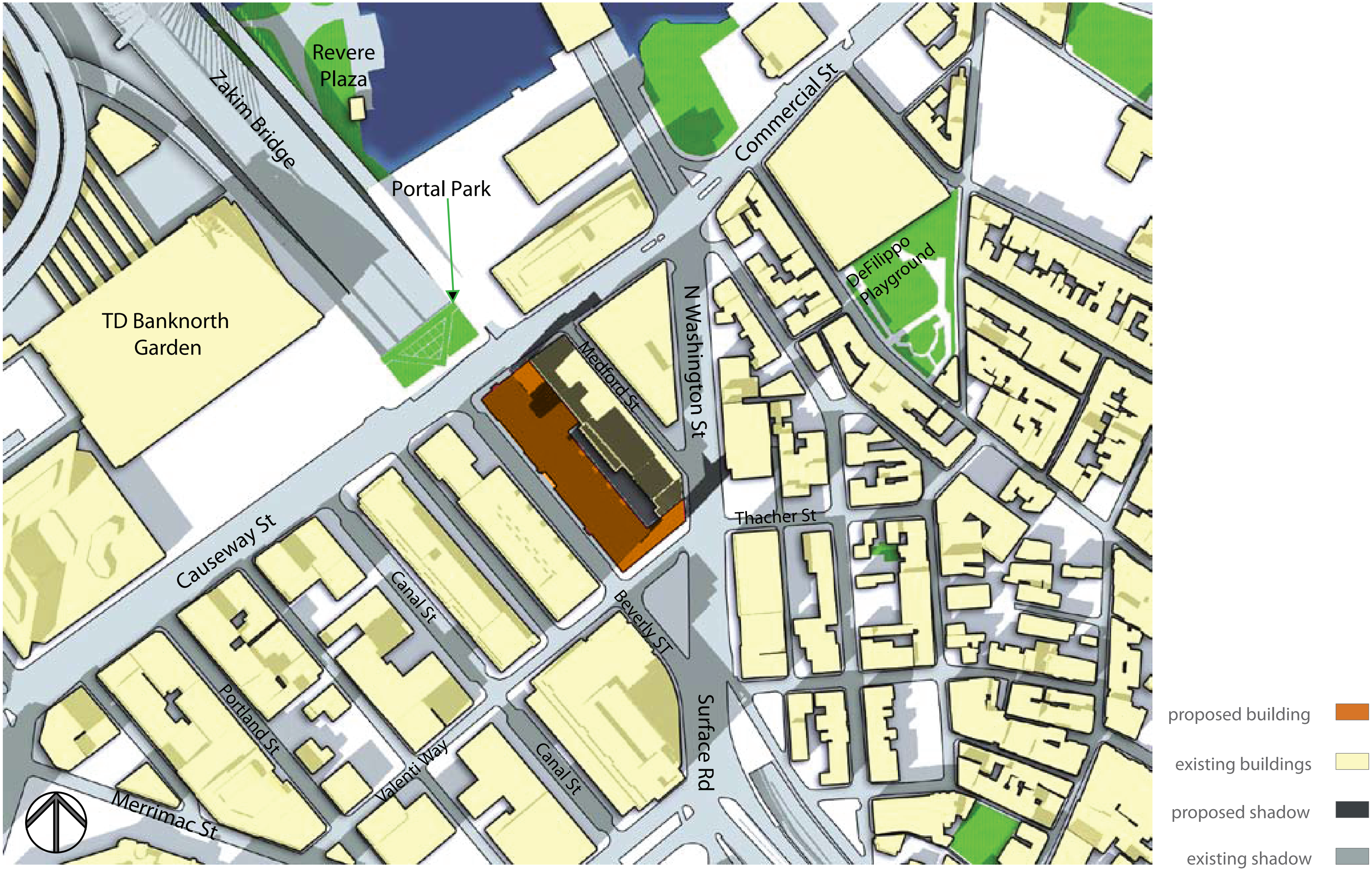


The Merano **Boston, MA**

cbt

Figure 3.2-9

Shadow Analysis, September 21 - 12 PM



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cbt

Figure 3.2-10

Shadow Analysis, September 21 - 3 PM

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Figure 3.2-11

Shadow Analysis, September 21 - 6 PM

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 to elongate and create considerable shadow in the area.

At 9:00 a.m., new shadow falls northwesterly across a portion of Causeway Street and its sidewalks, the existing Beverly Street (north of Causeway Street), and a portion of I-93 North. New shadow will also be cast onto a portion of Portal Park, and a very minor portion of Revere Plaza.

At 12:00 p.m., much of the area is under existing shadow, and new shadow will be cast onto a small portion of North Washington Street, and onto a very minor portion of Causeway Street and its sidewalks.

At 3:00 p.m., shadow fall northeasterly across portions of North Washington Street and its sidewalks, and Commercial Street and its southern sidewalk. New shadow will also be cast onto a minor portion of DeFilippo Playground.

New shadow created on the winter solstice is illustrated in Figures 3.2-12 through 3.2-14.

3.2.6 Conclusions

The Project will create limited new shadow in the area, although the existing and planned buildings adjacent to the site minimize the amount of new shadow created by the Project. New shadow will generally be cast onto the adjacent streets and their sidewalks. During nine of the 14 time periods studied, the Project will not cast new shadow onto Portal Park. During 13 of the 14 time periods studied, the Project will not cast any new shadow onto DeFilippo Park. New shadow at DeFilippo Park is limited to the 3:00 p.m. time period studied during the winter solstice. During 13 of the 14 time periods studied, the Project will not cast any new shadow onto DeFilippo Park. New shadow at Revere Plaza is limited to the 9:00 a.m. time period during the winter solstice. The Project is not expected to result in substantial adverse impact to other open spaces in the area.

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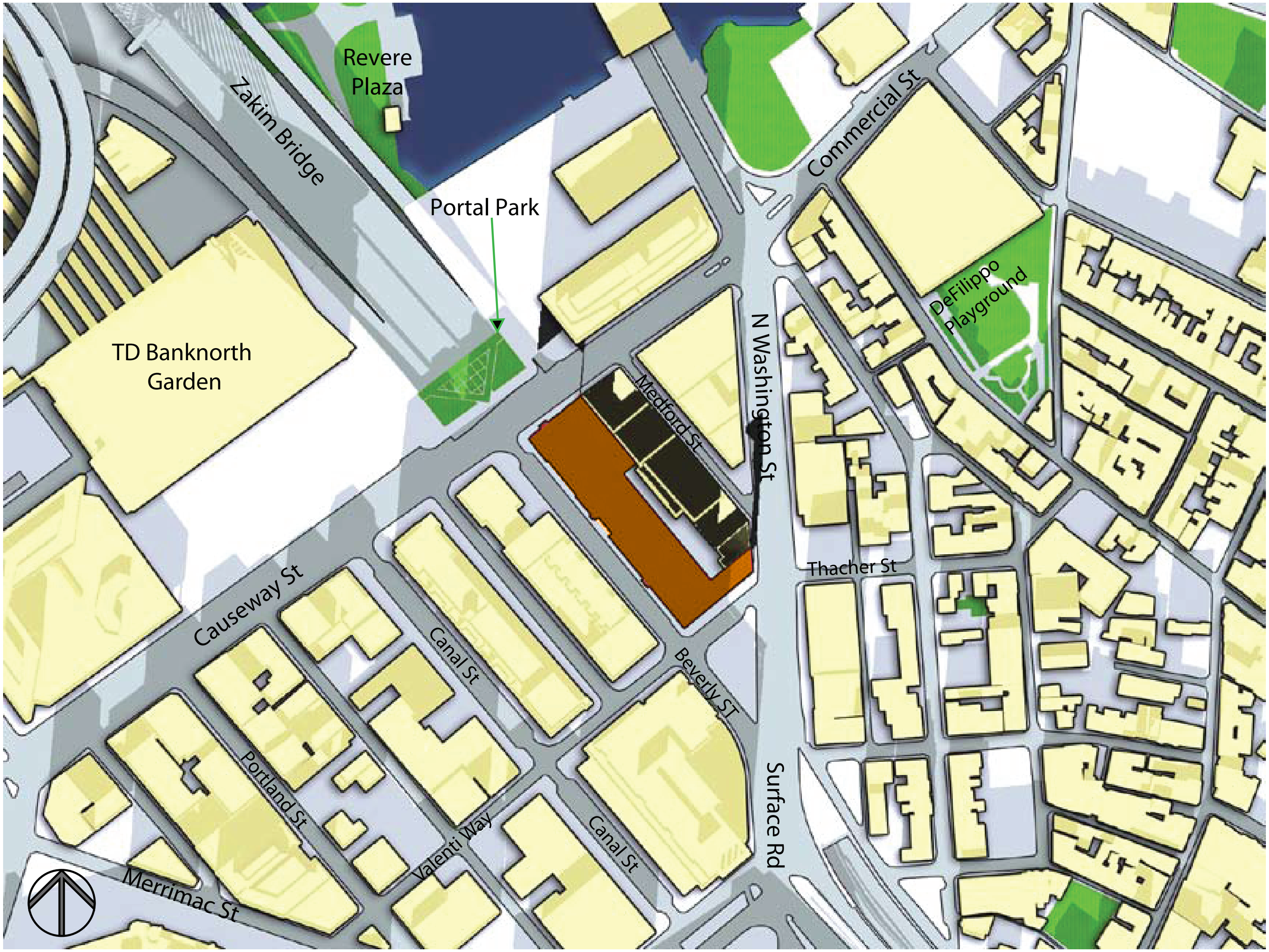
Figure 3.2-12

Shadow Analysis, December 21 - 9 AM



proposed building

existing buildings

proposed shadow

existing shadow

Figure 3.2-13

Shadow Analysis, December 21 - 12 PM

proposed building

existing buildings

proposed shadow

existing shadow

The Merano **Boston, MA**

cbt

Figure 3.2-14

Shadow Analysis, December 21 - 3 PM

3.3 Daylight Analysis

3.3.1 Introduction and Summary of Analysis

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 the project site. As is typically required by the BRA, the daylight analysis for the Project considers both existing and proposed daylight conditions as well as those of the surrounding area. Since the Project site abuts existing buildings, these buildings are included in both the existing and proposed conditions.

The Project site is primarily vacant (however, it currently includes one small building) and the site abuts existing buildings. Although the development of the Project will result in increased daylight obstruction at the site over existing conditions, the resulting conditions are typical of a densely developed area and are similar to daylight obstruction values associated with other existing and proposed buildings in the vicinity of the Project site.

3.3.2 Methodology

The daylight analysis was performed using the Boston Redevelopment Authority Daylight Analysis (BRADA) computer program. 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. Due to the constraints of the BRADA program, the setbacks of the building may be simplified or the building may be divided into sections in some cases. The BRADA program calculates the percentage of daylight that will be obstructed on a scale of 0% to 100% 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 a given viewpoint.

As mentioned, the BRA typically requests that the analysis treats the following elements as controls for data comparison:

- Existing Conditions;
- Proposed Conditions; and
- The Context of the Area.

Viewpoints were chosen along Beverly Street (Viewpoints 1, 2 and 3), Valenti Way (Viewpoint 4), Medford Street (Viewpoint 5), and Causeway Street (Viewpoint 6). The daylight analysis examined daylight obstruction from the four locations for the existing and proposed conditions. Additionally, this study considered area context points to provide a basis of comparison to existing conditions in the surrounding area. These viewpoints were taken along Valenti Way (AC1 and AC6), looking northwest; Causeway Street (AC2, AC7), looking southeast; Friend Street (AC3), looking northeast; and Haverhill Street (AC4), looking southwest; Canal Street (AC5), looking northeast. The viewpoints are illustrated on Figure 3.3-1.

3.3.3 Daylight Analysis Results

The results for each viewpoint under each alternative condition are described in Table 3.3-1. Figures 3.3-2 through 3.3-6 illustrate the BRADA results for each analysis and are located at the end of this section.

Table 3.3-1 Viewpoint Locations

Viewpoint Locations		Existing Conditions	Proposed Conditions
Viewpoint 1	Beverly Street at Hotel Portion		80.6%
Viewpoint 2	Beverly Street at Office Portion		81.9%
Viewpoint 3	Beverly Street	16.2%	
Viewpoint 4	Valenti Way	12.9%	82.2%
Viewpoint 5	Medford Street	80.1%	80.2%
Viewpoint 6	Causeway Street	21.5%	71.1%
Area Context Points*			
AC1	Valenti Way (looking west at Canal Place**)	75.2%	
AC2	Causeway Street (Looking east at Canal Place)	66.9%	
AC3	Friend Street (looking at 233 Friend St.)	71.9%	
AC4	Haverhill Street (looking southwest at Canal Place)	73.2%	
AC6	Valenti Way (looking at 14 Valenti Way)	41.3%	
AC7	Causeway Street (looking south at 27 Medford St.)	76.5%	

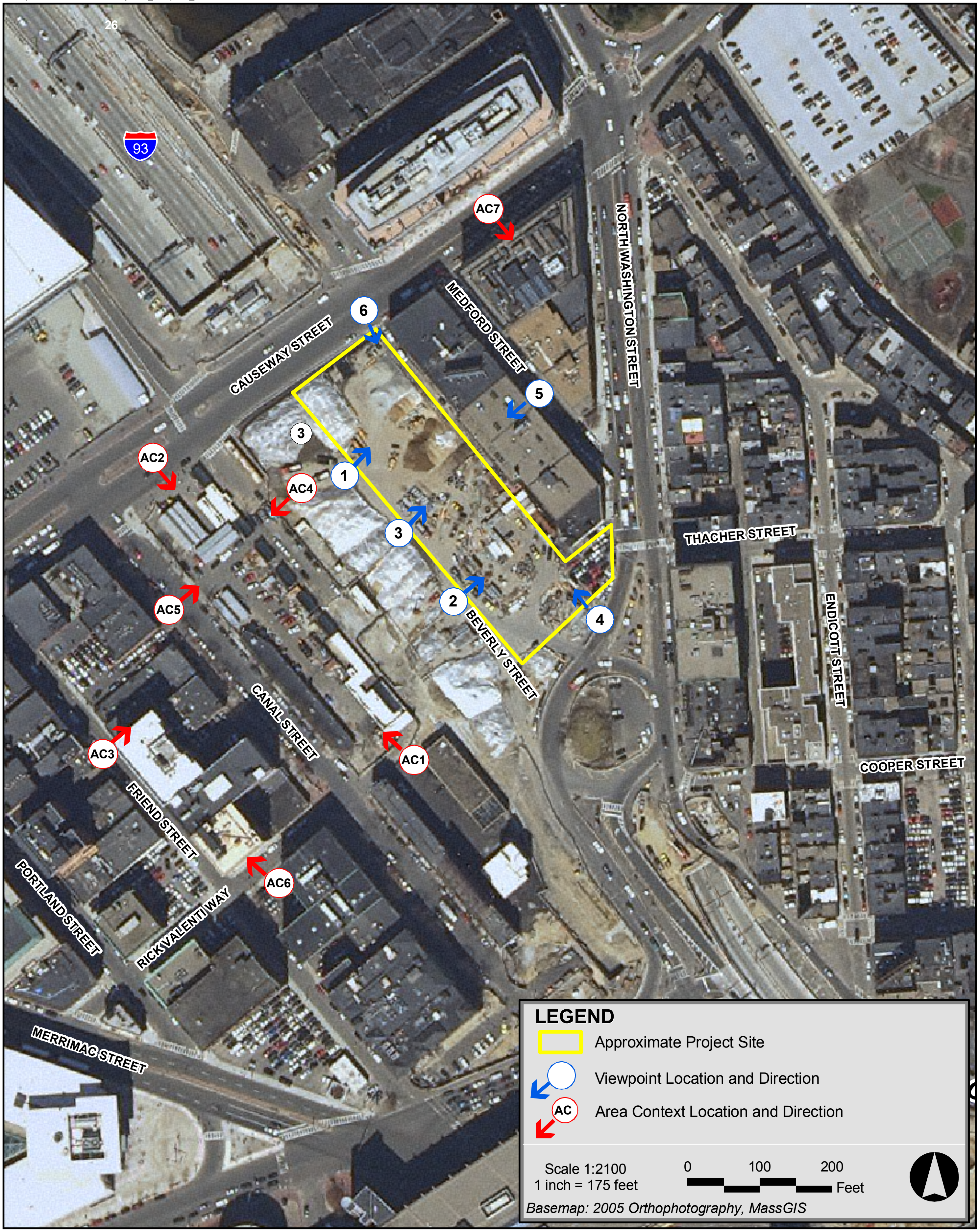
*AC1 through AC6 are based on a daylight analysis prepared by Epsilon Associates for the Canal Place Expanded PNF, November, 2005; AC7 is based on a daylight analysis prepared by Epsilon Associates for the Lovejoy Wharf DPIR, July 2005.

**Canal Place is now known as Avenir.

Beverly Street – Viewpoints 1, 2 and 3

Beverly Street runs along the southwestern edge of the Project site. Viewpoints 1 and 2 were taken from the center of the street. Viewpoint 3 was taken from the center of the proposed Beverly Street (currently not open to the public). Viewpoint 1 looks northeast at the hotel portion of the Project. Viewpoint 2 looks northeast at the office portion of the

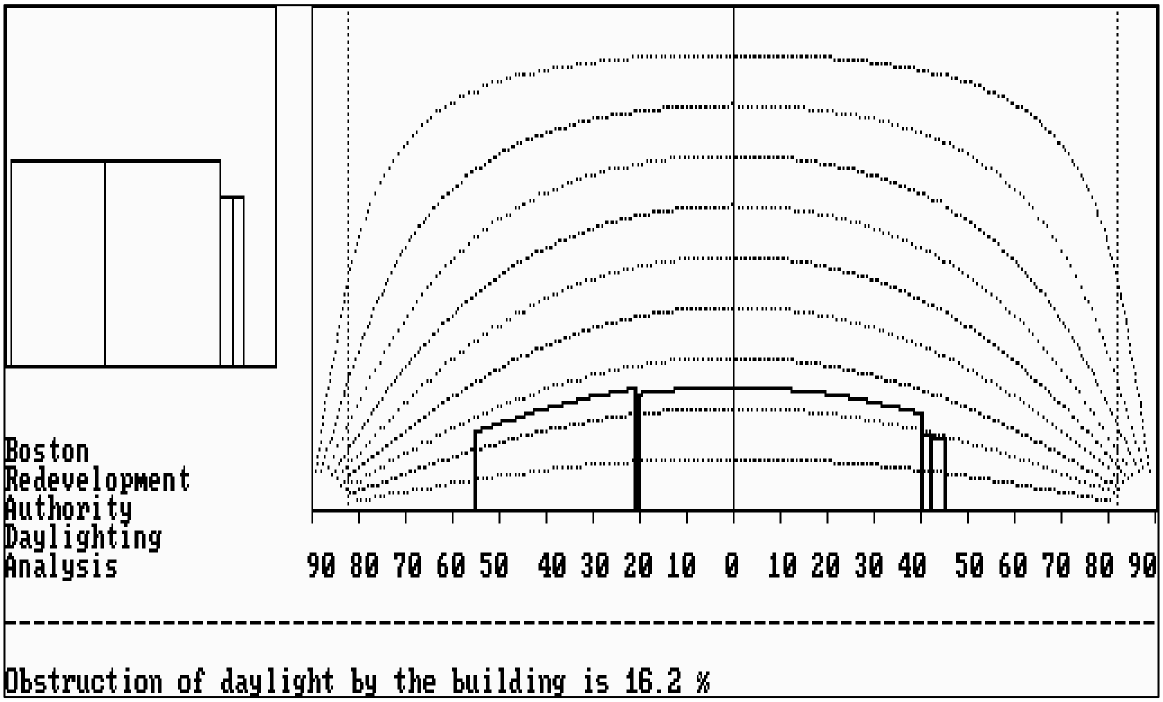
G:\Projects2\MA\Boston\2026\fig3.3-1_viewpoint_locations.mxd



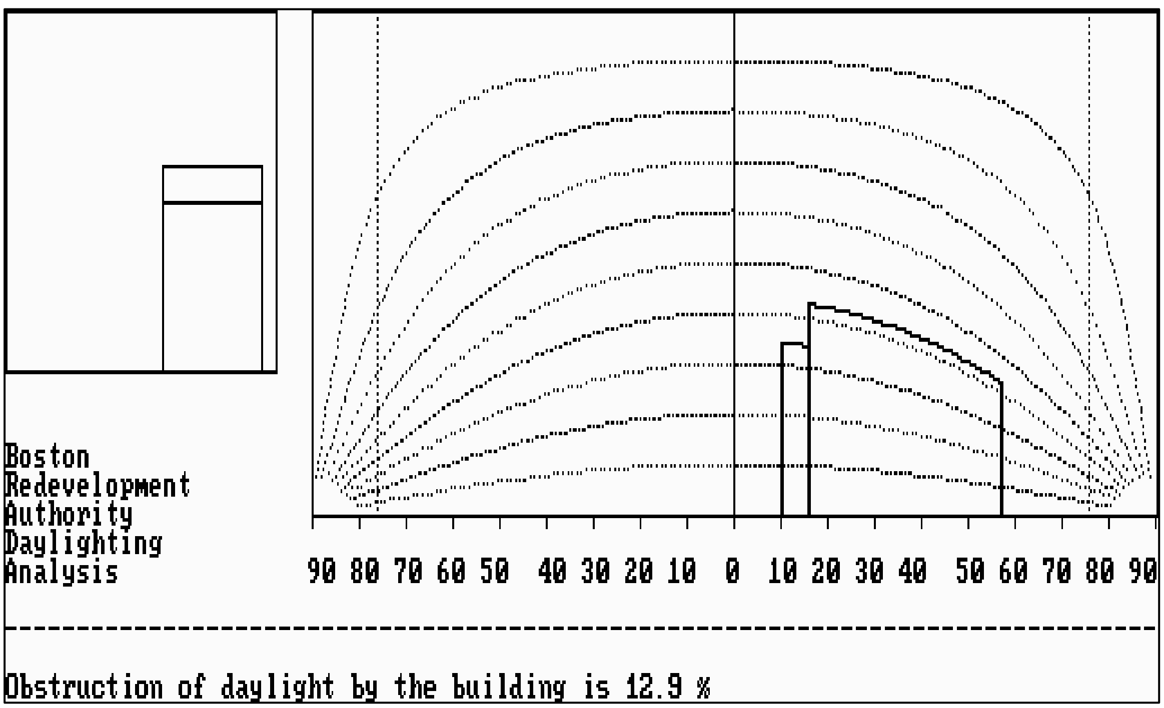
The Merano Boston, MA

Epsilon ASSOCIATES INC.

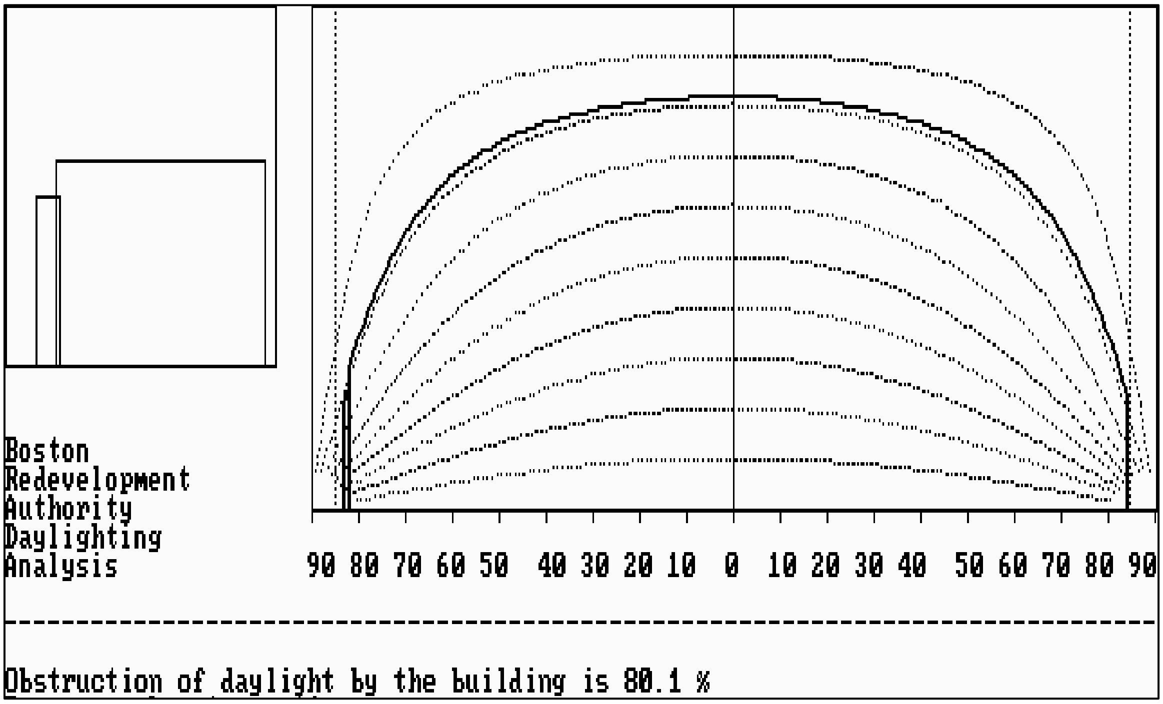
Figure 3.3-1
Daylight Analysis
Viewpoint Locations



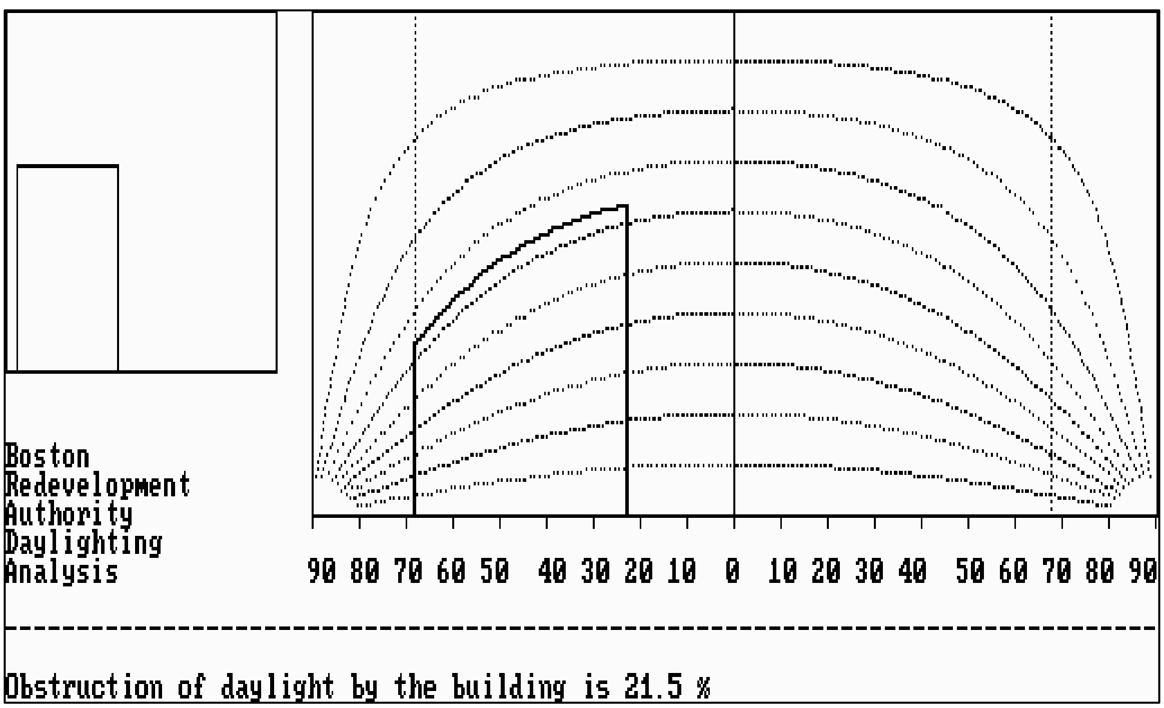
Viewpoint 3: Existing Site from Beverly Street



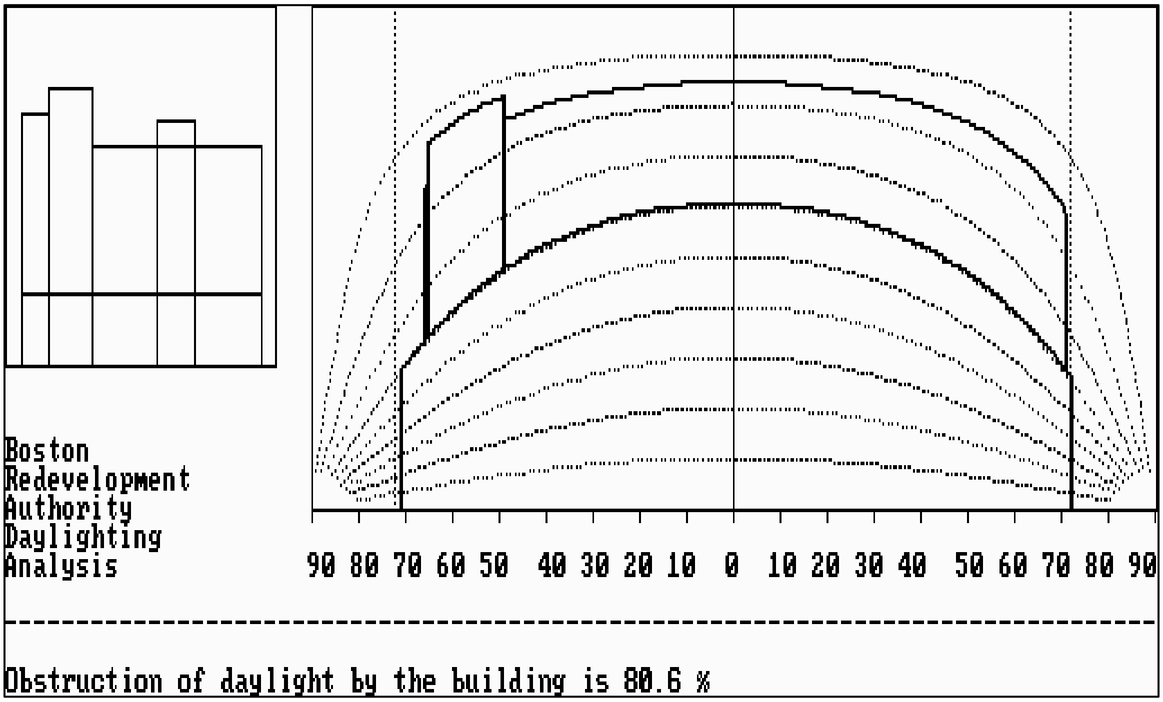
Viewpoint 4: Existing Site from Valenti Way



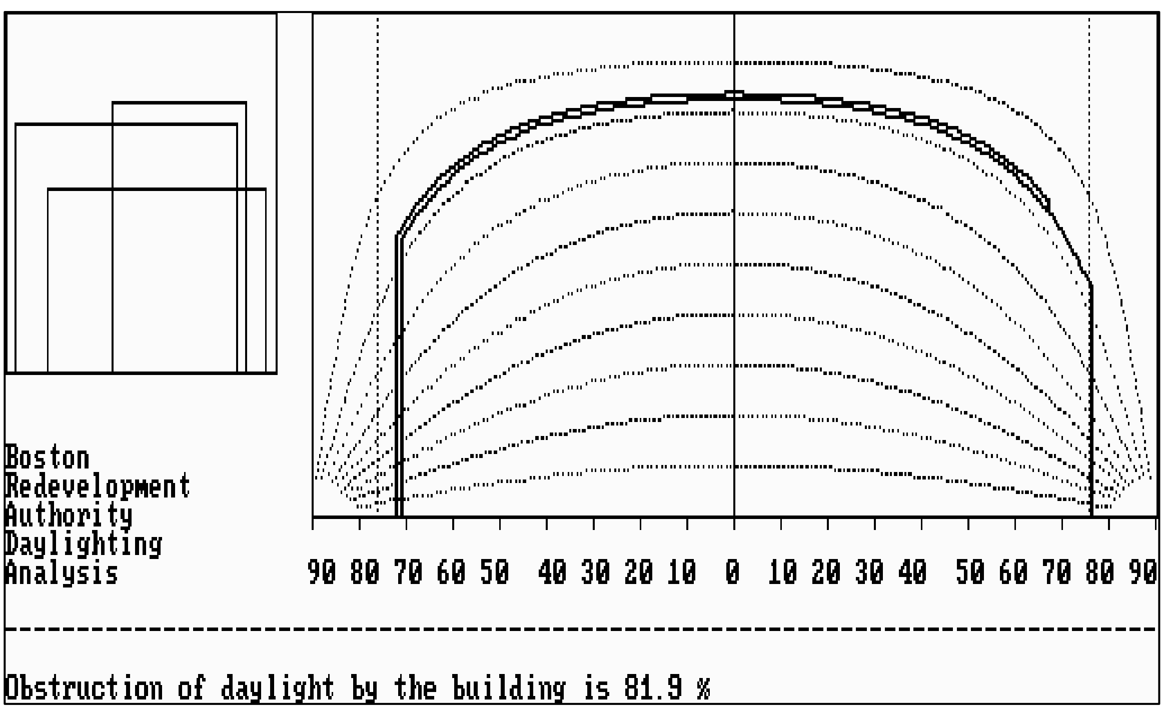
Viewpoint 5: Existing Site from Medford Street



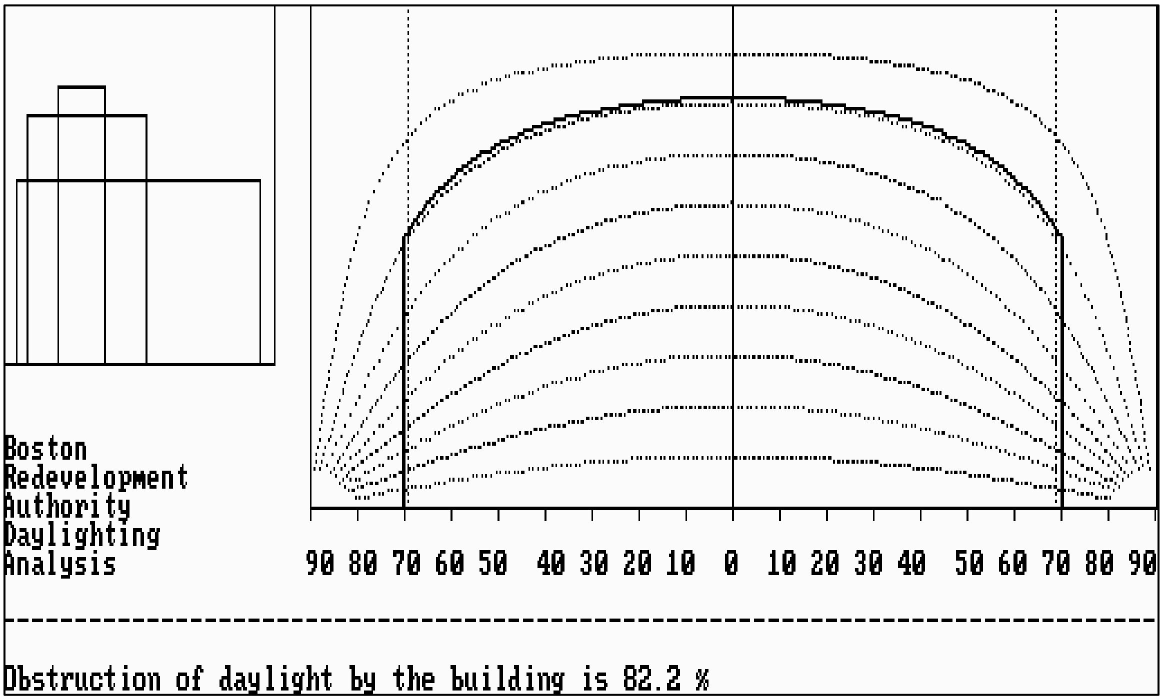
Viewpoint 6: Existing Site from Causeway Street



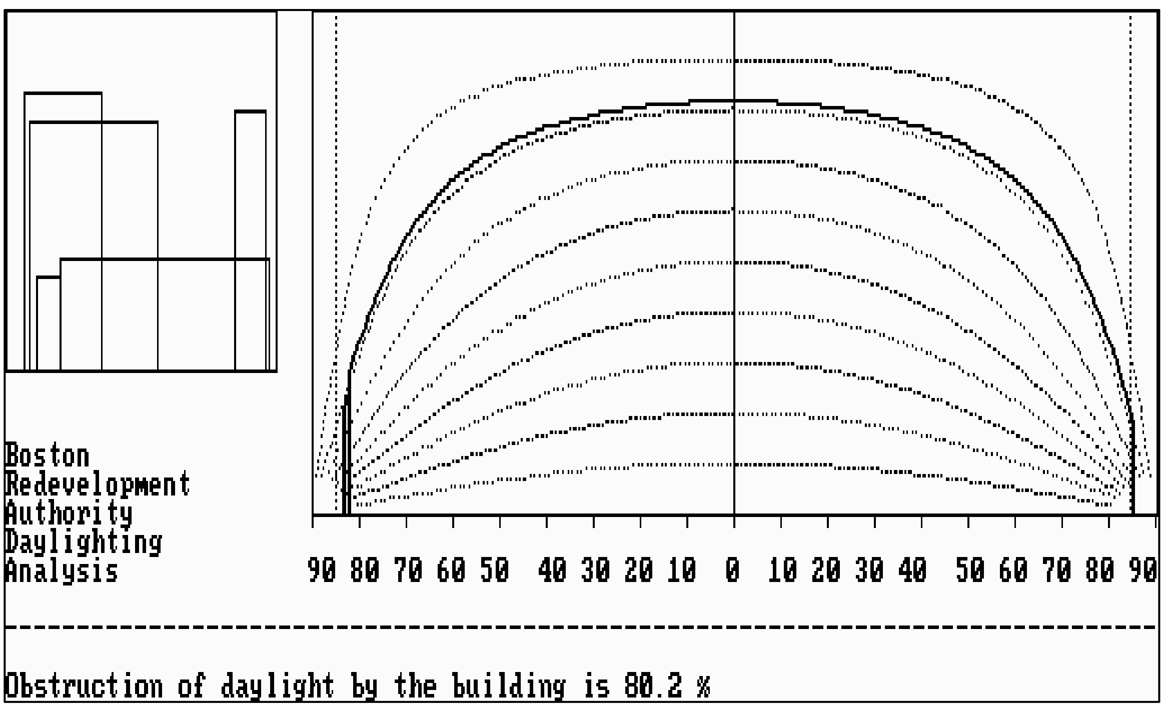
Viewpoint 1: Proposed Site (Hotel Section) from Beverly Street



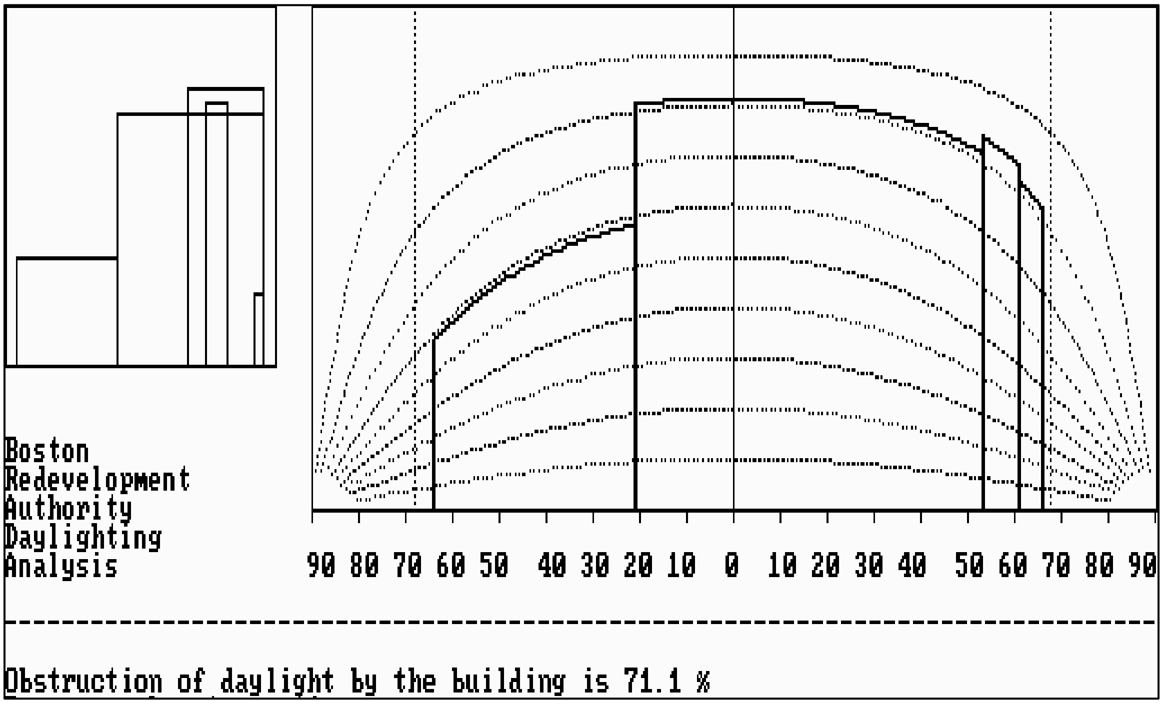
Viewpoint 2: Proposed Site (Office Section) from Beverly Street



Viewpoint 4: Proposed Site from Valenti Way



Viewpoint 5: Proposed Site from Medford Street



Viewpoint 6: Proposed Site from Causeway Street

Project. Viewpoint 3 looks northeast at the whole Project site. Due to the vacant space between the Beverly Street and the existing buildings, the existing daylight obstruction value is only 16.2%.

With the development of the vacant site between the existing buildings and Beverly Street, the daylight obstruction value will increase to 80.6% (at Viewpoint 1) and 81.9% (at Viewpoint 2), slightly more than the daylight obstruction values found in the surrounding area and typical of dense urban areas.

Valenti Way – Viewpoint 4

Valenti Way runs along the southeastern edge of the Project site. Viewpoint 4 was taken from the center of Valenti Way looking northwest at the site. The existing daylight obstruction value at the site is 12.9%. The development of the Project will increase daylight obstruction values at the site to 82.2%, which is only slightly more than the daylight obstruction values found in the surrounding area and is typical of dense urban areas.

Medford Street – Viewpoint 5

Medford Street runs along the northeastern edge of the Project site. Viewpoint 5 was taken from the center of the street looking southwest at the Project site.

Due to the height of the existing buildings along Medford Street, the proposed Project will not be visible from the center of the street. Therefore, the existing and proposed daylight obstruction values are almost the same at 80.1 % and 80.2%, respectively.

Causeway Street – Viewpoint 6

Causeway Street runs along the northwestern edge of the Project site. Viewpoint 6 was taken from the center of the street looking southeast at the Project site. The existing building at the corner of Causeway Street and Medford Street, and the vacant Project site adjacent to it, allow for a relatively low daylight obstruction value of 21.5%. The development of the Project will increase the daylight obstruction value to 71.1%. While this is an increase over existing conditions, the daylight obstruction value is within the daylight obstruction range of other buildings in the Project vicinity.

Area Context Views

The Project site is located between two areas with contrasting building heights. To the north, west and south of the Project site, the area is characterized by taller high-rise existing and proposed buildings such as the Thomas P. O'Neill Federal Building, the TD Banknorth Garden, Simpson Parcel 1, Avenir, and The Bulfinch Triangle Project. To the east of the Project site are the lower rise buildings along Boston's Inner Harbor and residential buildings in the North End. The Project's daylight obstruction values fit within the context of these areas.

To provide a larger context for a specific comparison of daylight conditions, obstruction values were calculated from seven viewpoints. The daylight conditions ranged from 41.3% on Valenti Way between Canal and Friend Streets (AC6) to 76.5% at 27 Medford Street (AC7) adjacent to the project site. In addition, the daylight obstruction values for other proposed projects in the vicinity range from 38.2% to 82.9% for The Bulfinch Triangle Project and from 61.3% to 84.9% for Simpson Parcel 1. In comparison, daylight obstruction values for the project range from 71.1% to 82.2%.

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 Project design sets some taller portions of the building back from the streets, thus reducing the impact on pedestrian's views of the sky. The results of the BRADA analysis indicate that while the development of the Project will result in increased daylight obstruction at the site over existing conditions, the resulting conditions generally will be consistent with the area context and are typical of daylight obstruction values downtown.

3.4 Solar Glare

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

3.5 Air Quality Analysis

3.5.1 Introduction

An air quality analysis was conducted to determine the impact of carbon monoxide (CO) emissions from combustion and mobile source emissions generated by the Project. A microscale analysis is typically performed to evaluate the potential air quality impacts due to traffic flow around the Project area. In addition, for stationary sources (i.e. combustion stacks, loading/unloading area, and garage vents), United States Environmental Protection Agency (EPA) approved air dispersion models were used to estimate ambient concentrations of nitrous oxide (NOx), particulate matter (PM), and sulfur dioxide (SO2).

The impacts were added to monitored background values and compared to the Federal National Ambient Air Quality Standards (NAAQS). The standards were developed by EPA to protect the human health against adverse health effects with a margin of safety.

A mesoscale analysis was also performed for the Project based on the number of vehicle trips per day (vtd) generated, which will exceed the 3,000 vtd threshold for a mesoscale analysis. The analysis includes both an estimate of the volatile organic carbon (VOC) emissions associated with all project-related vehicle trips and a comparison of the No-build to Build conditions. In the case where hydrocarbon emissions from the build condition are expected to be greater than the future no-build, the analysis includes identification and review of reasonable and feasible reduction and mitigation measures.

The modeling methodology was developed in accordance with the latest Massachusetts Department of Environmental Protection guidelines. The air quality analysis results show that CO, NOx, PM, and SO2 concentrations at all sensitive receptors studied are well under NAAQS thresholds.

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

3.5.2 Methodology

3.5.2.1 Microscale Analysis

The microscale analysis typically examines ground-level CO impacts due to traffic queues and parking garage exhaust systems 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. NAAQS have been established by the EPA for CO to protect the public health (known as primary standards). These standards do not allow ambient CO concentrations to exceed 35 parts per million (ppm) for a one-hour averaging period and nine ppm for an eight-hour averaging period, more than once per year at any location. The widespread use of CO catalysts on late-model 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 microscale analysis has been conducted using the latest versions of EPA MOBILE6.2, CAL3QHC, and SCREEN3 to estimate CO concentrations at sidewalk and other sensitive locations.

Future build and no-build emissions data calculated from the MOBILE6.2 model, along with traffic data, were input into the CAL3QHC program to determine CO concentrations due to traffic flowing through the intersections. SCREEN3 was used to estimate potential ground-level impacts due to emissions from the parking garage, heating boilers, and the loading docks.

CAL3QHC and SCREEN3 results were then added to background CO values of 3 ppm (one-hour) and 1.8 ppm (eight-hour), as provided by the DEP, to determine total air quality impacts due to the project. This value was compared to the NAAQS for CO of 35 ppm (one-hour) and 9 ppm (eight-hour).

Intersection Selection

Intersection selection criteria for a microscale analysis is typically based on a Level of Service (LOS) D where the project increases traffic volumes by ten percent or greater, or if the intersection operates at LOS E or F and the project degrades conditions at the location. An analysis of the intersections from the traffic study conducted by Howard/Stein-Hudson, Associates for the Build Condition was conducted (See Chapter 2.0, Transportation). There were three intersections that met the microscale analysis criteria:

1. North Washington Street/Causeway Street;

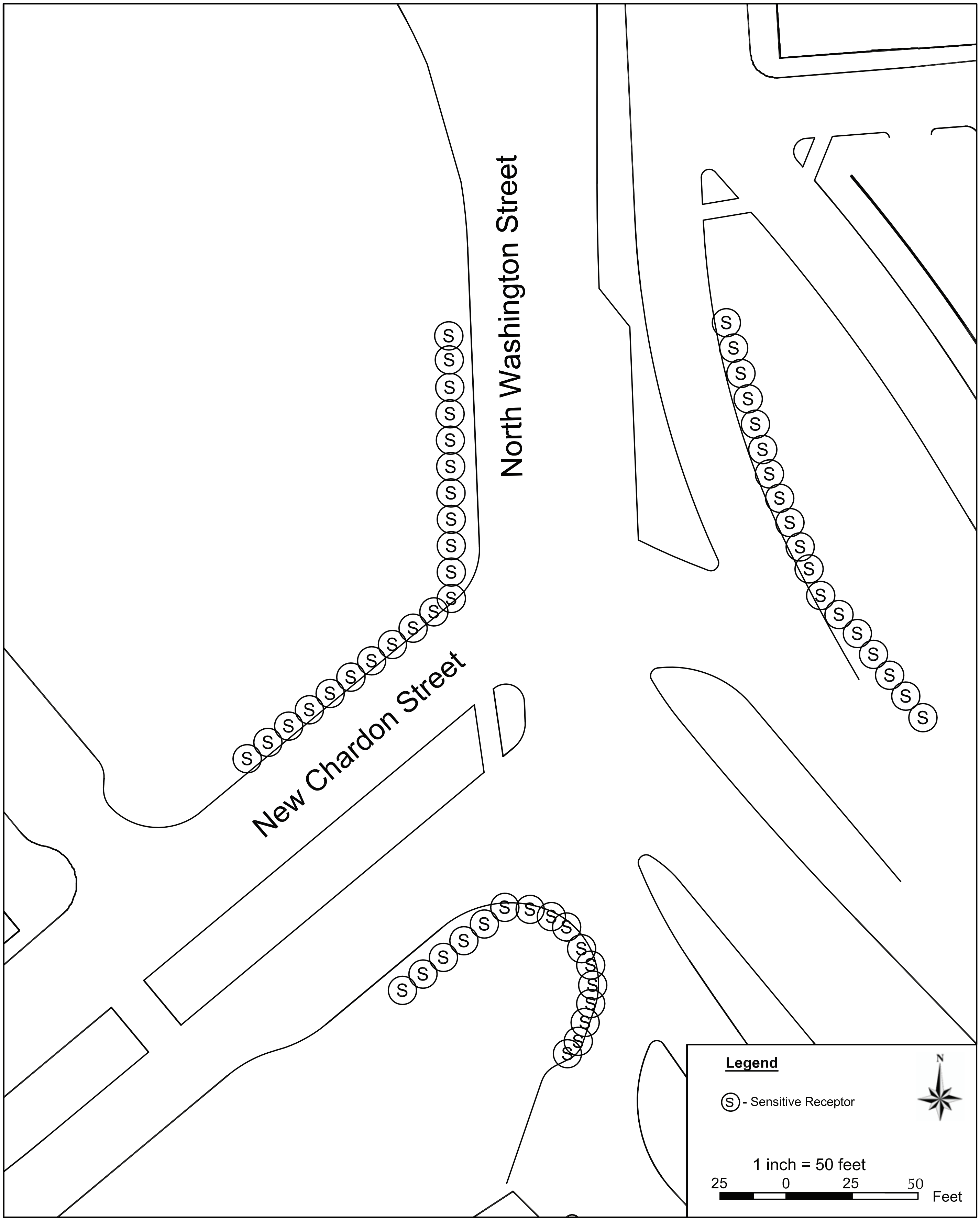
2. North CausewayStreet/Valenti Way/Thacher Street; and

3. New Chardon Street/Surface Road/I-93 Southbound and Callahan Tunnel On-ramp/Sumner Tunnel Off-ramp.

The traffic volumes and LOS calculations provided in Chapter 2.0 and Appendix C form the basis of evaluating the traffic data versus the microscale thresholds.

Sensitive Receptors Evaluated

Receptors were placed in the vicinity of the project area and at each intersection. The receptor locations are presented in Figures 3.5-1 through 3.5-3.

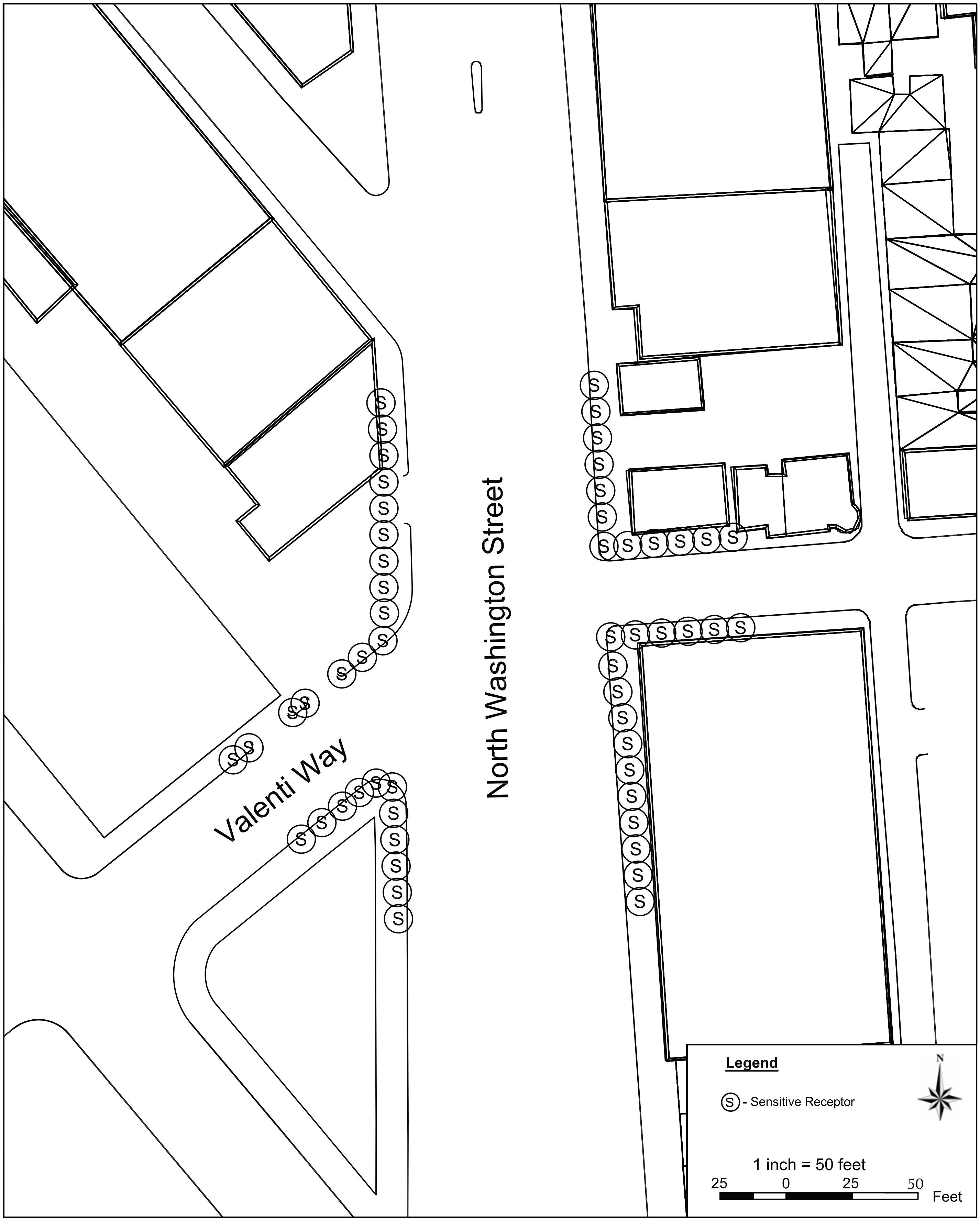


The Merano Boston, MA

Epsilon ASSOCIATES INC.

Figure 3.5-1

North Washington St / New Chardon St Receptor Locations



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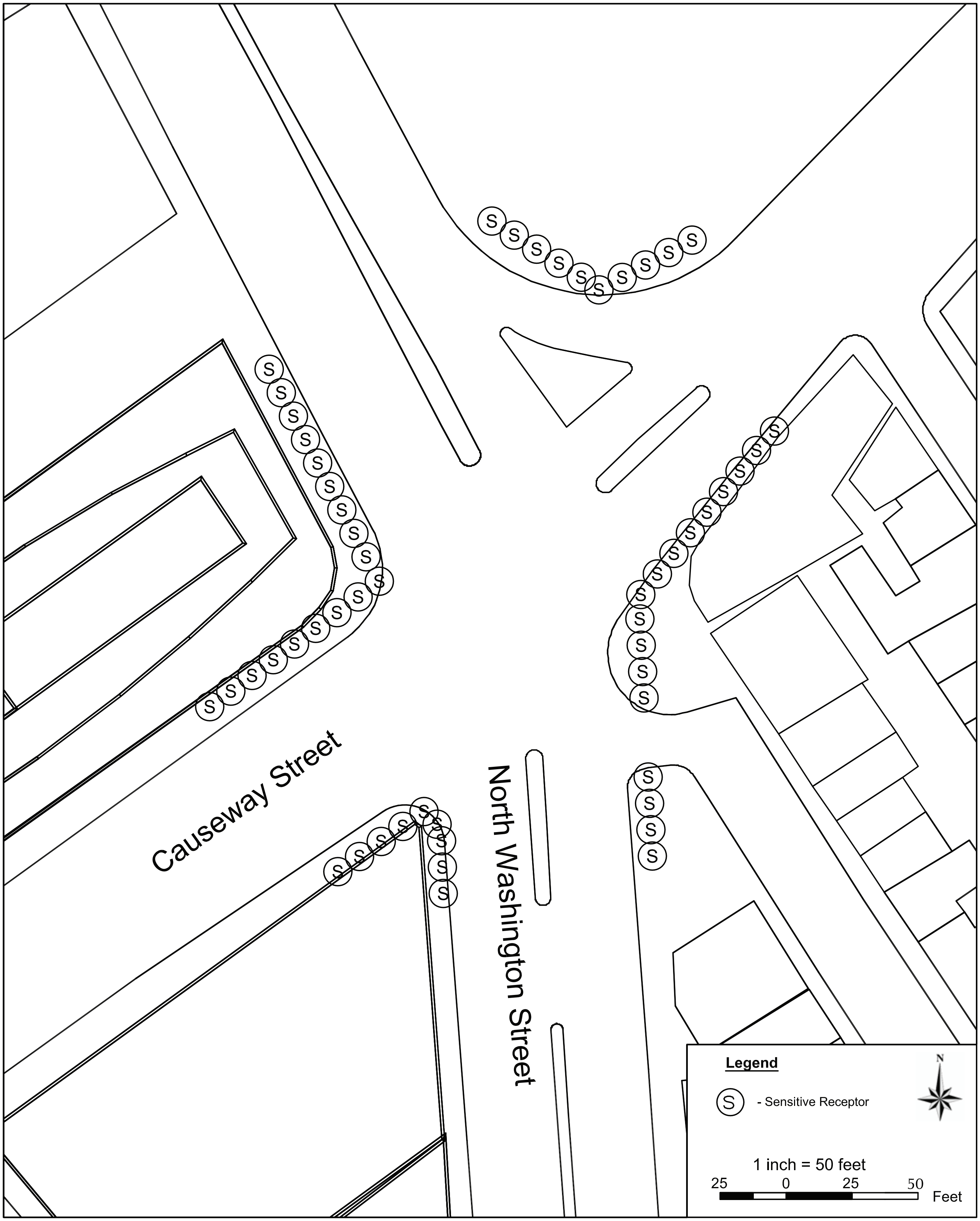
Epsilon ASSOCIATES INC.

Figure 3.5-2

North Washington St / Valenti Way Receptor Locations



The Merano Boston, MA

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Figure 3.5-3

Causeway St / North Washington St Receptor Locations

Emissions Calculations (MOBILE6.2)

The MOBILE6.2 inputs are based on the latest guidance issued by MassDEP[1] regarding updated inputs to the model.

To estimate emissions from trucks in the loading dock area, idle emissions were calculated.

The current version of MOBILE6.2 does not explicitly calculate idle emissions. However, idle emissions can be obtained from a vehicle speed of 2.5 miles per hour (mph) (the lowest speed MOBILE6 will model). The resulting emission rate given in (grams/mile) is then multiplied by 2.5 mph to estimate idle emissions (given in grams/hour). Moving emissions are calculated based on actual speeds at which free-flowing vehicles travel through the intersections.

Impact Calculations (CAL3QHC)

The CAL3QHC model predicts one-hour concentrations using queue-links at intersections based on 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. The CAL3QHC methodology was based on EPA CO modeling guidance. Signal timings were provided directly from the traffic modeling runs. Travel speeds were estimated based on field observations, traffic data, and queue links at the intersections. The CAL3QHC parameters are listed in Appendix C.

SCREEN3 Modeling

The EPA SCREEN3 model was used to estimate ground-level impacts due to emissions from the combustion sources. This model allows for the consideration of urban dispersion environments, building downwash, and cavity regions.

Parking Garage Exhaust Vents

There is an above-grade parking garage planned for the Project. The garage will consist of one level (level 2) and have a capacity of up to 226 spaces (double stacked). There are two supply and two exhaust vents on the roof. Carbon monoxide monitors will be installed within the garage to measure the levels of CO. For the air quality analysis, it was assumed that the exhaust fans will discharge emissions from the parking garage 10 feet above the building. This corresponds to 169 feet above ground level (agl) for the office and 157 feet agl for the retail at the closest sensitive receptor. For modeling purposes, emissions are conservatively assumed to vent from one louver at the lowest exhaust height (147 agl). Emissions from the parking garage were calculated using MOBILE6.2 and an estimate of the

1 MassDEP: February 12, 2003 memorandum for MOBILE6 inputs for performing indirect source air quality analysis and latest inputs supplied by BRA.

total miles traveled within the garages during the a.m. and p.m. peak hours. The total miles traveled are calculated by multiplying the average distance a car would travel in the garage by the number of cars entering and leaving the garage. It was estimated that each vehicle, on average, is driven halfway into the garage and halfway out to park and leave.

The footprint of the garage is approximately 425 feet by 120 feet. Assuming the cars entering and exiting the garage travel approximately 545 feet, a total trip of 23.3 miles is traveled on the garage (545 feet x 226 cars / 5,280 feet per mile) during the peak a.m. or p.m. hour.

To provide a conservative assumption for emissions from the garage, an emission rate from MOBILE6.2 of 2.5 miles per hour was assumed for the 2013 conditions.

Therefore, the emission rate from the garage can be calculated as follows:

<u>2013 Conditions</u>

19.42 grams/mile x 23.3 miles/hour x 1 hour/3600 seconds x 2.5 = 0.31 grams/second

The SCREEN3 model was run to determine ground level impacts. The following input parameters were used:

- The vent was placed 157 feet (47.8 meters) above ground level;
- Building dimensions of the mechanical roof height (using worst case conservative building dimensions) were used for downwash and cavity calculations (H= 159', Width= 150', L= 425'); and
- Urban dispersion coefficients were used.

Heating Equipment

A total estimated boiler heat input of 24 million British Thermal Units (BTU per hour) is proposed for providing heat and hot water to the Hotel and Office building. The boilers will be natural gas-fired and located in a mechanical penthouse area on the roof of each building. The boilers will not be subject to the MassDEP’s Environmental Results Program (ERP) since individual estimated heat inputs are less than the 10 MMBtu/hr ERP threshold. For this analysis, however, emissions were estimated for each boiler based on the MassDEP Boiler ERP program emission limits. Dispersion modeled impacts from the heating units were conservatively estimated from one exhaust stack 10 feet (157 feet above ground level) above the building mechanical roof height of 147 feet above ground level. Detailed calculations are presented in Appendix C.

Emergency Generator

The building will contain two 550-kW standby generators designed to provide temporary power to the building in the case of a power interruption. The generators will exhaust at least ten feet above the mechanical penthouse roof height (157 feet above ground level). Typically, the generator will operate for approximately one hour each month for testing and general maintenance. On March 23, 2006, the MassDEP new regulations for emergency generators became effective. The emergency generator ERP regulation applies to new 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's maximum rating capacity is greater than the ERP limit of 37 kW, both units will be subject to the new 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 commencement.

Emissions were estimated for the emergency generator based on vendor supplied data and the new ERP limits for a 550-kW generator. Detailed calculations are presented in Appendix C.

Loading/Unloading Dock Vents

Loading and service are provided by two loading dock areas. The northern loading dock will serve the hotels and restaurants, while the southern loading area will serve the retail and office tenants. Access and egress are provided from the South Site Driveway from Valenti Way. Preliminary estimates are for a total of up to 26 trips per day (tpd) from the northern loading area and 21 tpd from the southern loading area.

Emissions of particulate matter (PM) for an idling truck were estimated from the EPA MOBILE6.2 emission factor program. Concentrations were estimated for the Valenti Way area from the CAL3QHC model. Idling at both the loading/unloading areas were assumed for five minutes.

Receptors were placed around the loading/unloading area of the Project site to determine maximum 24-hour and annual concentrations.

The CAL3QHC modeling results are presented in Table 3.5-2 for the loading/unloading areas along with the mechanical equipment and compared to the NAAQS.

Methodology

The maximum concentrations from SCREEN3 for the loading dock vents and the heating/emergency generator stacks were added together. This is conservative in that maximum impacts are added together regardless of space or time. Therefore, if maximum combined impacts from both sources are below the NAAQS at one receptor, then this is indicative of any receptor placed around the Project.

3.5.3 Background CO Concentrations

An air quality analysis also requires an estimate of "background" air quality levels, representing the contribution of all sources in the project area except the specific intersections. Background levels of future CO concentrations of 3 ppm (one-hour) and 1.8 ppm (eight-hour) were provided by DEP.

For the peak eight-hour period, SCREEN3 concentrations were calculated using an eight-hour to one-hour ratio (or persistence factor) of 0.70 as recommended by EPA. This persistence factor accounts for the variability in meteorology over an eight-hour period relative to one-hour conditions.

3.5.4 Air Quality Results

3.5.4.1 Mobile Source Analysis

The results of the one-hour build CO concentrations from CAL3QHC and SCREEN3 for the highest predicted receptor are provided in Table 3.5-1.

The results of the one-hour modeled CO ground-level concentrations from both models were added to DEP supplied background levels for comparison to the NAAQS. The one-hour values were then scaled by 0.7 to generate eight-hour values. These values represent the highest potential concentrations as they are predicted during the simultaneous occurrence of "defined" worst case meteorology.

The highest one-hour concentration predicted in the area of the project for the future build conditions plus background is 5.1 ppm at two of the sensitive receptors located at the Project site (i.e Receptor 1 and Receptor 2 from Figure 3.5-4). The total one-hour concentration includes the maximum predicted concentrations from SCREEN3 for the parking exhaust vent, the heating boilers, and the emergency generator. This value is well below the one-hour NAAQS standard of 35 ppm.

The highest eight-hour concentration predicted in the area of the project for the future build conditions plus background is 3.2 ppm at the same locations as the one-hour. The total eight-hour concentrations include maximum predicted concentrations from SCREEN3 modeled sources. This value is well below the eight-hour NAAQS standard of nine ppm.

3.5.4.2 NAAQS Analysis

In addition to the microscale analysis, a cumulative impact analysis was also conducted for comparison to the NAAQS for SO2, NOx, and PM. This analysis addresses emissions from the Project’s heating boilers, emergency generator, and the loading/unloading area (PM only). Similar to the microscale analysis, the one-hour predicted concentrations from SCREEN3 were scaled by EPA approved adjustment factors of 0.9, 0.4, and 0.08 to obtain three-hour, 24-hour, and annual concentrations.

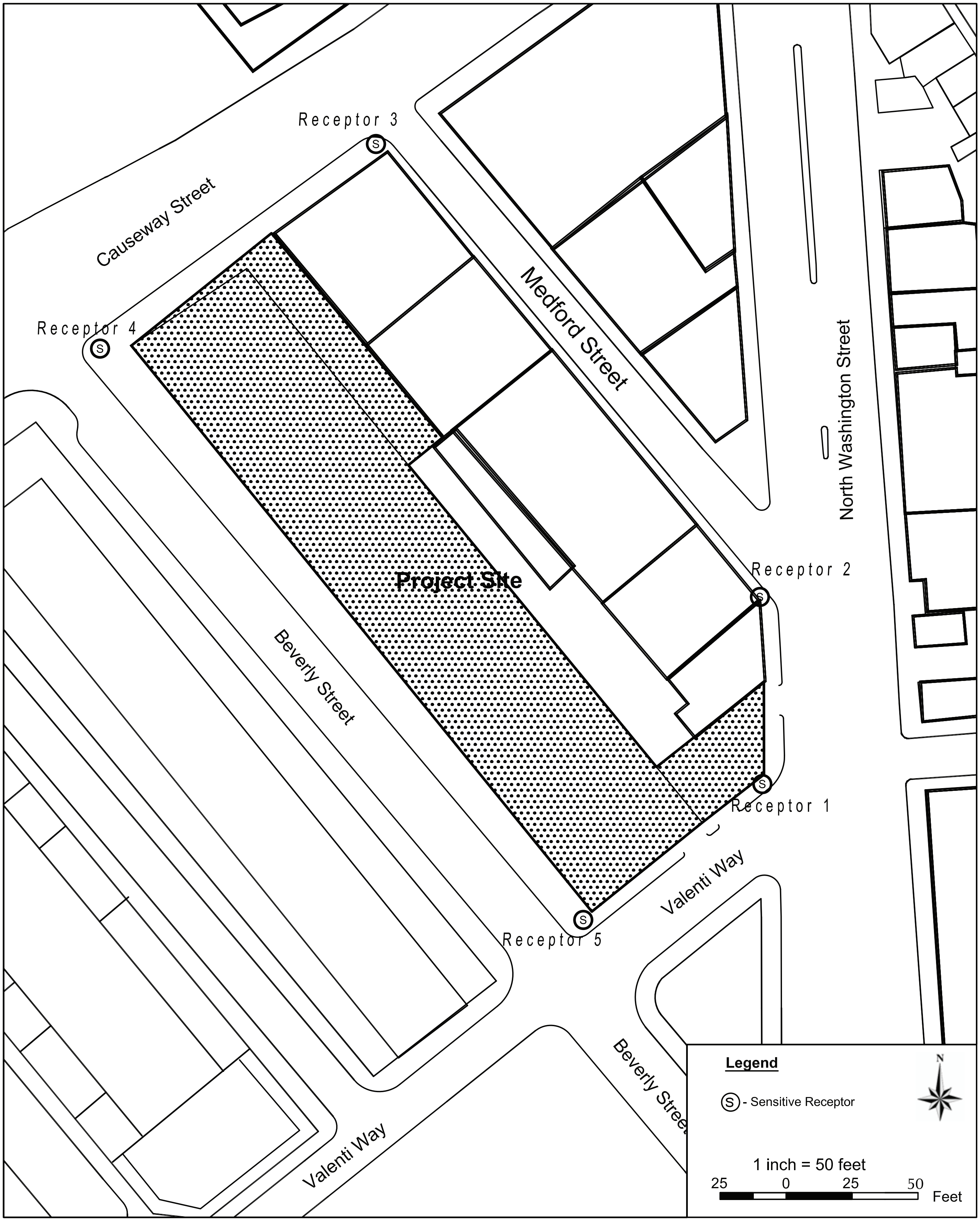

Figure 3.5-4

Project Site Sensitive Receptor Locations

Worst case maximum predicted impacts from these sources were added to monitored background values obtained from the MassDEP website for 2005 and compared to the NAAQS.

Table 3.5-2 presents the cumulative modeling results for the three sources. The total impacts when combined with the monitored background values are well below the NAAQS for all pollutants and averaging periods.

Table 3.5-1 Summary of Microscale Modeling Analysis

							1-hr Back	3	8-hr Back	1.8
Intersection	Peak	1-hour Modeled CO Impacts (ppm)	Project Garage CO Modeled Impacts (ppm)	Project Mechanical Equipment Modeled Impacts (ppm)	Total Build CO Impacts (ppm)	8-hour Scaled CO Impacts (ppm)	1-hour Total CO Impacts (ppm)[1]	1-hour NAAQS (ppm)	8-hour Total CO Impact (ppm)[1]	8-hour NAAQS (ppm)
Valenti Way at North Washington Street	AM	0.9	0.10	0.35	1.4	0.9	4.4	35	2.7	9
	PM	0.8	0.10	0.35	1.3	0.9	4.3	35	2.7	9
New Chardon Street at North Washington Street	AM	1.5	0.10	0.35	2.0	1.4	5.0	35	3.2	9
	PM	1.6	0.10	0.35	2.1	1.4	5.1	35	3.2	9
Causeway Street at North Washington Street	AM	1.4	0.10	0.35	1.9	1.3	4.9	35	3.1	9
	PM	1.5	0.10	0.35	2.0	1.4	5.0	35	3.2	9
Sensitive Receptor 1	AM	1.5	0.10	0.35	2.0	1.4	5.0	35	3.2	9
	PM	1.6	0.10	0.35	2.1	1.4	5.1	35	3.2	9
Sensitive Receptor 2	AM	1.5	0.10	0.35	2.0	1.4	5.0	35	3.2	9
	PM	1.6	0.10	0.35	2.1	1.4	5.1	35	3.2	9
Sensitive Receptor 3	AM	0.3	0.10	0.35	0.8	0.5	3.8	35	2.3	9
	PM	0.3	0.10	0.35	0.8	0.5	3.8	35	2.3	9
Sensitive Receptor 4	AM	0.1	0.10	0.35	0.6	0.4	3.6	35	2.2	9
	PM	0.2	0.10	0.35	0.7	0.5	3.7	35	2.3	9
Sensitive Receptor 5	AM	0.3	0.10	0.35	0.8	0.5	3.8	35	2.3	9
	PM	0.4	0.10	0.35	0.9	0.6	3.9	35	2.4	9
MAX		1.6	0.10	0.35	2.1	1.4	5.1	35	3.2	9

Notes:

1) Total concentrations include background value.

2) Sensitive Receptor 1 denotes the receptor located at the intersection of Valenti Way and North Washington Street.

3) Sensitive Receptor 2 denotes the receptor located at the intersection of Medford Street and North Washington Street.

4) Sensitive Receptor 3 denotes the receptor located at the intersection of Medford Street and Causeway Street.

5) Sensitive Receptor 4 denotes the receptor located at the intersection of Beverly Street and Causeway Street.

6) Sensitive Receptor 5 denotes the receptor located at the intersection of Beverly Street and Valenti Way.

Table 3.5-2 Summary of NAAQS Modeling Analysis

Pollutant	Period	Generator Concentration (ug/m^3)	Loading Dock Concentration (ug/m^3)	Monitored Background (ug/m^3)	Total Concentration (ug/m^3)	NAAQS (ug/m^3)
NOx	Annual	2.23		47	49	100
SO2	3-Hour	5.52		84	90	1300
	24-Hour	2.45		52	54	365
	Annual	0.026		11	11	80
PM	24-Hour	9.8	0.05	58	68	150
	Annual	0.33	0.01	29	29	50
CO	1-Hour	412.6		2552	2965	40000
	8-Hour	288.8		1740	2029	10000

Notes:
1) Emergency Generators assumed to operate for 300 hours per year.
2) Heating boilers assume to operate for 8760 hours per year.

3.5.5 Conclusion

Using conservative estimates, the CO concentrations at the nearest sensitive receptors for impacts from the three intersections, and the heating and emergency generator units, plus monitored background values, are well under the CO NAAQS thresholds. In addition, maximum cumulative impacts from the heating and emergency units plus monitored background values are also well below the NAAQS thresholds for SO2, NOx, and PM.

3.5.6 Mesoscale Analysis

A mesoscale analysis was performed for the Project based on the number of vehicle trips per day (vtd) generated, which will exceed the 3,000 vtd threshold for a mesoscale analysis. The analysis includes both an estimate of the VOC emissions associated with all project-related vehicle trips and a comparison of VOC emissions associated with the build condition compared to the no-build condition. In the case where hydrocarbon emissions from the build condition are expected to be greater than the future no-build, the analysis includes identification and review of reasonable and feasible reduction and mitigation measures.

The analysis was conducted consistent with the MassDEP mesoscale guidance and other similar projects.

A mesoscale analysis was performed to assess the total VOCs/NOx associated with motor vehicle emissions related to the Project. Transportation demand management (TDM) and other mitigation strategies to reduce air quality impacts are described in Chapter 2.0 of this PNF.

3.5.6.1 Mesoscale Analysis

A mesoscale analysis predicts the change in regional emissions due to the Project. The total vehicle pollutant burden was estimated for the no-build and build conditions for the future year 2013 based on the traffic analysis. The conditions are described in more detail in Chapter 2.0 of this PNF.

For each condition modeled, the EPA MOBILE6.2 computer program was used to estimate motor vehicle emissions of VOC/NOx on the roadway network. Emission estimates derived from MOBILE6.2 for VOCs/NOx are based on the worst case of either wintertime or summertime conditions.

3.5.6.2 Intersection Selection

Intersection selection criteria for a mesoscale analysis is typically based on the area where the Project will affect the surrounding intersections and traffic patterns. For this analysis, five intersections were included in the analysis based on the traffic study. The intersections and traffic volumes calculations provided in Chapter 2.0 and Appendix C form the basis of the mesoscale study.

3.5.6.3 Emissions Calculations (MOBILE6.2)

For each case modeled, the EPA MOBILE6.2[2] computer program was used to estimate motor vehicle emissions on the roadway network. Emissions data calculated by the MOBILE6.2 model are based on motor vehicle operations typical of peak periods. The Commonwealth's statewide annual Inspection and Maintenance (I&M) Program was included, as well as state specific vehicle age registration distribution. The MOBILE6.2 inputs are based on the latest guidance issued by MassDEP[3] regarding updated inputs to the model. MOBILE6.2 input parameters are provided in the air quality appendix, Appendix C. In addition, emission calculations are presented for the VOC build and no-build scenarios.

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[2] MOBILE6.2 is an EPA computer model that calculates emission factors for hydrocarbons, carbon monoxide, and oxides of nitrogen form gasoline and diesel fueled highway motor vehicles

[3] MADEP: February 12, 2003 memorandum for MOBILE6 inputs for performing microscale and mesoscale analysis. Inputs are based on the latest MOBILE6 inputs from MassDEP dated 7/7/2004.

The mesoscale analysis predicts the change in regional emissions due to the Project. This is accomplished by multiplying changes in traffic flow (in vehicle miles traveled[4]) by an emission factor (grams per vehicle mile traveled). An average vehicle speed of 30 mph was used to estimate emissions for all links.

3.5.6.4 Conclusion

Results of the mesoscale analysis are presented in Table 3.5-3 for the 2013 buildout condition. The results show an increase in daily VOC and NOx emissions for the 2013 build conditions versus the no-build condition.

The 2013 build condition results in an increase in morning and evening peak hourly VOC/NOx emissions of 1.2 percent and 1.5 percent, respectively.

3.5.6.5 Mitigation Measures and Conclusions

As is required when the mesoscale results show an increase in emissions from the no-build to build conditions, the Proponent has identified and reviewed reasonable and feasible reduction and mitigation measures to address the increase in emissions associated with the 2013 build scenario. Proposed traffic mitigation measures are described in detail in Chapter 2.0 of this PNF.

Table 3.5-3 2013 Buildout Mesoscale Analysis Summary

Pollutant	Time	Units	Full Build	No-Build	BD-NB	% Difference (BD-NB)
VOC	AM Peak	grams/hr	1,546.6	1,528.8	17.9	1.17%
		tons/hr	0.00170	0.00169	0.00002	1.17%
		tons/day*	0.017	0.017	0.000	1.17%
	PM Peak	grams/hr	1711.017	1686.180	24.8	1.47%
		tons/hr	0.00189	0.00186	0.00003	1.47%
		tons/day*	0.019	0.019	0.000	1.47%

BD = Full Build

NB = No-build

* Tons/day estimated by assuming hourly peak is 10 percent of total volume.

4 Vehicle Miles Traveled (VMT) – the average daily traffic multiplied by the roadway link length.

Table 3.5-3 2013 Buildout Mesoscale Analysis Summary (continued)

Pollutant	Time	Units	Full Build	No-Build	BD-NB	% Difference (BD-NB)
NOx	AM Peak	grams/hr	3,152.4	3,116.0	36.4	1.17%
		tons/hr	0.00347	0.00343	0.00004	1.17%
		tons/day*	0.035	0.034	0.000	1.17%
	PM Peak	grams/hr	3,487.4	3,436.8	50.6	1.47%
		tons/hr	0.00384	0.00379	0.00006	1.47%
		tons/day*	0.038	0.038	0.001	1.47%

BD = Full Build

NB = No-build

* Tons/day estimated by assuming hourly peak is 10 percent of total volume

3.6 Solid and Hazardous Waste

3.6.1 Hazardous Waste

A Phase I Environmental Site Assessment following the general guidance of the ASTM Phase I Standard Practice has been conducted for the Project. The study included a site reconnaissance, a visual inspection of the subject site and surrounding properties for the presence of oil or hazardous materials (OHM), a review of site history, a review of selected local, state, and federal regulatory records, and interviews with persons and agencies familiar with the site. Historically recognized environmental conditions were identified at the site. However, historical releases or sources of OHM that were present at the site are believed to have been removed as part of the construction of the Central Artery tunnel that underlies the site.

Recent test pit explorations performed over the tunnel structures that underlie the site indicate that the soil consists of fill that was placed above the tunnels as part of the Central Artery/Tunnel project. Based on the regulatory requirements governing the Central Artery/Tunnel project, it is likely that only “clean” fill materials were used.

Available boring logs indicate the presence of urban fill underlying the ground surface outside the tunnel footprints. Common “urban” contaminants are anticipated to be present in fill, including ash, cinders, and miscellaneous debris. Residual contamination from historical use of portions of the site as a shoe manufacturing company, a carriage manufacturer, a machine shop, woodworking shops, a gasoline service station, and over 200 years of urban use on the remainder of the site may be present in localized site soils. Off-site disposal of soils at the site that may be required will be performed in accordance with Massachusetts Department of Environmental Protection (MassDEP) policies, which will be outlined in a site specific Soil Management Plan prepared for the Project and incorporated into the Contract Documents.

Presently, no regulatory response action or notification is required. Should construction activity or utility replacement encounter soil contamination resulting from historical site uses, notification to the MassDEP may be required.

3.6.2 Operation Solid and Hazardous Waste Generation

The Project will generate solid waste typical of other mixed-use projects. Solid waste generated by the Project will be approximately 674.9 tons per year, based on the amount of retail space proposed at a generation rate of 5.5 tons per 1,000 square feet per year, the amount of office space proposed at a generation rate of 1.3 tons per 1,000 square feet per year, and the number of hotel rooms proposed at a generation rate of four pounds per room per day as shown in Table 3.6-1.

Table 3.6-1 Solid Waste Generation

Proposed Use	Program	Generation Rate	Solid Waste (tons per year)
Office	213,000 sf	1.3 tons/1,000 sf/year	276.9
Retail/Restaurant	36,000 sf	5.5 tons/1,000 sf/year	198.0
Hotel	274 rooms	4 pounds/room/day	200.0
Total Solid Waste Generation			674.9

Solid waste will include wastepaper, cardboard, glass, bottles, and food waste. A portion of the waste will be recycled as described below. The remainder of the waste will be compacted and removed by a waste hauler contracted by building management. With the exception of “household hazardous wastes” typical of office, hotel and retail uses (for example, cleaning fluids and paint), the Project uses will not generate hazardous waste.

Trash will be picked up from the internal loading docks (two for the hotels and restaurants and two for office space) four times per week. Restaurant trash will be stored at the northern loading dock for collection.

3.6.3 Recycling

The Proponent will coordinate with the City of Boston to implement a strategy that complements the City’s Recycling Strategic Plan. Recycling by retail, office and hotel tenants will be encouraged and coordinated. To encourage recycling, the Proponent will implement a recycling program throughout the Project. The Project will include space for recycling in the building, and the loading and receiving areas will include space for the storage and pick-up of recyclable materials. Recyclable materials are expected to include newspaper, cardboard, cans, and bottles.

3.7 Noise Impacts

3.7.1 Introduction

This section provides a noise analysis for the Project, including a noise-monitoring program to determine existing noise levels and an estimate of future noise levels when the Project is in operation.

The analysis indicates that predicted noise levels from Project mechanical equipment with appropriate noise mitigation will be below the most stringent City of Boston Noise Zoning requirements for nighttime and daytime residential zones, and well below existing measured baseline noise levels in the area.

3.7.2 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. A property of the decibel scale is that the sound pressure levels of two separate sounds are not directly additive. For example, if a sound of 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 the fact that a change in sound levels of less than three dB is imperceptible to the human ear.

Another property of decibels is that if one source of noise is 10 dB or more, louder than another source, then the total 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. 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. A-weighted sound levels are reported in decibels designated as "dBA."

Because the sounds in the environment vary with time they cannot simply be described with a single number. Two methods are used for describing variable sounds. These are 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. For example:

> 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.
>
> 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.

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 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.

Baseline noise levels were measured in the vicinity of the proposed Project. Those baseline levels were then compared against the predicted noise levels from mechanical equipment operation. Sound levels for the equipment were based on information provided by the manufacturers. The predicted noise levels were compared to the City of Boston Zoning District Noise Standards.

3.7.3 Noise Regulations and Criteria

The primary set of regulations relating to the potential increase in noise levels is the City of Boston Zoning District 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). Results of the baseline ambient noise level survey and the modeled noise levels were compared to the City of Boston Zoning District Noise Standards. Separate regulations within the Standard provide criteria to control different types of noise. Regulation 2 is applicable to the effects of the completed proposed Project and was considered in this noise study. Table 3.7-1 presents the Zoning District Standards.

MassDEP regulates community noise by its Noise Policy: DAQC policy 90-001. The MassDEP policy limits source sound levels to a 10-dBA increase in the ambient measured noise level (L_{90}) at the Project property line and at the nearest residences. The policy further prohibits pure tone conditions – when any octave band center frequency sound pressure level exceeds the two adjacent center frequency sound pressure levels by three decibels or more.

Table 3.7-1 City of Boston Zoning District Noise Standards, Maximum Allowable Sound Pressure Levels

Octave Band Center Frequency (Hz)	Residential Zoning District Daytime (dB)	Residential Zoning District All Other Times (dB)	Residential-Industrial Zoning District Daytime (dB)	Residential-Industrial Zoning District All Other Times (dB)	Business Zoning District Anytime (dB)	Industrial Zoning District Anytime (dB)
31.5	75	68	79	72	79	83
63	76	67	78	71	78	82
125	69	61	73	65	73	77
250	62	52	68	57	68	73
500	56	45	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.

- 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.

3.7.4 Existing Conditions

3.7.4.1 Baseline Noise Environment

An ambient noise level survey was conducted to characterize the existing baseline acoustical environment in the vicinity of the Project. Existing noise sources in the vicinity of the Project include vehicular traffic (including trucks) on the local roadways, construction activity, pedestrian traffic, mechanical equipment located on nearby buildings, and the general din of the city.

3.7.4.2 Noise Measurement Locations

The selection of the sound monitoring receptor locations was based upon a review of the current and anticipated land use in the area surrounding the Project. Three noise-monitoring locations were selected in representative locations to obtain a sampling of the ambient baseline noise environment. This area encompasses locations on or near North Washington Street and Causeway Street. The measurement locations are depicted on Figure 3.7-1 and are described below.

- Location 1 is near 61 North Washington Street. Sound levels there were reflective of vehicular traffic on North Washington Street, pedestrian foot traffic, and mechanical equipment on building rooftops.
- Location 2 is at the intersection of Thacher Street and Thacher Court. This location is within a residential neighborhood off of North Washington Street. The primary audible sound source at this location was vehicular traffic on North Washington Street and air-conditioning units from a nearby building.
- Location 3 is the residential building located at 266 Causeway Street. Sound levels there were primarily due to traffic on I-93 (before the roadway goes underground).

3.7.4.3 Noise Measurement Methodology

Sound level measurements were taken for 20 minutes per location during daytime (1:00 p.m. to 4:00 p.m.) on May 30, 2008, and during the nighttime (12:00 a.m. to 3:00 a.m.) on May 30, 2008. 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.

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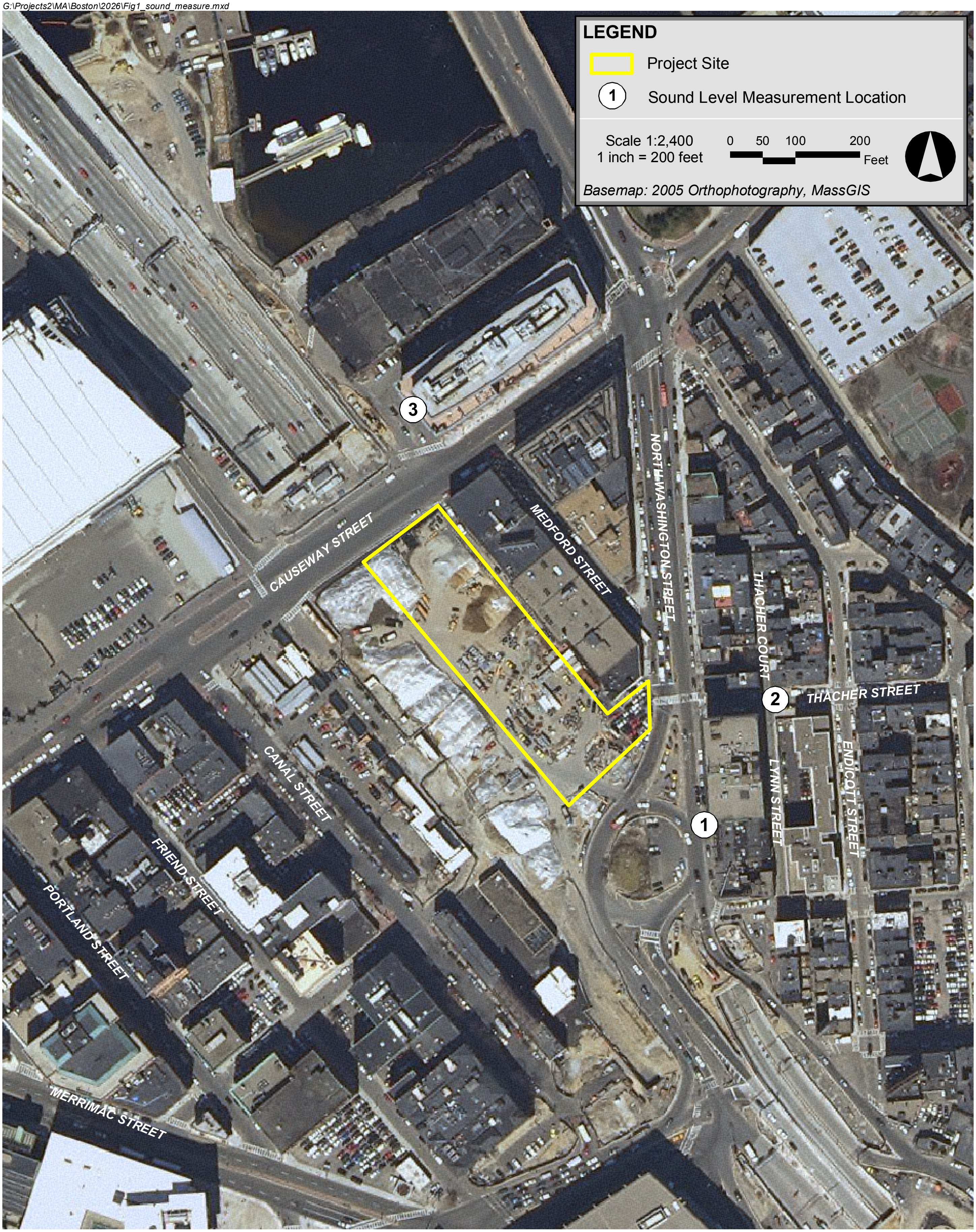

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Figure 3.7-1

Sound Level Measurement Locations

The sound levels were measured at publicly accessible locations at a height of five feet above the ground and at locations where there were no large reflective surfaces to affect the measured levels. The measurements were made under low wind conditions and with dry roadway surfaces. Wind speed measurements were made with a Davis Instruments TurboMeter electronic wind speed indicator, and temperature and humidity measurements were made using a Weksler sling psychrometer. Unofficial observations about meteorology or land use in the community were made solely to characterize the existing sound levels in the area and to estimate the noise sensitivity at properties near the proposed Project.

3.7.4.4 Measurement Equipment

A CEL Instruments Model 593.C1 Precision Sound Level Analyzer equipped with a CEL-257 Type 1 Preamplifier, a CEL-250 half-inch microphone and a four-inch foam 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. The meter was equipped with an internal octave band filter set along with data logging capabilities.

Statistical levels were calculated from the sound levels collected during each 20-minute sampling period. Octave band levels for this study correspond to the same data set processed for the broadband levels. The measurement equipment was calibrated in the field before and after the surveys with a CEL-284/2 acoustical calibrator which meets the standards of IEC 942 Class 1L and ANSI S1.40-1984.

3.7.4.5 Baseline Ambient Noise Levels

The existing ambient noise environment is impacted by vehicular traffic, including trucks, construction activity, and by general human activity during the daytime. During the nighttime, vehicular traffic was still moderate while pedestrian traffic was low, and construction activity was non-existent.

Baseline noise monitoring results are presented in Table 3.7-2 and summarized below.

The daytime residual background (L90 dBA) measurements ranged from 60 to 69 dBA;

The nighttime residual background (L90 dBA) measurements ranged from 52 to 60 dBA;

The daytime equivalent level (Leq dBA) measurements ranged from 64 to 72 dBA;

The nighttime equivalent level (Leq dBA) measurements ranged from 56 to 68 dBA;

It should be noted that the existing background sound levels (L90) for Location 2 (L90 = 52 dBA) already exceed the City of Boston noise standards for a residential area at night (50 dBA Night).

Table 3.7-2 Baseline Ambient Noise Measurements

						Octave Band Center Frequency: L_{90} Sound Levels								
Receptor I.D	Start Time	L_{10} (dBA)	L_{50} (dBA)	L_{90} (dBA)	L_{eq} (dBA)	32 L_{90} (dB)	63 L_{90} (dB)	125 L_{90} (dB)	250 L_{90} (dB)	500 L_{90} (dB)	1000 L_{90} (dB)	2000 L_{90} (dB)	4000 L_{90} (dB)	8000 L_{90} (dB)
Loc 1 Day	2:22 p.m.	74	69	**67**	72	72	75	70	65	62	63	59	52	41
Loc 1 Night	12:55 a.m.	71	65	**60**	68	64	66	62	58	56	57	52	38	24
Loc 2 Day	2:52 p.m.	67	62	**60**	64	66	66	61	58	57	56	52	46	36
Loc 2 Night	1:18 a.m.	58	54	**52**	56	57	58	54	53	50	48	43	36	24
Loc 3 Day	3:24 p.m.	73	71	**69**	72	71	72	67	64	64	67	61	48	33
Loc 3 Night	1:43 a.m.	66	62	**59**	65	61	64	60	55	54	56	51	36	19

Notes:

1. Daytime weather: Temperature = 85°F, RH = 25%, winds 5– 8 mph from the west
   Nighttime weather – Temperature = 66°F, RH = 30%, winds light and variable
2. Road Surfaces were dry during all periods.
3. All sampling periods were approximately 20 minutes in duration
4. Daytime measurements were collected on May 30, 2008
   Nighttime measurements were collected on May 30, 2008

3.7.5 Overview of Potential Project Noise Sources

The primary outdoor sources of sound resulting from the Project will include cooling towers, heating plants, hot water plants, emergency generators, and rooftop ventilation fans. A summary of the major mechanical equipment proposed for the Project is presented below in Table 3.7-3. A summary of noise emissions from the primary sources is presented in Table 3.7-4, which includes broadband (dBA) sound power levels and octave-band sound power levels.

The hotel and office sections of the building will each be equipped with cooling towers. Each cooling tower will be fitted with "Whisper Quiet" fans. For the heating system, each section of the building will have gas-fired boilers, which will be housed inside roof-top mechanical penthouses. The mechanical penthouse for the office section of the building will also contain two 350-ton centrifugal water-cooled chillers. The hotel section of the building will have two gas-fired energy recovery units on the rooftop. Also located on the rooftops will be elevator and stairwell pressurization fans, as well as exhaust/make-up air units for the smoke proof vestibules. Garage exhaust fans will also be located on the roof. Each section will also have a 550 kW emergency diesel generator.

Reference sound levels were calculated for the boilers and chillers using methods described in "Noise Control for Buildings and Manufacturing Plants" (Hoover and Keith, inc., 2005). It was assumed that each chiller would be composed of a packaged centrifugal compressor. Sound power values for rooftop fans and the energy recovery units were determined based on data published by the Greenheck Fan Corporation. Sound power levels for the cooling towers were taken from product literature published by Baltimore Aircoil Company (BAC).

Mitigation will be applied to multiple sources to ensure compliance with noise regulations. The boilers and chillers will be enclosed within mechanical penthouses, and it was assumed that the walls of the penthouses would have a Sound Transmission Class (STC) of at least 28 (STC 28). The emergency generators will be controlled using exhaust silencers and sound-attenuating enclosures. To further limit impacts, the required periodic routine testing of the generators 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 3.7-5.

Table 3.7-3 Expected Primary Noise Sources

Hotel Section of the Building

Noise Source	Quantity	Location (elevations approximate)	Size/Capacity (per unit)
Boilers	6	Penthouse – 132' AGL	2,000 MBH (each)
Energy Recovery Ventilators	2	Roof – 132' AGL	350 MBH and 200 MBH
Cooling Tower	2 Cells	Roof – 132' AGL	15 HP Fan
Garage Exhaust Fan	1	Roof – 132' AGL	22,500 CFM
Emergency Generator	1	Roof – 132' AGL	550 kW
Elevator Pressurization Fan	2	Roof	5,000 CFM
Stairwell Pressurization Fan	4	Roof	8,250 CFM
Smoke proof Vestibule Exhaust Fan	2	Roof	10,000 CFM
Smoke proof Vestibule Gas-Fired Make-Up Air Unit	2	Roof	6,500 CFM

Office Section of the Building

Noise Source	Quantity	Location (elevations approximate)	Size/Capacity (per unit)
Centrifugal Chillers	2	Penthouse – 144' AGL	350 Tons (each)
Boilers	6	Penthouse – 144' AGL	2,000 MBH (each)
Ventilation Unit	1	Penthouse – 146' AGL	29,000 CFM
Cooling Tower	2 Cells	Roof – 144' AGL	20 HP Fan
Garage Exhaust Fan	1	Roof – 144' AGL	22,500 CFM
Emergency Generator	1	Roof – 144' AGL	550 kW
Elevator Pressurization Fan	1	Roof	5,000 CFM
Stairwell Pressurization Fan	1	Roof	8,250 CFM
Smokeproof Vestibule Exhaust Fan	1	Roof	10,000 CFM
Smokeproof Vestibule Gas-Fired Make-Up Air Unit	1	Roof	6,500 CFM

Table 3.7-4 Reference Equipment Noise Levels – Total for All Units

Noise Source	Form of Data	Ref. Distance	Sound Level (dBA)	Octave Band Center Frequency (Hz)							
				63 (dB)	125 (dB)	250 (dB)	500 (dB)	1000 (dB)	2000 (dB)	4000 (dB)	8000 (dB)
BAC Model 15227 Cooling Tower (15 HP Whisper Quiet Fan)[1]	Sound Power	NA	90	101	97	91	89	83	81	76	70
BAC Model 15325 Cooling Tower (20 HP Whisper Quiet Fan)[2]	Sound Power	NA	91	102	98	92	90	84	82	77	72
Trane Model CVHF Centrifugal Chiller	Sound Power	NA	96	97	98	99	96	98	98	94	87
2,000 MBH Boiler (sound levels represent one unit)	Sound Power	NA	96	99	98	96	93	90	87	84	81
350 MBH Gas-Fired Energy Recovery Ventilation Unit – Greenheck Model ERCH-90H-30-27	Sound Power	NA	94	101	99	94	90	88	88	86	82
200 MBH Gas-Fired Energy Recovery Ventilation Unit – Greenheck Model ERCH-90H-30-20	Sound Power	NA	90	98	94	88	85	84	84	81	76
Elevator Pressurization Fan – Greenheck Model RSFP-180-20	Sound power	NA	78	76	74	73	74	74	73	68	62
Stairwell Pressurization Fan – Greenheck Model SWB-227-50	Sound Power	NA	80	84	80	84	77	73	71	66	63
Smokeproof Vestibule Exhaust Fan – Greenheck Model SWB-230-50	Sound Power	NA	80	84	81	83	77	74	72	67	63
600 MBH Gas-Fired Smokeproof Vestibule Makeup Air Unit – Greenheck Model IGX-115-H22	Sound Power	NA	89	91	85	82	84	85	81	79	76

Table 3.7-4 Reference Equipment Noise Levels – Total for All Units (Continued)

Noise Source	Form of Data	Ref. Distance	Sound Level (dBA)	Octave Band Center Frequency (Hz)							
				63 (dB)	125 (dB)	250 (dB)	500 (dB)	1000 (dB)	2000 (dB)	4000 (dB)	8000 (dB)
Garage Exhaust Fan – Greenheck Model QEI-36-I	Sound Power	NA	87	86	91	86	87	82	77	71	64
Emergency Generator (550 kW) [3]	Sound Power	NA	84	90	90	83	74	77	76	76	70
Emergency Generator Exhaust (550 kW)[3]	Sound Pressure	1 meter	116	63	88	102	103	108	110	110	107

NA = Not Applicable to sound power data.

1. Rooftop of hotel section of the building
2. Rooftop of office section of the building
3. Sound data for a Cummins DQCA 600 kW diesel generator were used

Table 3.7-5 Attenuation Values Used for Sound Level Modeling (dB)

Noise Source	Form of Mitigation	Octave Band Center Frequency (Hz)							
		63	125	250	500	1000	2000	4000	8000
Emergency Generator – Exhaust[1]	Exhaust Silencer	17	26	32	34	33	32	31	32
Mechanical Penthouse Equipment: Chilled Water and Hot Water Plants[2]	Transmission Loss of Wall Assembly	10	13	17	26	33	36	47	47

1. GT Exhaust Systems, Inc 411-5200 Series Critical Grade
2. North American Insulation Manufacturer's Association – STC 29 R13 Wall

3.7.6 Modeling Methodology

Anticipated noise impacts associated with the Project were predicted at the nearest residences around the Project using the Cadna/A noise calculation model. This model uses the ISO 9613-2 industrial noise calculation methodology. This model allows for octave band calculation of noise from multiple noise sources, as well as for computation of diffraction around building edges and multiple reflections off parallel buildings and solid ground areas. In this manner, all significant noise sources and geometric propagation effects are accounted for in the noise modeling.

3.7.7 Future Sound Levels from Project

Predicted Project-generated noise levels at each measurement location are all at least 10 dBA lower than the quietest nighttime sound levels, which accounts for attenuation due to distance, structures, and noise control measures. The predicted exterior sound levels with noise mitigation measures are expected to range from 39 dBA to 40 dBA at the street-level modeling locations. The street level sound levels are well within the most stringent nighttime residential zoning limits for the City of Boston (50 dBA). The Project's rooftop mechanical equipment will not create new pure tone conditions when combined with existing middle of the night background sound levels. The results of the modeling, including mitigation, are shown in Table 3.7-6 (MassDEP criteria) and Table 3.7-7 (Boston criteria).

Table 3.7-6 Comparison of Future Predicted Nighttime Sound Levels Incorporating Appropriate Mitigation with Existing Background – MassDEP Criteria

Location	Lowest Existing Nighttime L_{90} (dBA)	Future Project L_{90} (dBA)[1]	Future L_{90} – Nighttime Total (dBA)	Increase (dBA)
Location 1 – 66 North Washington Street	60	31	60	0
Location 2 – Thacher Street and Thacher Court	52	40	52	0
Location 3 – 266 Causeway Street	59	38	59	0

Notes: Calculations include rooftop ventilation equipment, cooling towers, chillers, and boilers. Emergency generator and parking garage fans not included.

Table 3.7-7 Comparison of Future Predicted Nighttime Sound Levels Incorporating Appropriate Mitigation to City of Boston Criteria

Location	Future L_{90} – Project (dBA)	Boston Nighttime Limit (dBA)
Location 1 – 61 North Washington Street	31	50
Location 2 – Thacher Street and Thacher Court	40	50
Location 3 – 266 Causeway Street	38	50

Notes: All noise sources listed in 3.9-7 included except the emergency generators.

3.7.8 Emergency Generators

The emergency generators will only operate during the day for brief, routine testing when the background sound levels are high, or during an interruption of the electrical grid, in which case the rooftop mechanical equipment will not be operating.

Sound levels from the emergency generators were calculated, and the results are shown in Table 3.9-8. Expected worst-case sound levels will be below the City of Boston daytime noise limit of 60 dBA. The generators will be equipped within sound-attenuating enclosures, so there will be very little increase above the sound levels shown in Tables 3.7-6 and 3.7-7.

Table 3.7-8 Predicted Emergency Generator Noise Levels Incorporating Appropriate Mitigation (Generators Operate During Daytime Only)

Receptor ID	Generator Sound Level
Location 1 – 61 North Washington Street	31 dBA
Location 2 – Thacher Street and Thacher Court	41 dBA
Location 3 – 266 Causeway Street	38 dBA
City of Boston Residential Zoning Criteria	60 dBA (day)
City of Boston Business/Commercial Zoning Criteria	65 dBA (day)

3.7.9 Conclusions

The above results indicate that noise levels due to the Project at the various receptor locations are predicted to be below the most stringent City of Boston Noise Zoning requirements for a nighttime residential zone for street level receptors, and are well below existing measured nighttime baseline noise levels. Through the various forms of noise mitigation incorporated into this Project, the results of the analysis indicate that the proposed building can operate without significant impact on the existing acoustical environment.

3.8 Water Quality/Storm Water Management

3.8.1 Existing Conditions

The Project site was formerly used for an elevated roadway section of Interstate 93. Storm water runoff from this portion of the elevated highway was discharged into the Boston Water and Sewer Commission (BWSC) combined sewer system at several locations. As part of the Central Artery/Tunnel project mitigation program, and on behalf of the City of Boston, the Massachusetts Turnpike Authority installed new storm water drainage systems adjacent to the Project site to remove storm water flows from the combined sewer system. Even though the previous surface characteristic of this site was completely impervious, portions of the undeveloped Project site currently include temporary grass cover on the soil portion of the site.

3.8.2 Future Storm Water Conditions

Storm water runoff from the Project will be directed to the existing BWSC storm water drainage system in adjacent public streets – (Beverly Street and Valenti Way) - and to the

54-inch diameter storm water drainage pipe located within an on-site easement east of Beverly Street, at the rear of 239 Causeway Street and 160 North Washington Street. This BWSC storm drain discharges into Boston Harbor in the vicinity of Lovejoy Wharf. Based on initial investigations, this drainage system is adequately sized to accept the incremental increase of storm water from the Project site.

The installation of green roofs is planned for the buildings, which will reduce peak runoff flow rates.

BWSC will review and evaluate the impacts of storm water connections to its system under its Site Plan Review Process. The Project team will submit a Storm Water Management Program to BWSC. The estimated existing runoff and future storm water flows from the site are summarized below in Table 3.8-1.

Table 3.8-1 Storm Water Runoff

	2-year Storm	10-year Storm	25-year Storm	100-year Storm
Estimated Existing Runoff (cfs)	3.6	4.7	5.5	10.4
Projected Future Runoff (cfs)	4.0	5.2	6.1	11.5

Information on the Project's compliance with the requirements of the MassDEP Stormwater Management Policy can be found in Section 6.4.3.

3.9 Flood Hazard Zones / Wetlands

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for the site located in the City of Boston - Community Panel Number 250286 0005 D indicates the FEMA Flood Zone Designations for the site area. The map shows that the Project is located in a Zone C, Area of Minimal Flooding.

The site does not contain wetlands.

3.10 Geotechnical Impacts

As part of the Central Artery/Tunnel project, extensive geotechnical investigations and reports were performed in and around the Project site. This information is used to evaluate the subsurface conditions for the proposed development of the Project site. The Project is proposed to be located above underground structures that cross the property, including the Central Artery. The Project is to be founded on the Central Artery tunnels in combination with independent deep foundations as needed.

3.10.1 Subsurface Soil and Bedrock Conditions

Above the Central Artery tunnel, the ground surface is underlain by upwards of 11 feet of granular fill. The ground surface over the portion of the site that is not occupied by the tunnel is generally underlain by a 10- to 13-foot thickness of miscellaneous fill associated with historic site filling. Underlying the fill deposit is an approximate 15- to 35-foot thick deposit of organic silt and peat. Beneath the fill and organic deposits, a marine clay deposit is anticipated to extend to a depth of about 60 feet below the existing ground surface. The marine clay deposit is anticipated to be underlain by a deposit of glacial till. The glacial till deposit is anticipated to be interbedded by discontinuous deposits of very dense sand and gravel and a hard silt and clay. Bedrock is anticipated at depths ranging from approximately 80 to 93 feet below ground surface.

3.10.2 Groundwater

Groundwater monitoring in the vicinity of the site over a period of several years indicates groundwater levels ranging from El. +7 to +11 (City of Boston Base). The groundwater level across the site will fluctuate due to seasonal changes, rainfall, local construction and utility activities, and other factors. Neither tidal fluctuations nor the water level in the Charles River appear to have a significant effect on the groundwater level at the site.

The Project site is located within the Groundwater Conservation Overlay District (GCOD) as outlined in Section 6 of Article 32 of the City of Boston Zoning Code. Because of the site's location in the Bulfinch Triangle, the Proponent will certify that the Project will not negatively impact groundwater levels on the site or on adjacent lots pursuant to the provisions of Article 32, Section 6. The Proponent has contacted the Boston Groundwater Trust to discuss the Project.

3.10.3 Project Impacts and Foundation Considerations

As previously indicated, the CA/T tunnel structures underlie the majority of the site (see Figure 3.10-1). These structures comprise most of the underground space within the site and leave little room for independent foundations for air rights development of the parcel. Therefore, it is proposed that the air rights development be based on the Central Artery tunnels with independent deep foundations installed for the portions of the proposed building located outside the existing tunnel footprint.

Based upon the design and configuration of the existing CA/T tunnel and the anticipated subsurface conditions overlying the tunnel roof, foundation support for the portion of the proposed structure to be located above the existing tunnel will be provided by a shallow footing foundation system. Foundation support for the portion of the proposed building

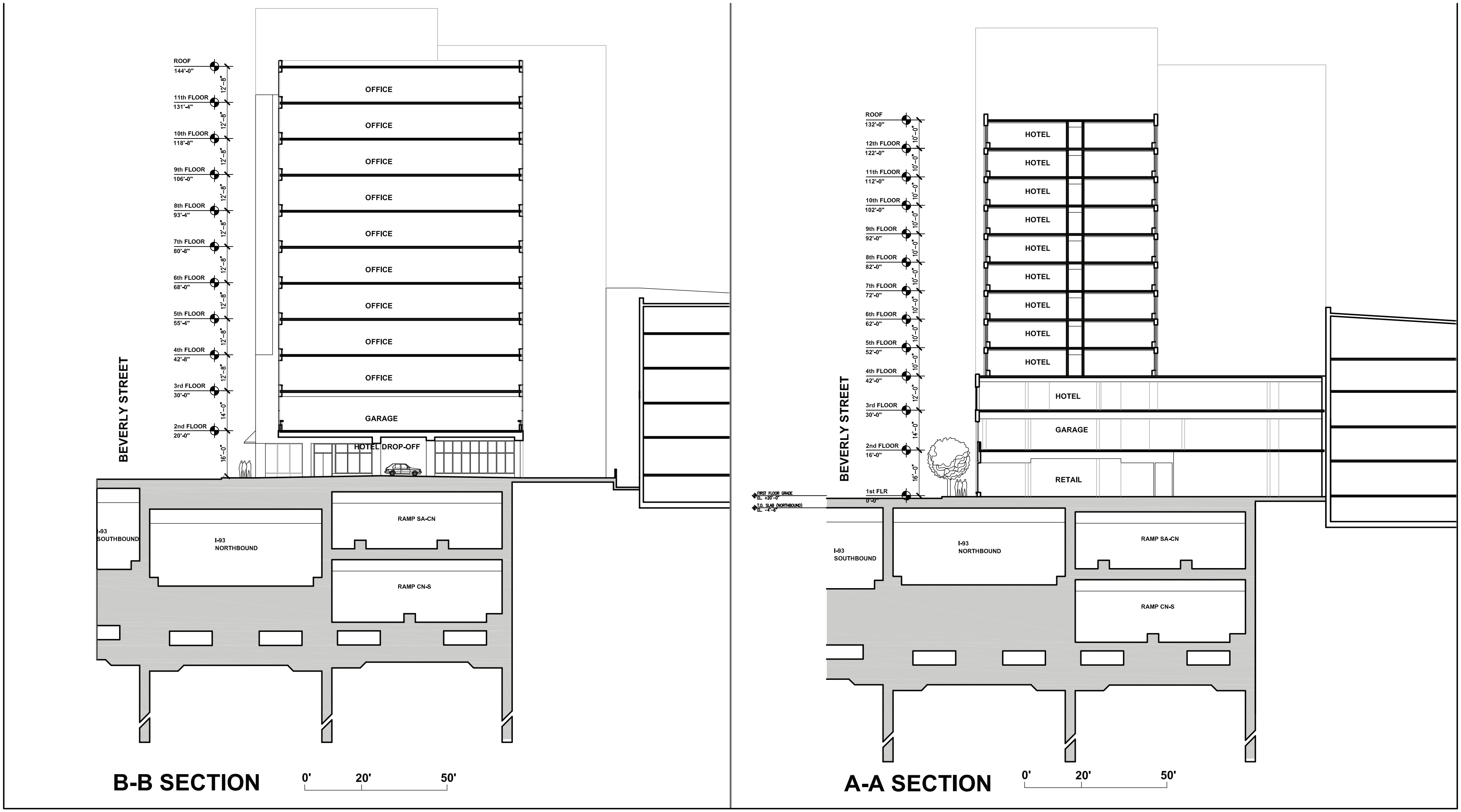

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Figure 3.10-1

Section Showing Tunnel Locations

located outside the tunnel footprint will be provided by end bearing piles, such as steel H-piles or precast concrete piles, that transfer the structural loads through the unsuitable fill, compressible organic and marine deposits, and into the underlying glacial till or bedrock deposits.

Pile driving produces ground vibrations that are perceptible to humans, but generally do not cause damage to structures. During pile driving, vibration levels will be monitored at the CA/T tunnel structure and surrounding properties to ensure that the pile driving is not adversely affecting the existing structures.

Given that groundwater is generally anticipated to be present at a depth of about 8 to 10 feet below ground surface, dewatering is generally not anticipated to be required for foundation construction other than to manage localized perched water conditions in pile cap and utility excavations. The proposed building is not anticipated to have below-grade space, and hence the building will not require perimeter or underslab drainage, and will therefore not have an adverse impact on the groundwater level within or adjacent to the site.

As discussed above, the Project will include coordination with the Boston Groundwater Trust to protect groundwater levels in the area, and it will include the monitoring of existing groundwater observation wells in the vicinity of the site before, during, and following construction.

3.11 Construction Impacts

A Construction Management Plan (CMP) will be submitted to the Boston Transportation Department (BTD) for review and approval prior to issuance of a building permit. The CMP will define truck routes which will help in minimizing the impact of trucks on local streets. The construction contractor will be required to comply with the details and conditions of the approved CMP.

Construction methodologies that ensure public safety and protect nearby businesses will be employed. Techniques such as barricades, walkways, painted lines, and signage will be used as necessary. Construction management and scheduling – including plans for construction worker commuting and parking, routing plans and scheduling for trucking and deliveries, protection of existing utilities, maintenance of fire access, and control of noise and dust - will minimize impacts on the surrounding environment.

It is expected that virtually all construction activities can be accommodated within the current site boundaries. The proposed construction staging plan will be designed to secure the perimeter and isolate the construction while providing safe access for pedestrians and vehicles during normal day-to-day activity and emergencies.

3.11.1 Construction Schedule and Coordination

Construction of the Project is estimated to last approximately 24 months, with initial site work expected to begin in fall 2008.

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 sound-generating activity will occur before 7:00 a.m. If longer hours, additional shifts, or Saturday work is required, the Construction Manager will place a work permit request to the Boston Air Pollution Control Commission and BTD in advance. Notification should occur during normal business hours, Monday through Friday. It is noted that some activities such as finishing activities could run beyond 6:00 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.

Proper planning with the City, neighborhood and developers of other projects under construction in the area will be essential to the successful construction of the Project. The construction contractor will be responsible for coordinating construction activities during all phases of construction with City of Boston agencies to minimize potential scheduling and construction conflicts with other ongoing construction projects in the area.

3.11.2 Foundation Construction

Section 3.10 provides details regarding foundation methodology and plans to protect adjacent infrastructure, buildings and underground tunnels during construction.

3.11.3 Construction Staging/Public Safety/Access

To minimize transportation impacts during the construction period, the CMP will include detailed construction trucking routes to and from the site. It is anticipated that the primary construction route will be I-93 to North Washington Street, with possible additional access along Causeway Street and Valenti Way.

Primary staging will be on-site. The proposed construction staging plan will be designed to isolate the construction while providing safe access for pedestrians and vehicles during normal day-to-day activities and emergencies. The staging areas will be secured by chain-link fencing to protect pedestrians from entering these areas.

Although specific construction and staging details for each phase of construction have not been finalized, the Proponent and its construction management consultants 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. 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 and, if required, the suspension of the use of certain sidewalks during the most hazardous periods of overhead work activity during the construction of the superstructure. If required by BTD and the Boston Police Department, police details will be provided to facilitate traffic flow. Construction procedures will be designed to meet all Occupational Safety and Health Administration (OSHA) safety standards for specific site construction activities.

3.11.4 Construction Employment and Worker Transportation

The number of workers required during the construction period will vary, with an estimated average daily work force ranging from approximately 200 to 240. The Proponent will make reasonable good-faith efforts to have at least 50 percent of the total employee work hours be for Boston residents, at least 25 percent of total employee work hours be for minorities and at least 10 percent of the total employee work hours be for women. The Proponent will enter into a construction 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 Proponent and contractor will work aggressively to ensure that construction workers are well informed of the public transportation options serving the area. The building is being constructed close to the existing MBTA trains directly adjacent to the Project. 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.

3.11.5 Construction Truck Routes and Deliveries

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. 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.

The Proponent will coordinate with BTD to designate access routes for truck deliveries and truck routes which will be established in the CMP.

Truck traffic will vary throughout the construction period, depending on the activity. Construction truck routes to and from the Project site for contractor personnel, supplies, materials, and removal of excavations required for the Project will be coordinated with BTD. Truck Access during construction will be determined by the BTD as part of the Construction Management Plan. These routes will be mandated as a part of subcontractors' contracts for the Project. Traffic logistics and routing are planned to minimize community impacts.

3.11.6 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.

3.11.7 Construction Air Quality

Short-term air quality impacts from fugitive dust may be expected during the early phases of construction and during excavation. Plans for controlling fugitive dust during demolition, construction and excavation 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. These measures are expected to include:

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

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

3.11.8 Construction Waste

The Proponent will reuse or recycle construction materials to the extent feasible. Construction procedures will allow for the segregation, reuse, and recycling of materials. Materials that cannot be reused or recycled will be transported in covered trucks by a contract hauler to a licensed facility, per the MassDEP regulations for Solid Waste Facilities, 310 CMR 16.00.

3.11.9 Rodent Control

A rodent extermination certificate will be filed with the building permit application to the City. Rodent inspection monitoring and treatment will be carried out before, during, and at the completion of all construction work for the proposed Project, in compliance with the City's requirements. Rodent extermination prior to work start-up will consist of treatment of areas throughout the site. During the construction process, regular service visits will be made.

3.11.10 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 plan review process.

3.11.11 National Pollutant Discharge Elimination System

The Project involves the disturbance of over one acre, therefore it will require coverage under the National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater during construction.

3.12 Sustainable Design

The Proponent is committed to developing a sustainable project that uses resources efficiently, reduces impacts on its surroundings, and creates a beneficial environment for workers and visitors.

3.12.1 Transportation

The Project represents a Transit Oriented Development through the creation of a mixed-use development adjacent to a variety of transit choices. The Project is located adjacent to North Station, with access to four MBTA Commuter Rail lines, and Amtrak service to New Hampshire and Maine. The North Station subway station is located one block away on Valenti Way and provides service on the Orange and Green Lines. In addition, MBTA bus service is located two blocks away in either direction on Canal Street and New Chardon Street. The bus service on Canal Street provides a connection to the MBTA Silver Line.

3.12.2 Smart Growth

Smart Growth is intended to draw attention and resources to restoring community vitality to city centers and older nearby suburbs. Smart growth and sustainable development principles that are embodied as part of the planning of the Project include:

- Concentrating development that is compact, integrates uses, and fosters a sense of place;
- Providing transportation choices;
- Increasing job opportunities near transportation options; and
- Planning regionally through the development of a project with regional benefits.

3.12.3 Leadership in Energy and Environmental Design (LEED)

The Project will comply with Article 37 of the Boston Zoning Code on Green Buildings requiring the Project to be certifiable under the Leadership in Energy and Environmental Design (LEED) program. In addition, the Proponent is committed to sustainable design and, as such, is exploring the potential for the Project to be LEED) certified.

The LEED New Construction rating system (version 2.2) has been applied to the Project, and the current checklist is attached as Appendix D. The LEED checklist indicates that the Project scope includes approximately 29 credits, potentially achieving a Certified rating.

The Project's LEED scope and specific methodologies are still being investigated and reviewed. It is proposed that the Project will do the following to meet LEED prerequisites and achieve LEED credits:

- Develop a sediment and erosion control plan in conformance with U.S. Environmental Protection Agency guidelines;

- Not be developed on an inappropriate site per the criteria prohibited by the LEED program, such as farmland, undeveloped floodlands, wetlands, habitat for rare and endangered species, undeveloped land within 50 feet of a water body, or prior public parkland;

- Increase development density and community connectivity by constructing the Project on a previously developed site in an urban area with a density far exceeding the LEED minimum of 60,000 sf per acre net;

- Reduce pollution and land development impacts from automobile use by locating the Project adjacent to a transportation hub and within a block or two of existing commuter rail, subway, and bus lines;

- Reduce pollution and land development impacts from automobile use by providing secure bike storage for 5% of all building users, and providing shower and changing facilities for 0.5% of the full-time equivalent occupants;

- Reduce pollution and land development impacts from automobile use by providing preferred parking for low-emitting and fuel-efficient vehicles for 5% of the total vehicle parking capacity;

- Reduce pollution and land development impacts from single occupancy vehicle use by providing preferred parking and drop off areas for carpools or vanpools for 5% of total provided parking spaces;

- Mitigate urban heat island effect by installing all parking within the building and installing a vegetative or light colored (high solar reflectance index) roof system;

- Reduce potable water consumption for landscape irrigation by utilizing native or adaptive species, using high efficiency irrigation systems, and recycling captured rainwater;

- Implement technologies to reduce water usage by 20% through the use of high efficiency/low flow water closets, urinals, lavatory faucets, showers, and kitchen sinks;

- Implement fundamental best practice commissioning procedures;

- Design the building to comply with ASHRAE/IESNA 90.1-2004 or the Massachusetts State code, whichever is more stringent;

- Utilize refrigerants which have both a low global warming potential and a low ozone depletion factor;

- Reduce environmental and economic impacts associated with excessive energy use by optimizing energy performance and exceeding the baseline building performance rating per ASHRAE/IESNA 90.1-2004 by 14%;

- Reduce waste generated by building occupants and disposed of in landfills by providing an easily accessible storage area for the collection and storage of materials for recycling;

- Develop and implement a construction waste management plan in order to divert 75% of nonhazardous construction waste from disposal in landfills and incinerators to recycle and/or reuse materials;

- Use construction materials with recycled content, reducing impacts from extraction and processing of virgin materials;

- Use construction materials that are manufactured regionally, thereby supporting the use of local resources and reducing the environmental impacts from transportation of materials;

- Enhance indoor air quality by meeting the minimum requirements of ASHRAE 62.1-2004, Ventilation for Acceptable Indoor Air Quality or local code, whichever is more stringent;

- Minimize exposure of building occupants to environmental tobacco smoke by prohibiting smoking in public areas of the building, limit exterior smoking to at least 25 feet from entries, intakes and operable windows opening to common area, and sealing penetrations in walls, ceilings and floors between hotel units;

- Develop a construction indoor air quality management plan to reduce indoor quality problems resulting from construction to enhance the well-being of both construction works and future building occupants;

- Reduce the indoor air contaminants and enhance air quality for installers and occupants through the use of low-emitting materials, including adhesives and sealants, paints, carpet systems, and composite wood products;

- Minimize cross-contamination of regularly occupied areas by chemical pollutants;

- Provide a high level of lighting system control by occupants to promote productivity, comfort and well-being of building occupants;

- Institute a comprehensive transportation management plan that demonstrates a quantifiable reduction in personal automobile use through the offering of multiple alternative transportation methods;

- Institute a green housekeeping program;

- Develop a building environmental education program, including appropriate written materials and signage; and

- Encourage design integration through the inclusion of multiple LEED Accredited Professionals on the Project team, including architectural and engineer team members.

Chapter 4.0

Urban Design

4.0 URBAN DESIGN

The Project envisions the revitalization of a prominent parcel located at the entranceway to the Bulfinch Triangle from the Rose Fitzgerald Kennedy Greenway, Downtown, and the North End. The three new major elements of the block are distinguished in height and mass to reflect their principal uses – hotel and office – and to best relate to the physical context of the surrounding structures.

The historic nature of the Project site is respected through preservation of the existing commercial buildings on Medford Street which are associated with the building scale of the adjacent North End. The site itself recreates a block structure similar to that existing prior to the building of the former elevated Central Artery, helping to knit the Bulfinch Triangle neighborhood back together. Retail activities at street level on Causeway and Beverly streets and Valenti Way will reinforce pedestrian links between the North End, the transportation hub at North Station, and Downtown.

The overall massing of the Project reflects the existing Bulfinch Triangle buildings that typically occupy their entire sites up to the sidewalk line with simple, large-scaled, mid-rise buildings articulated by simple brick facades.

The tallest building mass of the new construction (the extended-stay hotel) is placed on Causeway Street, where it addresses the views to Portal Park and the Zakim Bridge, and relates to the taller buildings across the street, including 236 Causeway Street and the TD Banknorth Garden. The highest element accentuates the entryway character of this site along the major thoroughfare of Causeway Street, visible when entering the Central Artery tunnel below on I-93 South. A prominent articulation of the building corner at Beverly and Causeway streets orients toward North Station.

The building steps down along Beverly Street toward the second hotel element, offering variety in the heights of the block. The office and retail building element sets back at the upper floors to mitigate the height along Beverly Street and transition to the lower office building mass along Valenti Way. The elevation along Valenti Way is lower in height, sympathetic to the North End neighborhood across North Washington Street from the site, wrapping around the end of the block to transition to the lower existing buildings along Medford Street. The southern corners of the site offer urban views from within the building to the city beyond.

A welcoming streetscape is fostered by wide, tree-planted sidewalks with ground-level retail space attracting passerby attention and extending street-level activity through the neighborhood. Sidewalks surrounding the site on Causeway, Beverly, and North Washington streets and Valenti Way will be replaced with new concrete walks with granite paving at the building's main entrances to the hotels and office lobbies. Existing newly planted street trees will be relocated and supplemented to coordinate with the building design.

An open air space, parallel to the block, centered between the existing buildings adjacent to the site and the new construction, allows natural light to reach the rear of both new and existing buildings, facilitates fire separation, and provides a vehicle access zone. The space also minimizes the width of the new building elements.

The mixed use Project includes retail, hotel, office and parking and will complement and enhance the Rose Fitzgerald Kennedy Greenway and Bulfinch Triangle neighborhood.

Please see Appendix A for figures showing floor plans, elevations, sections, and perspectives of the Project.

Chapter 5.0

Historic and Archaeological Resources

5.0 HISTORIC AND ARCHAEOLOGICAL RESOURCES

5.1 Introduction

The following section describes historic resources in the vicinity of the Project and generally discusses potential impacts on historic resources from the Project. A review of the State and National Registers of Historic Places, Massachusetts Historical Commission (MHC) and Boston Landmarks Commission (BLC) survey files, as well as a field review of the areas in the vicinity of the Project, were undertaken to identify historic resources.

The Project site is located immediately adjacent to the Causeway/North Washington Street District, a district determined eligible for listing on the National Register of Historic Places as part of the Central Artery project. The Project site is also located in the vicinity of the Bulfinch Triangle Historic District, a district listed in the State and National Registers of Historic Places.

5.2 Historic and Archaeological Resources

5.2.1 Existing Historic Resources

The name and address of properties listed in the State and National Registers of Historic Places and properties included in the Inventory of Historic and Archaeological Assets of the Commonwealth within a quarter-mile radius of the Project are listed in Table 5-1. Figure 5-1 depicts the locations of these properties. Photographs of the Project site and adjacent historic properties and a photograph key are depicted in Figure 5-2 to 5-8.

There are no historic properties located within the Project site. The Project site is located immediately adjacent to the Braman, Dow and Company Building at 239-245 Causeway Street; three late 19th century commercial buildings at 6-24 Medford Street; and the Francesco Building at 90 North Washington Street, contributing resources in the Causeway/North Washington Street District. This District, which also includes properties north of Causeway Street, east of Medford Street and along North Washington Street, consists of a group of six-to-nine-story, 19th and early 20th century commercial structures. A one-story, ca. 1929 structure is located at 88 North Washington Street. The structure is not included in the Inventory or listed in the State and National Registers of Historic Places.

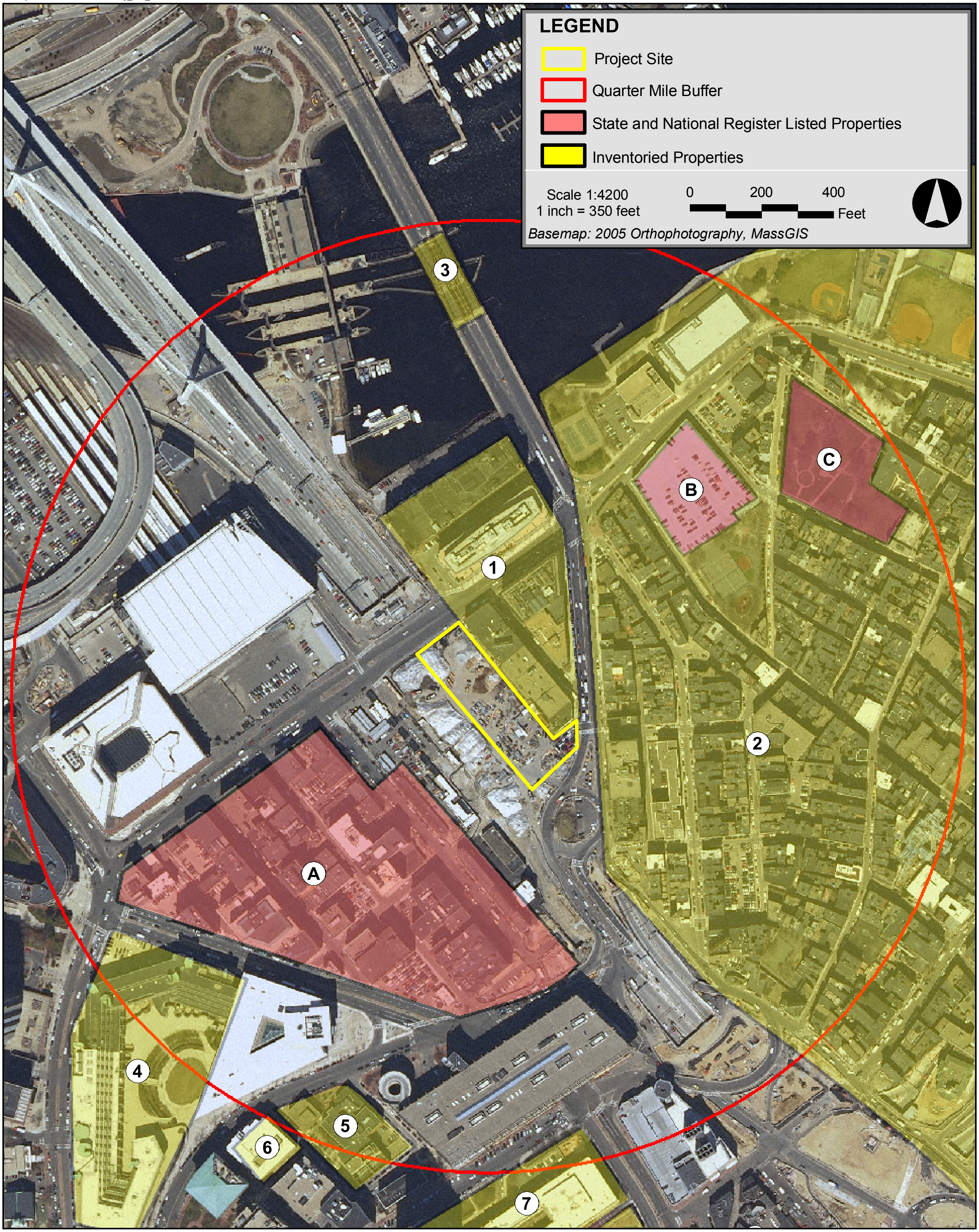
Table 5-1 Historic Resources in the Vicinity of the Project Site

Map Key to Figure 5-1	Historic Resource	Address
State and National Register-listed Properties		
A	Bulfinch Triangle Historic District	Canal, Causeway, Friend, Lancaster, Lowell Square, Merrimack, Portland and Traverse Streets
B	North Terminal Garage	600 Commercial Street
C	Copp's Hill Burial Ground	Snowhill Street
Properties included in the *Inventory of Historic and Archaeological Assets of the Commonwealth*		
1	Causeway/North Washington Street Area	Causeway and North Washington Streets
2	North End Area	Roughly the waterfront to North Washington to Central Artery to Clinton Street to Atlantic Avenue
3	Charlestown Bridge	North Washington to Rutherford Avenue over Charles River
4	Lindeman Center	15-25 Staniford Street
5	35, 43-45 Hawkins Street	
6	25 New Chardon Street	
7	JFK Federal Building	15 Cambridge Street

5.2.2 Development of the Causeway/North Washington Street Area

The Causeway Street/North Washington Street area was first developed when a polluted mill pond was filled with gravel taken from the peak of Beacon Hill, and a new street grid was laid out by then Boston selectman, architect Charles Bulfinch. Known as the Bulfinch Triangle, the original layout formed a triangle between Merrimac, North Washington and Causeway streets. The grid of streets, together with the buildings thereon was partially destroyed in the mid-twentieth century for the construction of the elevated Central Artery. The original street grid was restored as part of the Third Harbor Tunnel, Interstate 90/Central Artery, Interstate 93 project in the late twentieth century.

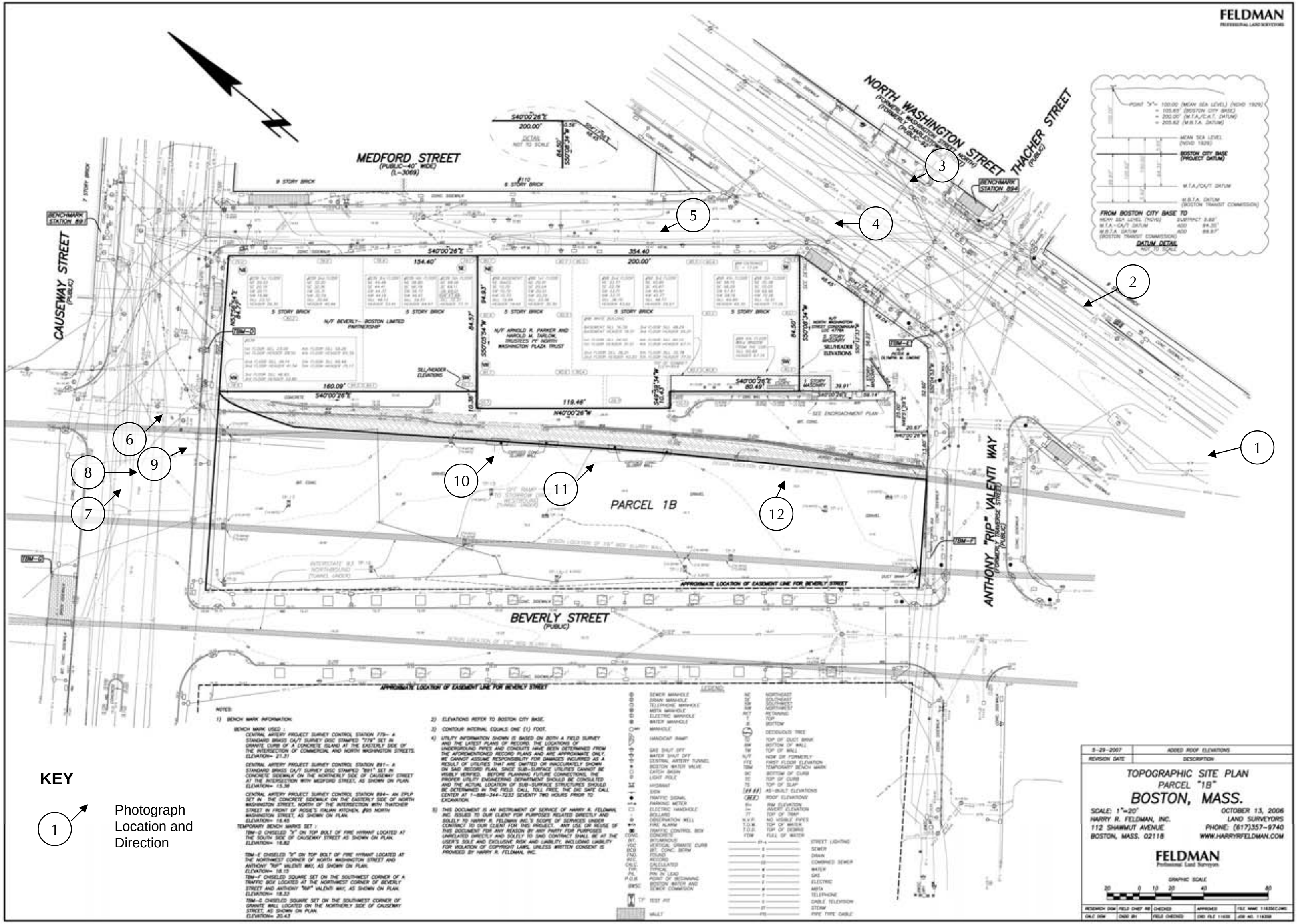
The Project site is located within the newly restored City block bounded by Causeway, Beverly and Medford streets and Valenti Way (formerly Traverse Street). The southeast corner of the block also includes a small frontage on North Washington Street, created when North Washington Street was widened in the early twentieth century. In the mid-nineteenth century, the block was dominated by two-to-three-story, primarily wood frame commercial structures with storage yards for materials. By 1885, the first large-scale brick structure was constructed at the corner of Causeway and Medford streets, which housed the Boston Rubber Shoe Company. This five-story structure was connected to another five-story



The Merano Boston, MA

Epsilon ASSOCIATES INC.

Figure 5-1
Historic Resources



KEY

1 Photograph Location and Direction

Photograph 1: View northwest of Parcel 1B, 88 North Washington Street, 90 North Washington Street, from intersection of North Washington Street and Valenti Way.

Photograph 2: View west of 88 North Washington Street and 90 North Washington Street, from intersection of North Washington Street and Valenti Way.

Photograph 3: View north, from intersection of North Washington and Thatcher Streets to Medford Street.

Photograph 4: View north down Medford Street

Photograph 5: View northwest along Medford Street of 6-24 Medford Street and 239 - 245 Causeway Street.

Photograph 6: View east along Causeway Street of 239-245 Causeway Street.

Photograph 7: View east from intersection of Causeway and Beverly Streets of 239-245 Causeway Street and 6-24 Medford Street

Photograph 8: View southeast of Parcel 1B from Causeway Street.

Photograph 9: View southeast of 239-245 Causeway Street and rear elevations of 6-24 Medford Street from Causeway Street.

Photograph 10: View east of rear elevations of 6-24 Medford Street from Parcel 1B.

Photograph 11: View east of rear elevations of 6-24 Medford Street from Parcel 1B.

Photograph 12: View east of 6-24 Medford Street, 90 North Washington Street and 88 North Washington Street from Beverly Street.

masonry structure housing the same company, which is located within the present-day Parcel 1B. At that time, Parcel 1B also included several smaller, four- and five-story brick structures and storage yards along Beverly Street. In addition, several two-story tenements were also located within this block. By 1895, two of the three, five-story, brick commercial buildings still present on Medford Street were constructed, and most of the remaining parcels on Beverly Street were infilled with new masonry structures, although some small, wood frame structures still remained.

By 1909, several new buildings constructed of reinforced concrete were added to the center parcels on the block, leaving only a few small-scale, wood frame structures at the northwest and southeast corners of the block. At that time, the Beverly and Medford streets' buildings located at the north end of the block shared party walls, several smaller structures were located immediately between the central buildings on Beverly and Medford streets, and the last two-story tenement, on the present-day location of 90 North Washington Street, had been converted to a "junk shop."

By 1929, the structures on the northwest corner of the block (within Parcel 1B) were demolished for a filling station. The former tenement building had been replaced with the present-day 90 North Washington Street building and the structures on the southeast corner of the block (now 88 North Washington Street) were also replaced with a filling station, including the existing building on the site. By the mid-twentieth century, all structures along Beverly Street, now located within Parcel 1B, as well as Beverly Street itself, were demolished for the construction of the elevated Central Artery. The original street grid was restored as part of the Central Artery project, and Parcel 1B was created as an air rights development site over the new below-grade tunnel system.

5.2.3 Archaeological Resources

No known archaeological resources are located within the Project site. The Project site was previously disturbed by the construction of the Central Artery/Tunnel project. No previously unidentified archaeological resources are anticipated to be located within the Project site.

5.3 Joint Development Guidelines

The redevelopment of Parcel 1B is subject to review by the MHC and BLC in compliance with Section 106 of the National Historic Preservation Act (Section 106). A Memorandum of Agreement (MOA) with the Federal Highway Administration was developed in 1984 to mitigate adverse effects to historic resources associated with the construction of the Third Harbor Tunnel, Interstate 90/Central Artery, Interstate 93 project. In compliance with Stipulation 5 of this MOA, certain parcels will be subject to the Joint Development Guidelines (JDG) drafted by the Massachusetts Department of Public Works (now the Massachusetts Highway Department), MHC, and BLC.

The historic resource considerations included in the JDG were developed as thematic guidelines that allow for flexible interpretation with the framework of the Secretary of the Interior's Standards. The purpose of the JDG was to encourage design that is compatible with historic resources by reinforcing historic patterns and the relationship between historic elements essential to the character of individual historic resources and districts. Major design issues include setbacks, size and shape of building forms, roof shapes, proportions of facades, rhythms of facades, proportions of fenestration, and rooflines.

5.3.1 Consistency with Joint Development Guidelines

The JDG are arranged into two categories: Corridor-wide Issues and Neighborhood Issues.

5.3.1.1 Corridor-wide Issues

Corridor-wide guidelines were developed during the Section 106 review and in a manner consistent with the *Secretary of the Interior's Standards for the Treatment of Historic Preservation Projects*. These Standards encourage new design to take existing architectural themes into account, and to interpret rather than imitate historic architecture. The guidelines for new construction are organized into eight principles; this section describes how the Project is consistent with these principles.

1. Reinforce the historic street plan between areas disrupted by the elevated Artery – such as along Traverse, North Washington, Hanover, Salem, Commercial, State, Central, Milk, and India Streets and Atlantic Avenue - by providing strong, continuous street edges and/or pedestrian routes.

   The design of the Project will reinforce the restored street plan along Beverly Street and Valenti Way and will maintain and reinforce the existing street plan along Causeway and North Washington streets by locating the proposed new construction along the rear edge of the sidewalks. The Project will reintroduce a strong street wall following the restored street pattern and reconnect pedestrian links from the Bulfinch Triangle Historic District, across the new Greenway and into the Causeway/North Washington Streets District.

2. Reinforce the connections between, and views of, historic resources, including views of the harbor and of Fort Point Channel, and connections between the Bulfinch Triangle and the Causeway/North Washington Streets District; the North End, Blackstone Block, and the two parts of the original Bulfinch Triangle; Quincy Markets and the Fulton/Commercial Streets District; and the Essex/Kingston, Leather, and Chinatown districts.

   The Project will reinforce the visual connection between the Causeway/North Washington Streets District across the Greenway and the Bulfinch Triangle Historic District through the building's architectural expression and choice of building materials. Along the Causeway Street and Valenti Way elevations, the components of the new *construction are composed of a modern expression of a clearly defined base, middle, and top, an architectural framework found in buildings in both districts. This connection with the old is also expressed through the use of natural materials including brick, stone and pre-cast masonry.*

3. Respect and respond to features such as size, scale, massing, color, and materials that give adjacent historic buildings and district their character. Respect the different proportions and scale of residential, commercial, and industrial buildings. The size of new details should respond to the proportions of neighboring historic features.

   In addition to Parcel 1B, the Project site also includes the parcel of land at 88 North Washington Street. The inclusion of this small parcel provides an opportunity to strengthen the restored street wall of the city block by wrapping the new construction around to the existing commercial structure at 90 North Washington Street. The proposed new construction will also maintain the street wall along Causeway Street by locating the new construction on the same plane as the existing historic building. The ground floor of the new construction will feature large expanses of tall storefronts consistent with the character of the ground floors of other buildings within the block and the overall Causeway/North Washington Streets District.

   The massing of the new construction has been designed to take into account the character of the surrounding former manufacturing/industrial buildings which consist of large commercial blocks with punched openings. The restored interior courtyard, historically located within the center of the block, will be used as an automobile entrance into the parking garage located on the second floor. This design will restore the historic layout of party walls along Causeway and North Washington streets while maintaining the rear exterior walls of the former commercial structures at 6-24 Medford Street and 90 North Washington Street. The height of the proposed new construction is addressed in Section 5.4.3. The use of different materials, building heights and setbacks enliven the elevations while maintaining the sense of rhythm created by other commercial blocks in the area.

   Overall, the Project takes its cues from the surrounding commercial structures within the Causeway/North Washington Streets District, but presents the Project in a modern architectural expression. As Project plans develop, architectural details will also respond to features within the adjacent historic district.

4. At the street edge, use similar front setbacks (typically non-existent in the downtown area) to form a continuous edge along the street. Above the street, use similar building heights (and/or setbacks) to maintain the shape of the space enclosed by neighboring structures.

   Along the restored street edges of Causeway, Beverly and North Washington streets and along Valenti Way, the proposed Project is designed to meet the street edge and *reinforce and extend the existing street walls within the Causeway/North Washington Streets District.*

Specifically, along Causeway Street, the street wall of the existing Braman, Dow and Company Building is extended through to the new construction. The same is proposed adjacent to 90 North Washington Street. The Project has also been designed to be set back from the existing buildings at 6-24 Medford Street to prevent the new construction from being visible from Medford Street above the existing buildings. Although the new construction is taller than the height of the buildings on Causeway, Medford and North Washington streets, the setback reduces the daylight obstruction on Medford and Canal streets while creating a similar feeling of the pedestrian experience one finds on other streets within the Causeway/North Washington Streets District.

5. Respect existing roof and cornice lines that define the skyline of adjacent historic districts. When new buildings are taller, use materials, banding, cornice lines, and building setbacks to refer to predominant building heights in adjacent historic districts. Minimum building heights should also be considered.

   The proposed Project will incorporate setbacks at various intervals along all elevations above the base of the building to provide variation to the elevations. Components of the new building will be further differentiated through the use of differently sized punched window openings and articulation of the facades through the use of traditional masonry materials and detailing, including horizontal banding, and more modern glass curtain wall elements. Architectural detailing of the overall Project will be more fully developed at the 60 percent design phase, but is anticipated to include moderately recessed window openings to provide shadow lines at all elevations, the use of strong horizontal banding, and architectural elements that minimize the appearance of vehicular entrances and exits to maintain a strong element of glass storefronts along the sidewalk.

6. Respect the distinctive horizontal levels that are typical of historic buildings, including an articulated base and top. For example, a common architectural pattern along the Central Artery alignment consists of first floor storefronts with a high proportion of transparent openings; a middle section of relatively solid masonry walls with punched openings; and a projecting cornice and/or contrasting top story.

   The proposed new construction is consistent with this guideline. All components of the new construction contain a clearly defined base with a high proportion of transparent openings; the middle sections are typically characterized by solid vertical lines with regularly spaced punched opening; and the tops contain a flat and solid horizontal expression in a contrasting material and appearance.

7. Relate to the façade rhythm of elements such as door and window openings, perceived floor-to-ceiling height, proportion of window and door openings, and projections such as bay windows, cornices, and trim.

   The Project has been designed to create richly detailed elevations as a method of bringing variety to the facades. Along the base of each elevation, the percentage of transparent openings is far greater than it is in the middle and top sections of the building. These larger expanses of openings along the base are consistent with the traditional storefront proportions found in other buildings within the Causeway/North Washington Streets District. The floor to ceiling heights, proportion of windows, and location and articulation of the top sections of the components similarly takes its proportion from the nearby warehouse and industrial structures in the District.

8. Acknowledge the rich layering of details that is characteristic of historic architecture and adds texture, light, shadow, and individuality to a building. Recognize both the variety and common themes of the historic architecture of downtown Boston, and respond to the particular context of each joint development parcel.

   The character of the adjacent Causeway/North Washington Street District is reflected in the new construction. While individual components of the Project create a varied streetscape consistent with the adjacent historic district, the massing of the new base firmly establishes this Project within a pedestrian-friendly environment. The introduction of setbacks creating planes of light and shadow will be highlighted further as Project plans develop. Specific architectural details on elevations will also be refined.

5.3.1.2 Neighborhood Issues

Located within the Bulfinch Triangle Area, the Neighborhood Guidelines indicate new development on particular parcels should consider and respond to the historic resources in the area that merit protection. In addition, the activation of the ground floors on restored streets and pedestrian-oriented design is encouraged. This section describes how the proposed new construction is consistent with these principles.

Specifically, guidelines for Parcel 1B include a recommended height of 100 feet and a recommended minimum height of 60 feet. The guidelines recommend a minimum 20-foot set back along Causeway Street for those portions of buildings more than 65 feet in height.

The guidelines further recommend that building facades align with the back of the sidewalk at ground level to reinforce and continue the street wall. Along Causeway Street, which is restricted by a subsurface utility corridor, an open arcade (covered walkway) it may be necessary at the ground floor to allow access to these utilities.

The heights of proposed new construction range from 42 to 149 feet along Causeway Street; 42 to 149 feet on Beverly Street; and 106 to 144 feet along North Washington Street and Valenti Way. A 149 foot component immediately abuts the Braman, Dow and Company Building on Causeway Street but steps down to 42 feet extending into the center of the parcel. An open courtyard separates the buildings at 6-24 Medford Street from the 144 foot section of the building; and a 106 foot component immediately abuts the building at 90 North Washington Street. Although the height of the new construction exceeds the recommended 100 foot maximum height, the additional height is required to produce sufficient revenue to offset the cost of construction and to accommodate the necessary square footage to make the office and hotel uses financially viable. Please see the alternatives analysis (Section 5.4) for additional information. A 20 foot setback above 65 feet along Causeway Street is not possible as the Project requires a sufficient number of hotel rooms to be financially viable, which cannot be accommodated in a single-loaded corridor scenario. Two notches in the new construction are proposed from the height of the roof of the Braman, Dow and Company Building to the roof of the new construction to reference and reinforce the roofline of the adjacent historic building.

As noted above, the massing of the components of the building is designed to create interesting and varied elevations rather than a solid massive structure. Consistent with the guidelines, the building facades will align with the sidewalk at the ground level and will reinforce the street wall on Causeway, Beverly and North Washington streets and Valenti Way.

5.3.2 Shadow Impacts

New shadow impacts to historic resources is limited to a brief period of time during daylight hours. Minor net new shadow will be cast on the rear elevations and rooftops of the 6-24 Medford and 90 North Washington streets buildings at 12:00 p.m., 3:00 p.m. and 6:00 p.m. on the vernal equinox. Fleeting shadow also extends to the rooftops of buildings in the North End at 3:00 p.m. and 6:00 p.m. when much of the area is already in shadow. At 3:00 p.m. on the summer solstice, new shadow will fall on the rear elevations and rooftops of 6-24 Medford Street. These shadows will remain at 6:00 p.m. and will also extend across to one structure on North Washington Street in the North End Area. Fleeting new shadow from the Project will fall across the roof of 24 Medford Street and 90 North Washington Street at 9:00 a.m. at the autumnal equinox. At 12:00 p.m., new shadow falls on the rear elevations of 6-24 Medford Street and 90 North Washington Street. At 3:00 p.m., new shadow will fall on rooftops of 239-245 Causeway, 6-24 Medford and 90 North Washington streets with a fleeting shadow across North Washington Street in the North End area. Shadow at 6:00 p.m. is limited to the roof of 90 North Washington Street and fleeting shadow on one building across North Washington Street; however, the majority of the area is already in shadow at this time. New shadow during the winter solstice is limited to fleeting shadow across the rooftop of 6-24 Medford Street, which will then extend to the roofs of 239-245 Causeway Street and 90 North

Washington Street by 12:00 p.m. New shadow extends across North Washington Street onto the façade of one building and the rooftops of other structures within the North End Area at 3:00 p.m. when the majority of the area is already in shadow.

New shadow from the Project is limited and will not have significant impacts on nearby historic resources. Shadow impacts are discussed in further detail in Section 3.2.

5.4 Alternatives Analysis

5.4.1 Existing and Proposed Site Considerations

The proposed Project has been designed to take into consideration existing site conditions associated with the Central Artery structures, as well as current market conditions. This section describes these conditions and impacts each has had on the proposed design. Unique characteristics of the Project site present challenges to the design process to make the Project financially and programmatically viable.

5.4.1.1 Below-grade Structures

The Project site includes a portion of the I-93 Northbound tunnel on the south side of the site and two stacked tunnels for on- and-off ramps to the I-93 Northbound tunnel. The presence of below-grade tunnels prohibits construction below the surface of this site of uses that are often located below ground, such as loading, parking and some mechanical equipment.

The Central Artery tunnels below the Project site can bear only a limited amount of weight from new construction above. During the due diligence phase of the Project, it was determined that the below-grade tunnels were closer to the surface of the Project site than previously identified. As a result, the Project must span trusses over the tunnels which are both expensive and consume great expanses of space within the Project site. The costs associated with construction over the tunnels must be offset by the revenues generated by the proposed Project.

5.4.1.2 Adjacent Buildings

The Project site is bounded on the north by the Braman, Dow and Company Building and the structures at 6-24 Medford and 90 North Washington streets. The Proponent owns the Braman, Dow and Company Building at 239-245 Causeway Street as well as 90 North Washington Street.

Punched openings were added to the rear (south) elevation of the Braman, Dow and Company Building following demolition of the Beverly Street structures in the mid-twentieth century, and large openings, some possibly fire doors between the portion of the building demolished for the elevated highway, are present at the east end of the south elevation of the building. The rear wall will be restored to a party wall by abutting the new construction.

A one-story, former filling station building located at 88 North Washington Street, which will also be owned by the Proponent, abuts the east wall of the building at 90 North Washington Street. There are no window openings on the east wall of 90 North Washington Street. The small structure at 88 North Washington Street will be demolished, and the new construction will immediately abut the east wall of 90 North Washington Street. The existing windows on the rear (south) elevation will be retained within the courtyard area of the proposed Project.

Consistent with the historical development of this city block, the rear elevation of the buildings at 6-24 Medford Street will be located within the central courtyard created by the new construction. No alterations to the rear elevations of these buildings are proposed.

5.4.1.3 Office/Hotel Uses

An office use requires an approximately thirteen foot floor-to-floor height. Hotel uses require a ten foot floor-to-floor height. Nine floors of office are proposed at the east end of the site and nine floors of hotel rooms are proposed on the west end of the site with an additional level at the third floor for the hotel lobby and ancillary hotel uses. To provide adequate light and air and usable floor plates, the office floors are laid out to provide wide open floor spaces serviced by a single central elevator and service core on each floor. A secondary egress stair is located at the east end of the building and is accessed by a rear corridor serving the east side of the office component of the building.

Two hotels will be constructed at the site: one an extended stay hotel and the other a storm-term stay hotel. The two types of hotels require separate elevator cores. Within the hotel component, hotel rooms are located on each side of a central corridor serviced by two elevators and service cores, one in each wing of the hotel component. On hotel room floors, the massing of the building is dictated by the need for exterior windows, to provide light and air into each hotel room, created through the use of a double loaded corridor.

The size and shape of the Project site and location of loading and parking on the interior of the city block requires that the office component have a single entrance on Beverly Street. The ground level lobby connects to the upper level elevator cores which extend though the second floor parking level. On the hotel side of the Project, guests enter into a porte cochere and the hotel lobby under the main mass of the building. Elevators provide access to the third floor hotel lobby and extend through the second level parking floor.

5.4.1.4 Parking, Loading and Access Requirements

Sufficient parking to meet the needs of the hotel use is required on site. Since no parking can be constructed below-grade due to the presence of the Central Artery tunnels, parking is proposed on the second level of the new construction. By locating the parking on the second level, the ground floor spaces can be used for retail uses to activate the pedestrian experience along Causeway and Beverly streets and Valenti Way. Parking is accessible via an up and down ramp within the center of the building and is accessible from the porte cochere off of Beverly Street.

To minimize the impact of loading on the restored pedestrian experience, loading for the proposed Project will be located within the center of the city block. Access to loading is located off of Valenti Way, adjacent to 88 North Washington Street, through a ground level tunnel below the office section of the building. These back-of-house functions have been located within the center of the block and access to these areas has been designed to minimize the impact of these necessary uses on the pedestrian experience along public facades of the building.

5.4.2 Detailed Project Design

The proposed design of the new construction and its association with the adjacent structures in the Causeway/North Washington Streets District is described in this section.

5.4.2.1 Setback from Adjacent Buildings

The new building will abut the existing buildings at 239-245 Causeway Street and 90 North Washington Street along the property lines leaving a nominal six-inch seismic gap between the buildings. A code-required fire-rated demise is required at the new building's ground through fifth floors along the property lines. The new construction has been designed to align with the existing buildings along the rear edge of the sidewalk and immediately abut these buildings to reinforce the streetwall and provide sufficient square footage to make the Project viable.

5.4.2.2 Architectural Design of New Construction

The perspective views included in Appendix A depict preliminary views of the body of the new building as a red brick façade with recessed windows in the office section of the building. This treatment is proposed to link the new construction literally and visually to the existing Causeway/North Washington Streets District masonry building facades. The upper office floors, set back from Valenti Way and Beverly and North Washington streets, are distinguished by a change of material from brick to a glass curtain wall system. This treatment creates a strong top to the façade composition and mitigates the building height relative to its immediate neighbors.

To maintain a regularity of ground floor storefronts, the office entry is highlighted by a monumentally-scaled, three-story glass curtain wall with an inset entrance vestibule set beneath an overhang. The hotel entrance is located within the porte cochere, allowing retail and restaurant uses to dominate the elevations of the new building. Vehicular entrances are limited to one-story at the ground level, thereby reducing their impact on the rhythm of the ground floor storefronts.

The architectural framework of base, middle and top found in the adjacent historic district is articulated in the new construction with a clearly distinguished base created by a cast stone horizontal string course running along the North Washington Street, Valenti Way and Beverly Street elevations above the third floor. Along Causeway Street, the base of the building is articulated through the third floor by the use of various window types. The middle section of the building along this elevation is identified through its use of recessed vertical bays with each floor articulated in brick and detailed with cast stone bands at each floor level, and the top is defined by a wide horizontal band, reminiscent of the wide cornices in the adjacent historic district, at the parapet. The setback vertical bays of the middle section and the defined parapet at the top extend around to Beverly Street in the hotel portion of the building. The office section of the building is differentiated in both height and material at mid-block through the use of a wide vertical bay of glass curtain wall which extends horizontally above the lower masonry middle portion of the office building along the ninth, tenth and eleventh floors. At the top of the masonry middle portion, a wide parapet band, similar to that in the hotel section, creates the top portion of this section.

Overall, the use of traditional masonry materials and regularly-spaced openings and the orientation of the facades to incorporate a traditional base, middle and top allow this simple, yet richly detailed masonry building, to read as a new structure incorporating more modern glass curtain wall systems into the new building while remaining in concert with its immediate existing neighbors.

5.4.2.3 Cornerstone

The proposed Project will include a dated cornerstone facing a public right-of-way within the new construction to identify the date of construction for future generations.

5.4.3 Consideration of Alternatives

Alternatives to avoid, minimize, or mitigate adverse effects to the Causeway/North Washington Streets and Bulfinch Triangle districts have been considered by the Proponent. The Proponent undertook a series of studies to reduce the size of the proposed Project to a maximum building height of 100 feet and a minimum building height of 60 feet as anticipated in the 2002 JDG and to include additional the 20 foot setback along Causeway Street above 65 feet. The results of these studies are summarized in this section.

5.4.3.1 Reduction to 60 to 100 feet in Height

The Proponent considered reducing the height of the proposed new construction to 100 feet, the recommended maximum height identified in the JDG. This was determined to be infeasible. To reduce the proposed height of the project from 149 feet (not including the rooftop mechanicals) to 100 feet, the square footage devoted to hotel, office and retail must be reduced.

Reduction in the square footage of hotel uses and office space was not considered a prudent and feasible alternative. As described above, the uses of the Project require sufficient square footage and floor layouts to accommodate the proposed uses, and the Project is not financially viable without the proposed square footage. The specific Project uses were chosen in part to address the desire of the community to have a balance of office and residential uses within the Bulfinch Triangle. This creates a better balance of uses by including a significant office component.. As shown in the building plans and sections, the hotel and office components of the Project must be separated due to their differing uses. In addition, the office building requires, to the maximum extent possible, a double loaded corridor to maximize the square footage of office space. One wing of the office section is already reduced to a single loaded corridor, thereby reducing leasable square footage, to avoid blocking existing windows on the rear elevation of 90 North Washington Street. Similarly, the hotel section requires a double loaded corridor to provide a sufficient number of hotel rooms and the required exterior windows for light and air. Due to the number of hotel rooms for each section of the hotel (long- and short-term) and the separate clientele associated with each, the form taken by the hotel requires two separate wings, each with an elevator core and emergency egress stairs.

The available square footage for office and hotel uses is limited by the setback required to provide fire separation and adequate light and air to rear elevations of 6-24 Medford Street and 90 North Washington Street. In addition, as much massing of the new construction above the Medford Street buildings as possible has been held back from the center of the block to minimize the visibility of the new construction from within the Causeway/North Washington Streets District. To reduce the height of the Project to 100 feet, four levels of office and five levels of hotel rooms would be removed, leaving only five floors of usable office space, six floors of hotel rooms, and one level for the hotel lobby. Although a reduction in office space and hotel rooms would concurrently reduce the parking needed to serve the Project site, it would not significantly diminish the height of the ground through second floors due to the presence of the parking ramps and would not provide sufficient revenue to offset the cost of construction. Therefore, a reduction in office space and hotel rooms is not a viable alternative.

5.4.3.2 Reduction to between 101 and less than 149 feet in Height

Although any Project over 100 feet would exceed the height limit identified in the JDG, consideration was given to reducing the height of the proposed Project to between 101 and less than 149 feet after determining that reducing the height to 100 feet was infeasible. To meet this goal, the size of the hotel and the square footage of office and retail spaces must be reduced. This option was determined to be infeasible.

Reduction in Hotel Space

If the number of floors for the entire hotel were reduced, the reduction in square footage would not reduce the size of the entrance/lobby, porte cochere and two required elevators and egress stairs, due to the layout of the building into two wings, but would reduce the size of the mechanicals and number of parking spaces dedicated to this use. The proposed restaurant uses could be omitted from the Project, and the hotel lobby relocated to the first floor, thereby freeing up the third level for hotel uses; however, this additional square footage would not be sufficient to make the Project viable due to the loss of a substantial number of hotel rooms. In addition, the omission of the restaurant uses along the ground floor would diminish the pedestrian experience on this prominent corner of Causeway Street.

Consideration was given to reducing the height of only the hotel wing adjacent to 239-245 Causeway Street; however, this alternative would require the omission of too many hotel rooms to make the Project financially viable. Omitting the restaurant use along Causeway Street for use as the hotel lobby was also considered in this scenario; however, this option was infeasible for the same reasons discussed above.

Reduction in Office Space

A reduction in the square footage of office space was considered to reduce the height of the Project. As described in Section 5.4.3.1, any reduction in office space is not financially viable as the revenue produced from the proposed square footage of office space is necessary to offset the additional costs associated with constructing over two Central Artery tunnels. A reduction in office space makes the Project infeasible. Although one floor of office could be located on the ground floor by omitting the proposed retail uses, this alternative would only reduce the height of the new construction by approximately 12 feet and would diminish the pedestrian experience along Beverly Street, Valenti Way and North Washington streets, which this Project, together with the new construction on other nearby Central Artery Parcels, will reconnect the Bulfinch Triangle Historic District with the Causeway/North Washington Streets District and the North End.

5.4.3.3 Introduction of Setbacks along Causeway Street

Consideration was given to including a setback of 20 feet for those sections over 65 feet in height along Causeway Street. This was determined to be infeasible. A 20 foot setback along Causeway Street above the sixth floor would require the relocation of the Causeway Street wing further back into the center of the Project site. This reorientation of hotel rooms would result in the loss of too many hotel rooms to make the Project viable. Specifically, the available square footage provided in this scenario reduces the length of the double loaded corridors allowing access to the reduced number of hotel rooms. If only a single loaded corridor was provided along Causeway Street, this option would also result in too few hotel rooms to make the Project viable.

5.5 Coordination of Design Review

As noted above, the redevelopment of Parcel 1B requires review by the MHC and BLC in compliance with Section 106. As noted in Stipulation 5 of the MOA and in Part 1 of the design guidelines, the MHC and BLC will be afforded the opportunity to review and approve preliminary, final, and construction specifications for joint development ventures for consistency with the design guidelines, as they affect historic resources. The preliminary design plans included in this document are provided to the MHC and BLC as the first (preliminary) review of the proposed Project design. The Proponent anticipates continued design review with these agencies as Project plans are developed.

The Proponent intends to continue consultation with the MHC, BLC and FHWA to address the adverse effects associated with the proposed Project.

5.6 Proposed Mitigation

The MHC and the BLC will be afforded the opportunity to review and comment on the plans at the 60 and 90 percent design levels for the proposed new construction on the Project site.

Chapter 6.0

Infrastructure Component

6.0 INFRASTUCTURE COMPONENT

The Project will connect to existing municipal and private utility company systems in the adjacent public streets of Valenti Way and Beverly Street. This chapter evaluates the infrastructure systems that will support the Project. Based on initial investigations and consultations with the appropriate agencies and utility companies, existing infrastructure systems are adequately sized to accept the incremental increase in demand associated with the development and operation of the Project. The following utilities were reviewed: wastewater, water, drainage, natural gas, electricity, and telecommunications. In addition, consideration was given to sustainable elements of the energy supply provision for the Project. Appendix E includes a site survey.

The final design process for the Project will include required engineering analyses and will adhere to applicable protocols and design standards, ensuring that the proposed building is properly supported by the City's infrastructure. Detailed design of the Project's utility systems will proceed in conjunction with the design development of the buildings and interior mechanical systems.

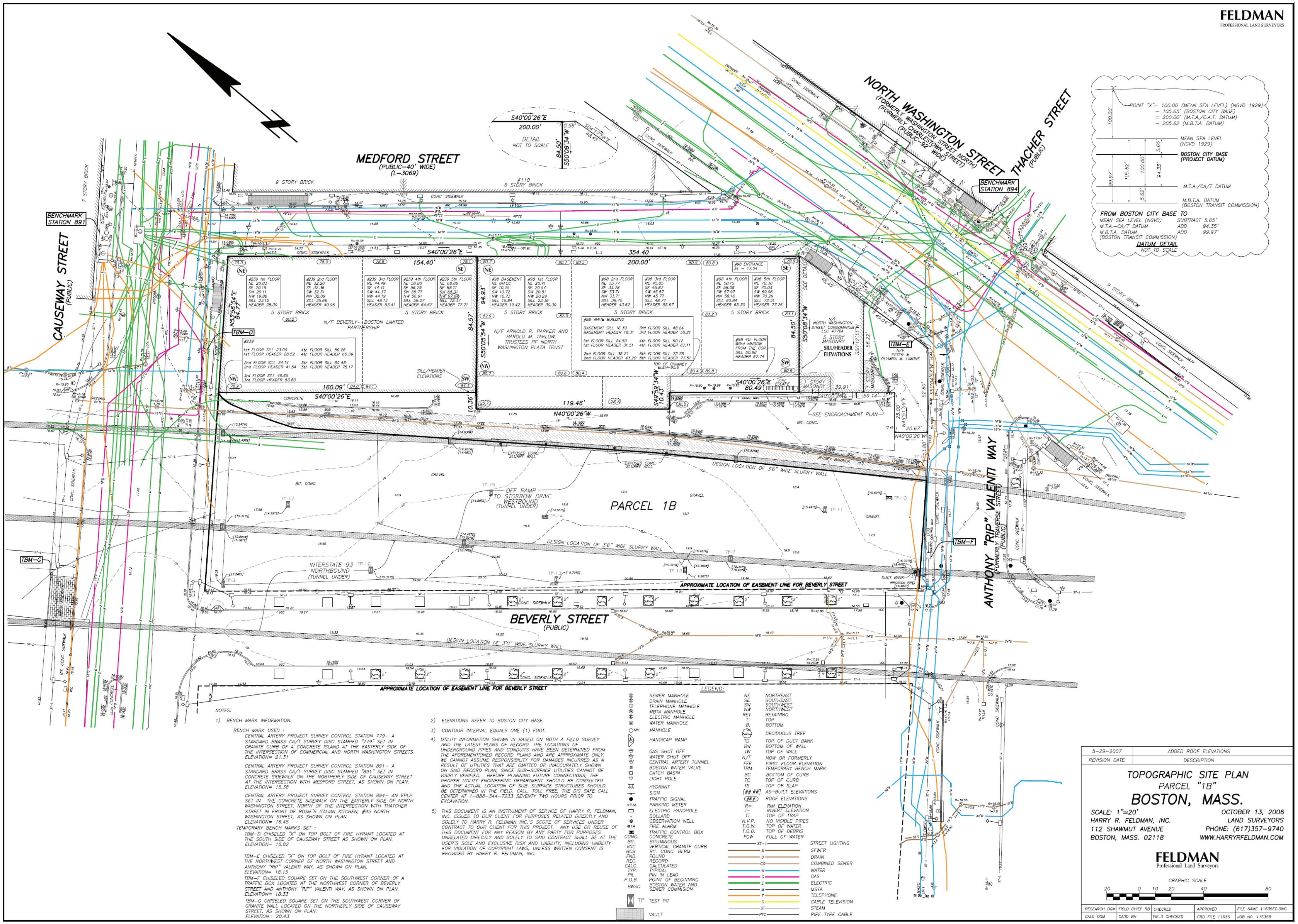
The systems discussed below include those owned and managed by the Boston Water and Sewer Commission, private utility companies, and on-site infrastructure systems. There will be close coordination among these entities and the Project engineers and architects during subsequent reviews, and the design development process. Figure 6-1 depicts the existing utilities infrastructure.

All improvements and connections to the BWSC infrastructure will be reviewed by the BWSC as part of its Site Plan Review Process. This process includes a comprehensive design review of the proposed service connections, assessment of system demands and capacity, and establishment of water and sewer service accounts.

6.1 Regulatory Framework

This chapter, in addition to a description of existing and future infrastructure connections, discusses the regulatory framework of utility connection reviews and standards. All connections will be designed and constructed in accordance with city, state and federal standards.

- In the City of Boston, the BWSC is responsible for the majority of water, sewer and storm water drainage systems.
- The Boston Fire Department (BFD) will review the Project with respect to fire protection measures such as siamese connections and standpipes.
- Design of site access hydrant connections and energy systems (gas and electric) will also be coordinated with the respective system owners, such as National Grid and NSTAR.



The Merano Boston, MA

Figure 6-1

Utility Plan

- The Boston Public Works Department will authorize new utility connections through the street opening permit process, as required.

- Additional information on the regulatory framework for each utility system is included in subsequent sections of this chapter.

A more complete list of the state and local permits anticipated in connection with the Project infrastructure is included above in Section 1.8.

6.2 Wastewater

6.2.1 Existing Wastewater

Local sanitary sewer service in the City of Boston is provided by the BWSC. The Project site will be serviced by the combined sewer system at Valenti Way and North Washington Street. There is no sanitary sewer available in Beverly Street.

6.2.2 Demand Use

The Project consists of approximately 444,000 square feet of building space as listed below. A total sewer generation of 62,815 gallons per day (gpd) is expected for the proposed building program. Generation rates are based on wastewater flow design criteria included in the Massachusetts Department of Environmental Protection 310 CMR 15.203: *The State Environmental Code (Title 5).* The Project is also expected to generate demand for "blow down" from cooling systems operations, which is included in the total wastewater generation as shown.

Table 6-1 Projected Wastewater Flows

Use	Program	Generation Rate	GPD
Short-term Hotel	153 rooms	110 gpd / room	16,830
Long-term Stay Hotel	121 rooms	110 gpd / room	13,310
Office	213,000 sf	75 gpd / 1,000 sf	15,975
Retail	19,000 sf	50 gpd / 1,000 sf	950
Restaurant	450 seats	35 gpd / seat	15,750
TOTAL			62,815

6.2.3 Proposed Connection

The sewer connection will be made on the BWSC 48-inch combined sewer near the intersection of Valenti Way and North Washington Street by means of a 12-inch gravity sewer pipe to be positioned in the Service Road area east of the new building, and behind 98 North Washington Street and 239 Causeway Street. Sanitary sewers cannot be installed in Beverly Street because of the height of the underground Central Artery tunnel structure.

The Proponent will coordinate with the BWSC and the necessary agencies on the design and capacity for proposed connections to the sewer system. In addition, the Proponent will submit a General Service Application and Site Plan, for review as the Project progresses.

Since the projected flow rate of wastewater generated is greater than 50,000 gallons per day, the Project is subject to the DEP requirements for submitting a *Sewer System Extension Permit Application Form WP 74.*

6.3 Domestic Water and Fire Protection

6.3.1 Existing Water Supply System

Water for domestic and fire supply purposes will be obtained from the BWSC. There are two different water systems serving the Project area. The southern low service system with a typical pressure range of 50 to 60 psi is located in North Washington Street and Valenti Way. The southern high service system with a pressure range of 90 to 100 psi is also located in North Washington Street and Valenti Way. There are no water mains in Beverly Street.

6.3.2 Demand / Use

Domestic water demand is based on estimated wastewater generation with an added factor of ten percent for consumption, system losses and other uses. Based upon the wastewater generation rates outlined in the DEP Sewer Connection and Extension Regulations, 310 CMR 15.203, the Project will require approximately 69,100 gallons per day for domestic water supply purposes.

6.3.3 Proposed Connections

The Project will require a minimum of two connections – one for domestic from the BWSC low service system in Valenti Way, and a second connection for fire supply purposes from the BWSC high service system also in Valenti Way. The Proponent of the Project has discussed the installation of multiple meters for different portions of the building with the BWSC.

Compliance with the standards for the water main connections for domestic and fire supply purposes will be reviewed as part of BWSC's Site Plan Review Process. This review will include, but is not limited to, sizing of the domestic and fire supply protection services, calculation of meter sizing, backflow prevention design, and locations of hydrants and siamese connections conforming with the BWSC and BFD requirements.

6.4 Storm Water Management

Since the majority of the Project is currently impervious to rainfall percolation, construction of the Project will not produce significant changes in either the pattern of, or increase the rate of, storm water runoff. Storm water management controls will be established in compliance with BWSC standards, and the Project will not result in the introduction of any peak flows, pollutants or sediments that would potentially impact the local BWSC storm water drainage system.

6.4.1 Existing Conditions

The Project site was formerly used for an elevated roadway section of the Massachusetts Turnpike Authority Central Artery Interstate Route 93. Storm water runoff from this portion of the elevated highway was discharged into the BWSC combined sewer system at several locations. As part of the Central Artery/Tunnel Project Mitigation Program, and on behalf of the City of Boston, the Massachusetts Turnpike Authority constructed new 54-inch diameter storm drain adjacent to the Project site to divert storm water flows away from the BWSC combined sewer system. Even though the previous surface characteristics of this site was completely impervious, portions of the undeveloped site contain temporary grass cover.

6.4.2 Proposed Conditions

Storm water runoff from the Project site will be directed to the existing BWSC drainage systems in adjacent public streets – Beverly Street and Valenti Way) and to the 54-inch diameter storm water drainage pipe located within an on-site easement east of Beverly Street at the rear of 239 Causeway Street and 98 North Washington Street. This BWSC storm drain discharges into Boston Harbor in the vicinity of Lovejoy Wharf. Based on initial investigations, this drainage system is adequately sized to accept the incremental increase of storm water from the Project site.

The Proponent is planning installation of green roofs on the buildings, which will help to reduce peak runoff flow rates and improve storm water quality. Storm water generated from the proposed green roof and landscaped areas will be collected by area drains on site and conveyed to the BWSC storm drains within a private sub-surface drainage system.

The BWSC will review and evaluate the impacts of storm water connections to its system under its Site Plan Review Process. The Proponent will submit a Storm Water Management Program to the BWSC. The estimated existing runoff and future storm water flows for the site are summarized below in Table 6-2.

Table 6-2 Storm Water Runoff

	2-year Storm	10-year Storm	24-year Storm	100-year Storm
Estimated Existing Runoff (cfs)*	3.6	4.7	5.5	10.4
Projected Future Runoff (cfs)	4.0	5.2	6.1	11.5

* cfs = cubic feet per second

The BWSC will review and evaluate the impacts of storm water connections to its system under its Site Plan Review Process. Storm water management controls will be established in compliance with BWSC standards; the Project will not introduce any increased peak flows, pollutants or sediments that would potentially impact the Boston Harbor. In conjunction with the Site Plan and the General Service Application, the Proponent will submit a Storm Water Management Plan to BWSC. Compliance with the standards for the final site design will be reviewed by the BWSC under the Site Plan Review Process.

6.4.3 Compliance with MassDEP Storm Water Management Policy

The Project will comply with the requirements of the MassDEP Stormwater Management Policy as follows:

Standard No. 1: Untreated Storm Water

Compliance: The Project will provide treatment of runoff from service roads, entrance-ways by means of catch basins.

Standard No. 2: Post-Development Peak Discharge Rates

Compliance: The impervious characteristic of the post-development site will be the same as the historical pre-existing conditions. The post-development runoff rate will exceed the pre-development rate to Boston Harbor.

Standard No. 3: Recharge to Groundwater

Compliance: Since most of the Project site will be developed over the existing Interstate 93 Highway Tunnel structure, it is doubtful that groundwater recharge is feasible.

Standard No. 4: 80 Percent Total Suspended Solids Removal

Compliance: Storm water runoff will be directed to catch basins prior to discharge into the BWSC storm drainage system.

Standard No. 5: Higher Potential Pollutant Loads

Compliance: The Project site does not contain land uses with higher potential pollutant loads.

Standard No. 6: Protection of Critical Areas

Compliance: The Project site does not contain critical areas.

Standard No. 7: Redevelopment Projects

Compliance: The Project will meet or exceed these standards.

Standard No. 8: Erosion / Sediment Controls

Compliance: Construction contracts will include requirements for erosion and sediment controls, including silt fences, straw bales, catch basin filter sacks. Construction dewatering discharges will comply with National Pollutant Discharge Elimination System (NPDES) and City of Boston dewatering standards.

Standard No. 9: Operation / Maintenance Plan

Compliance: The Project team will prepare an Operation and Maintenance Program for both the construction and post-development phases of the Project to minimize movement of sediment and pollutants off-site. Typical requirements during the Construction Phase will include removal of excess soils from the site, routine street sweeping, catch basin cleaning and cleaning of catch basin filter sacks. A truck and trailer wheel wash station will be established during construction at the Work Zone exit area to minimize transport of construction materials off site.

6.5 Anticipated Needs

The Project will connect to existing public and private utilities in Beverly Street, Valenti Way and Causeway Street. The Project will require the following utility connections:

Utility Service	Connection Location
Domestic Water	BWSC 20-inch low service in Valenti Way
Fire Supply Connection	BWSC 16-inch high service in Valenti Way
Sanitary Sewer Connection	BWSC 48-inch combined sewer in North Washington Street

Utility Service	Connection Location
Communications	Comcast and Verizon in Valenti Way Verizon in Valenti Way / North Washington Street
Electric Power	NSTAR network at Valenti Way & North Washington Street
Natural Gas	National Grid – (Keyspan) 6-inch intermediate pressure service North Washington Street

Based on initial investigations, the existing utility infrastructure systems have adequate capacity for the new service connections. Coordination meetings with the various utility companies will be conducted during Design Development.

6.6 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 and drainage improvements within public ways will be in accordance with the BWSC, the Boston Public works Department, the Dig Safe program and governing utility company requirements. All necessary permits will be obtained before the commencement of work. Specific methods for constructing proposed water sewer and drainage systems will be reviewed by the BWSC as part of the Site Plan Review Process.

Chapter 7.0

Coordination with Other Governmental Agencies / Public Review Process

7.0 COORDINATION WITH OTHER GOVERNMENTAL AGENCIES / PUBLIC REVIEW PROCESS

7.1 Community Outreach

The Proponent is committed to effective community outreach and will continue to engage the community to ensure public input on the Project. It should be noted the Proponent was designated as developer of Central Artery Parcel 1B by the Massachusetts Turnpike Authority following a public Request for Proposal process which included numerous public presentations and meetings. More recently the Proponent has met with the Downtown North Association, and has also reached out to immediate abutters including the BTCAC co-chairs of West End, Strada 234 and West End Council/West End Place. The Proponent has also met with the Boston Redevelopment Authority (BRA).

7.2 Architectural Access Board Requirements

The Project will comply with the requirements of the Architectural Access Board and will be designed to comply with the standards of the Americans with Disabilities Act.

7.3 Massachusetts Environmental Policy Act (MEPA)

The Project is subject to environmental impact review by the Massachusetts Environmental Policy Act (MEPA) Office of the Massachusetts Executive Office of Energy and Environmental Affairs. An expanded Environmental Notification Form will be filed.

7.4 Massachusetts Historical Commission

The redevelopment of Parcel 1B requires review by the Massachusetts Historical Commission (MHC) and Boston Landmarks Commission (BLC) in compliance with Section 106. As noted in Stipulation 5 of the MOA and in Part 1 of the design guidelines, the MHC and BLC will be afforded the opportunity to review and approve preliminary, final, and construction specifications for joint development ventures for consistency with the design guidelines, as they affect historic resources. The preliminary design plans included in this document are provided to the MHC and BLC as the first (preliminary) review of the proposed Project design. The Proponent anticipates continued design review with these agencies as Project plans are developed.

The Proponent intends to continue consultation with the MHC, BLC and Federal Highway Administration (FHWA) to address the adverse effects associated with the proposed Project.

7.5 Other Permits and Approvals

Boston Civic Design Commission

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

Boston Landmarks Commission

The Project is subject to review by the Boston Landmarks Commission (BLC) in their role as a signatory to the Section 106 Memorandum of Agreement described in Section 7.4.

The proposed Project is also subject to review by the Boston Landmarks Commission through the Boston Environment Department. The PNF will be submitted to the BLC as part of the Article 80 process.

An application is also being submitted to the BLC concurrently with this filing for review of the proposed demolition of the one-story, ca. 1929 structure at 88 North Washington Street in compliance with Article 85 of the Boston Zoning Code, Demolition Delay.

Other Permits

Section 1.8 provides a list of agencies from which permits and approvals for the Project may be sought.

Chapter 8.0

Project Certification

8.0 PROJECT CERTIFICATION

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

Signature of Proponent's Representative

Richard Wakeman, Jr.
Boston Development Group
93 Union Street, Suite 315
Newton Centre, MA 02459

6/27/08
Date

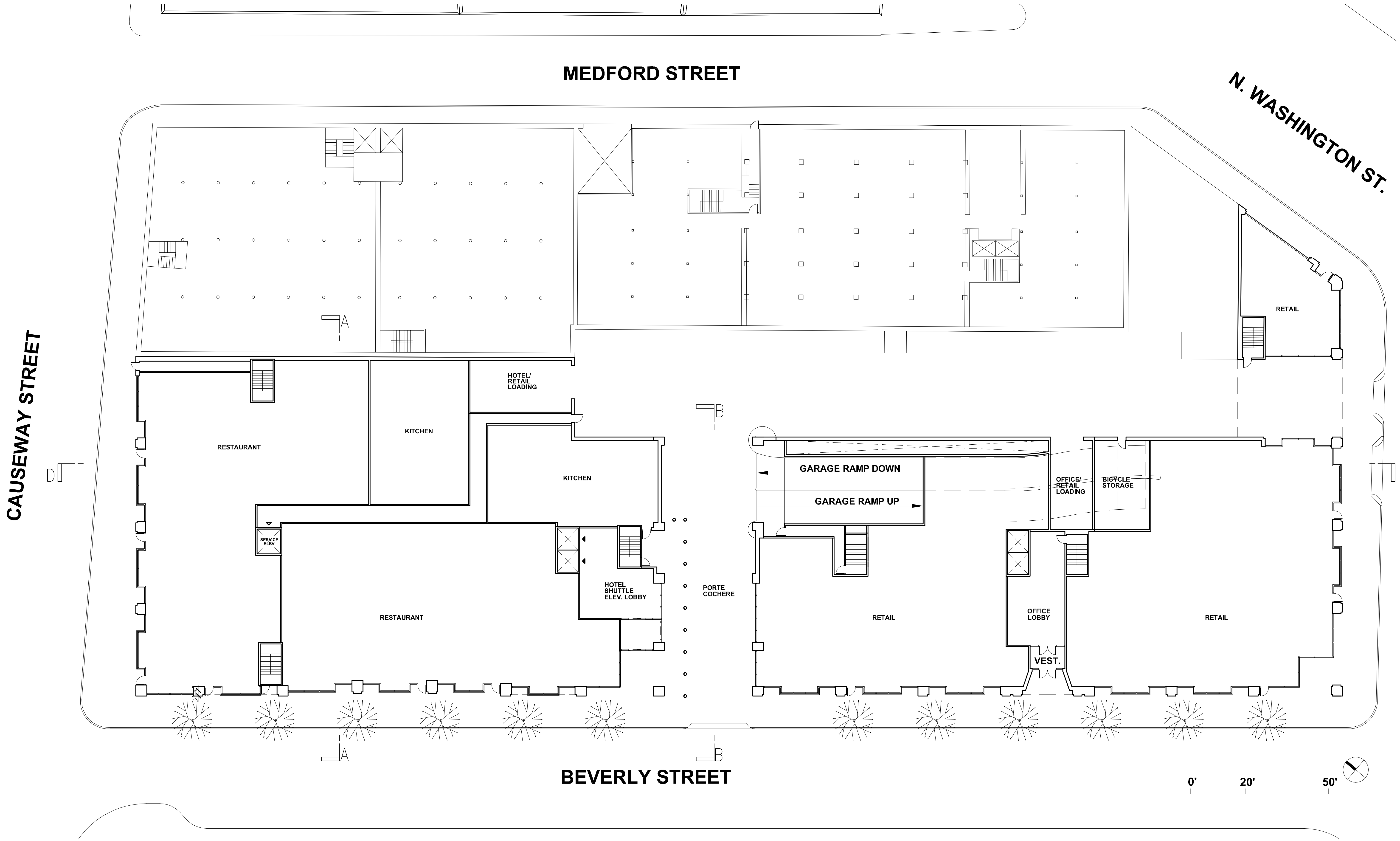
Signature of Preparer

Laura Rome
Epsilon Associates, Inc.
3 Clock Tower Place, Suite 250
Maynard, MA 01754

6/27/08
Date

Appendix A

Floor Plans, Elevations, Sections, and Perspectives



cbt

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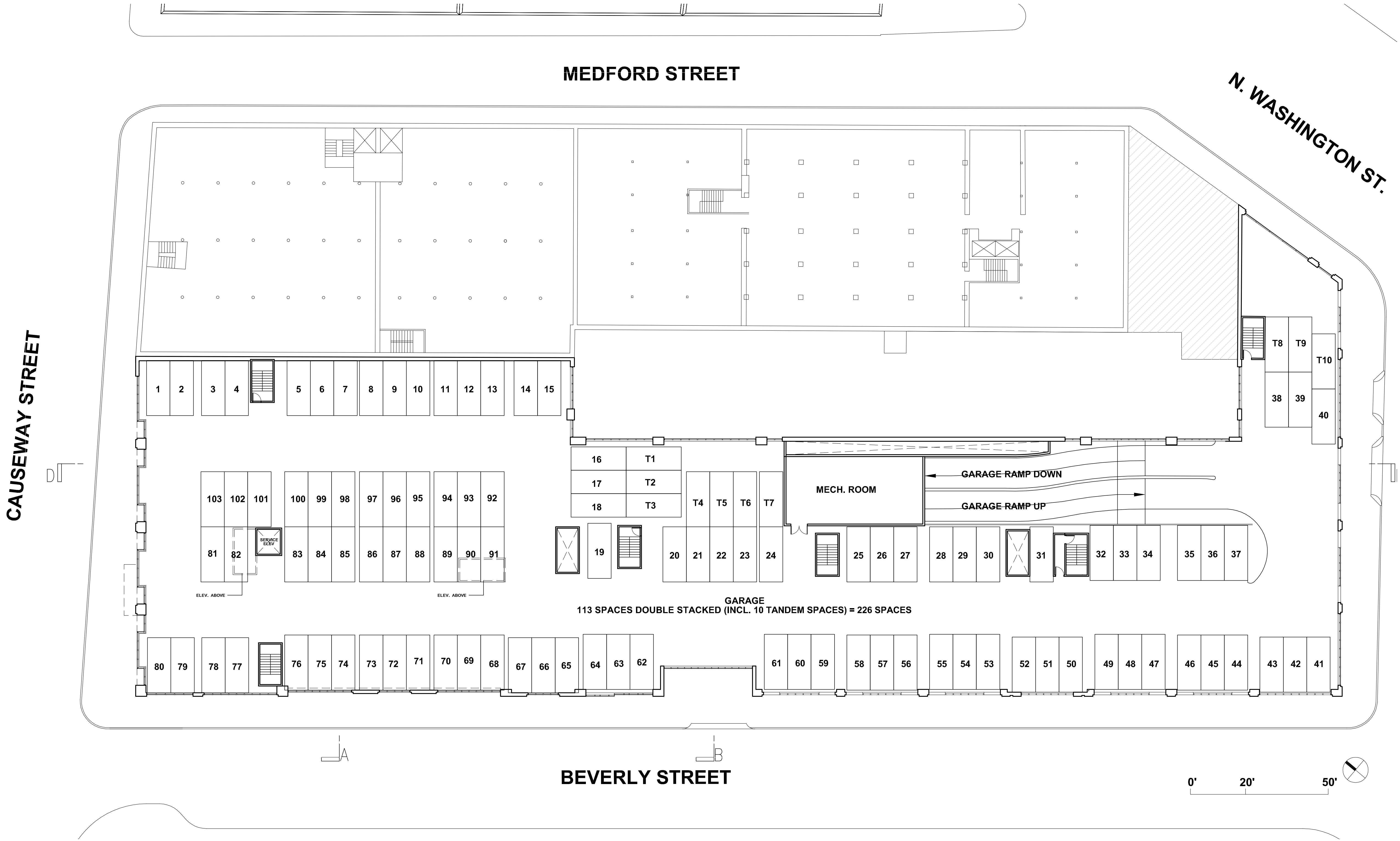
floor 1

june 11, 2008



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floor 2

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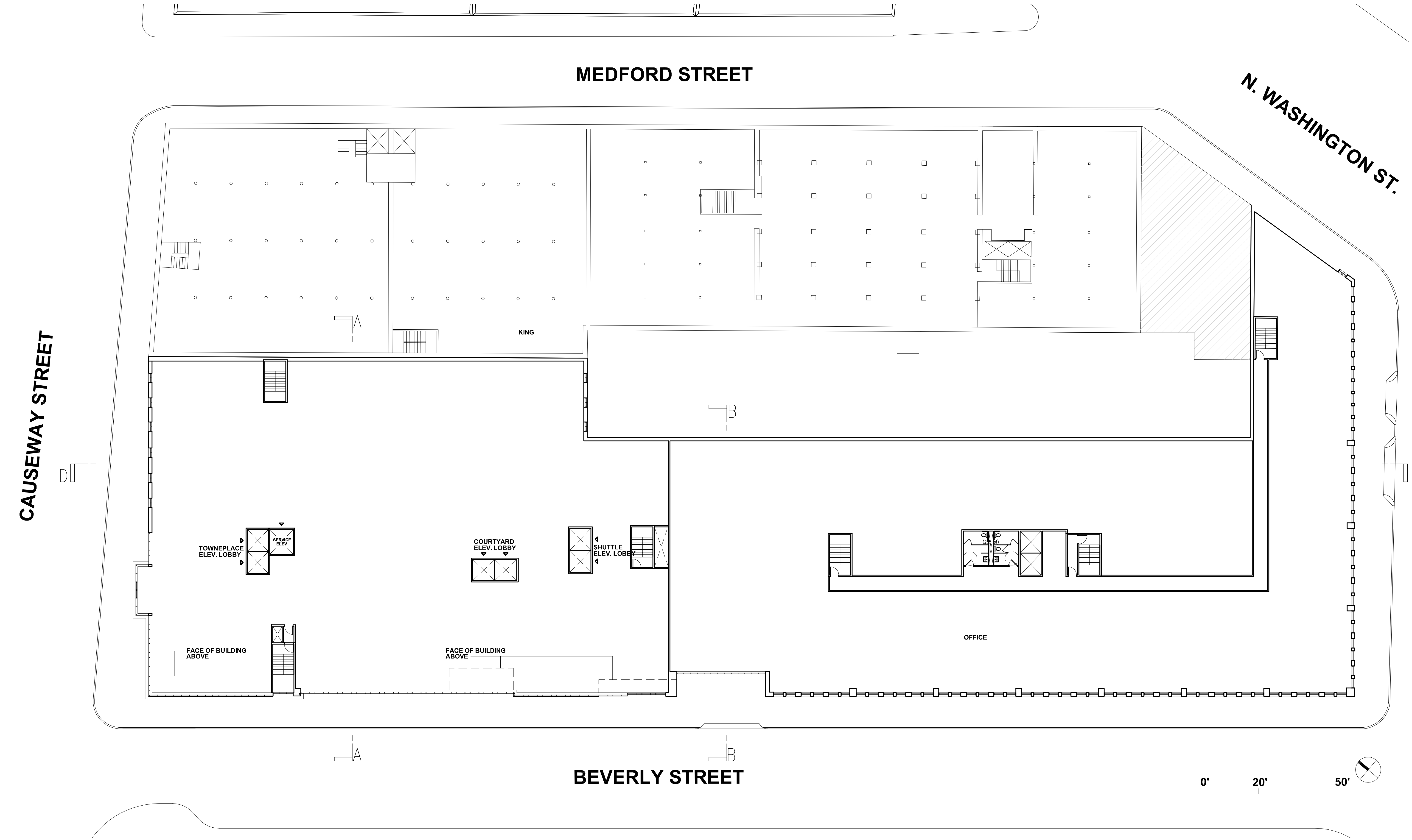

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floor 3

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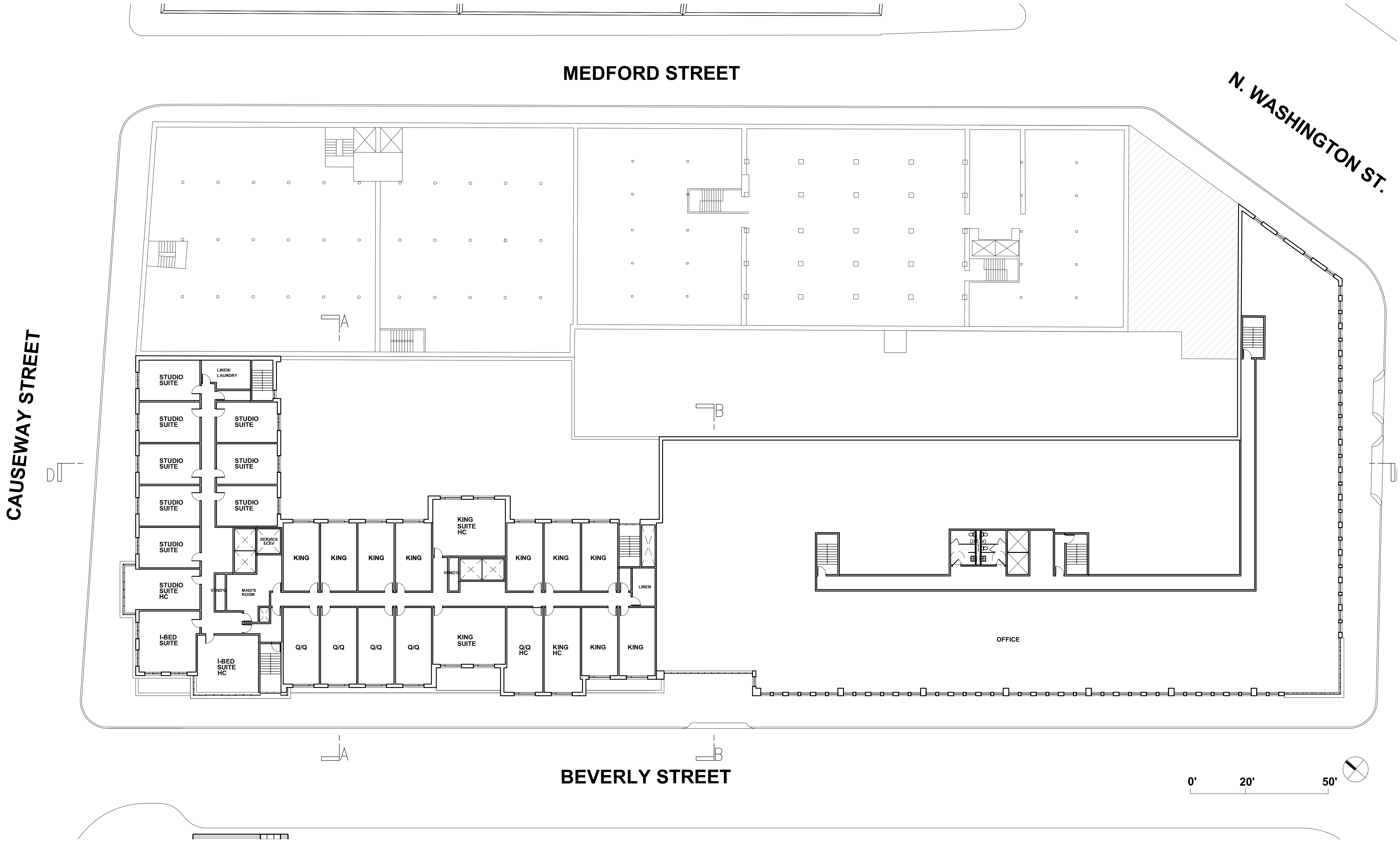

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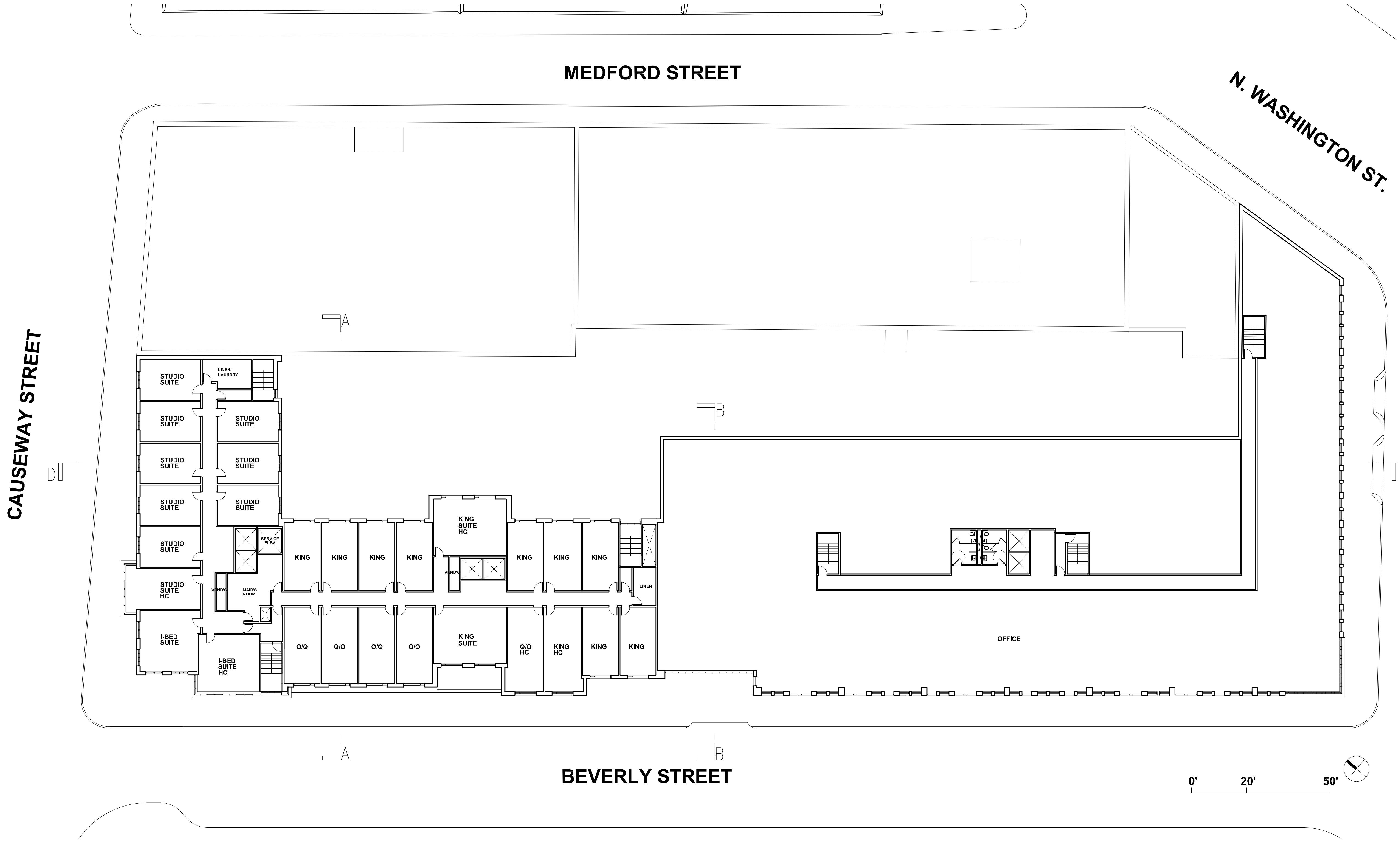
floor 4

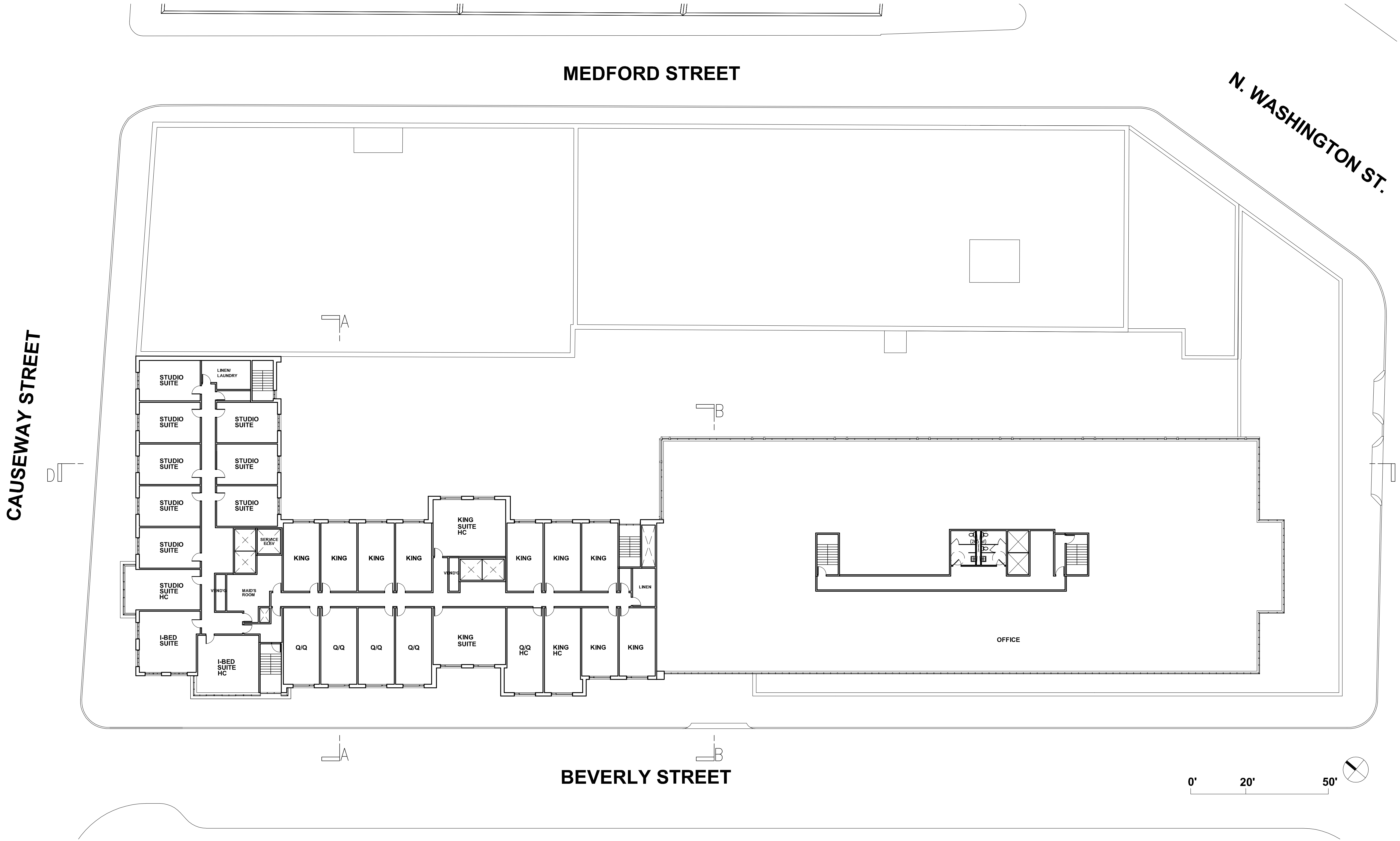
june 11, 2008



cbt

parcel 1b, boston, ma
floor 5, 6, 7, 8

june 11, 2008



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floor 9, 10, 11

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floor 12

june 11, 2008

BEVERLY STREET ELEVATION

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CAUSEWAY STREET ELEVATION

VALENTI WAY ELEVATION

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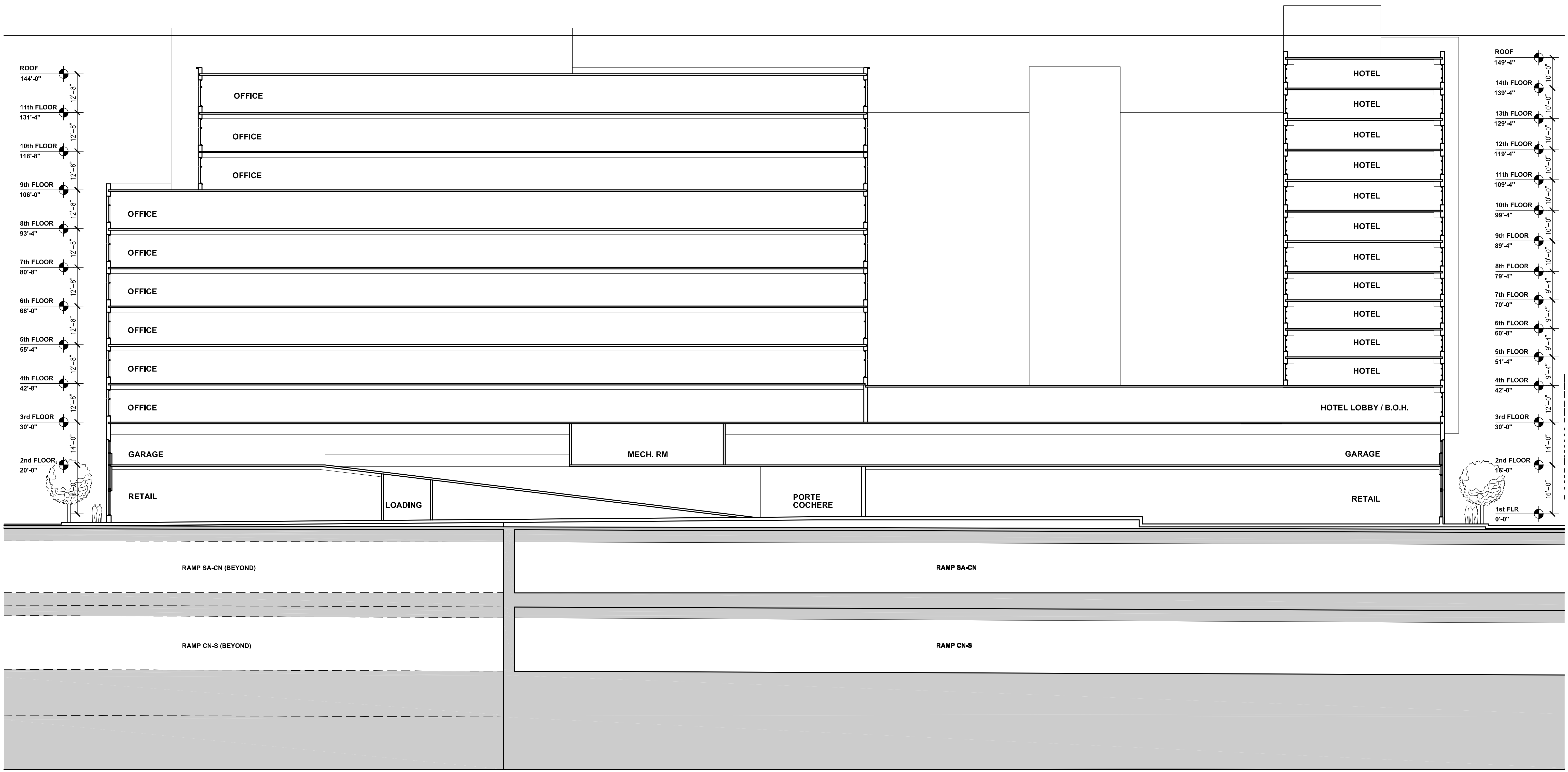
elevations

june 11, 2008


ROOF 144'-0"
11th FLOOR 131'-4"
10th FLOOR 118'-8"
9th FLOOR 106'-0"
8th FLOOR 93'-4"
7th FLOOR 80'-8"
6th FLOOR 68'-0"
5th FLOOR 55'-4"
4th FLOOR 42'-8"
3rd FLOOR 30'-0"
2nd FLOOR 20'-0"
OFFICE
OFFICE
OFFICE
OFFICE
OFFICE
OFFICE
OFFICE
OFFICE
OFFICE
GARAGE
RETAIL
LOADING
MECH. RM
PORTE COCHERE
HOTEL
HOTEL
HOTEL
HOTEL
HOTEL
HOTEL
HOTEL
HOTEL
HOTEL
HOTEL
HOTEL
HOTEL LOBBY / B.O.H.
GARAGE
RETAIL
ROOF 149'-4"
14th FLOOR 139'-4"
13th FLOOR 129'-4"
12th FLOOR 119'-4"
11th FLOOR 109'-4"
10th FLOOR 99'-4"
9th FLOOR 89'-4"
8th FLOOR 79'-4"
7th FLOOR 70'-0"
6th FLOOR 60'-8"
5th FLOOR 51'-4"
4th FLOOR 42'-0"
3rd FLOOR 30'-0"
2nd FLOOR 16'-0"
1st FLR 0'-0"
RAMP SA-CN (BEYOND)
RAMP CN-S (BEYOND)
RAMP SA-CN
RAMP CN-S
0'
20'
50'

D-D SECTION

cbt

perspective at corner of Causeway street and Beverly Street

parcel 1B development, Boston, MA

cbt

perspective at corner of Beverly Street and Valenti Way

parcel 1B development, Boston, MA

cbt

perspective at corner of Medford Street and North Washington Street

parcel 1B development, Boston, MA

Appendix B

Transportation Appendix

N/S Street : Commercial St/Causeway St
E/W Street: North Washington Street
City/State : Boston, MA
Weather : Cloudy

Accurate Counts
978-664-2565

File Name : 61640004
Site Code : 61640004
Start Date : 4/10/2007
Page No : 1

Groups Printed- Cars - Trucks

	Commercial St From North					Endicott St From Northeast					North Washington St From East					Causeway St From South					North Washington St From West							
Start Time	Hard Left	Left	Thru	Right	Peds	Hard Left	Bear Left	Bear Right	Hard Right	Peds	Left	Thru	Right	Hard Right	Peds	Left	Thru	Bear Right	Right	Peds	Left	Bear Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00	0	24	29	33	7	1	0	1	2	4	5	89	19	0	40	22	22	0	10	4	77	0	172	112	25	80	618	698
07:15	0	19	28	39	14	2	0	0	3	0	6	91	15	0	54	33	23	0	15	2	61	0	211	108	32	102	654	756
07:30	0	28	28	39	11	0	1	4	7	0	3	82	10	0	46	27	22	0	20	2	56	0	261	139	14	73	727	800
07:45	0	24	37	51	23	1	0	3	3	0	13	90	17	0	50	41	31	0	22	5	97	0	299	144	26	104	873	977
Total	0	95	122	162	55	4	1	8	15	4	27	352	61	0	190	123	98	0	67	13	291	0	943	503	97	359	2872	3231
08:00	0	26	42	44	20	0	0	4	5	1	7	103	10	0	32	34	23	0	21	2	90	0	262	108	30	85	779	864
08:15	0	30	34	74	30	1	0	5	6	1	2	96	3	0	28	33	29	0	25	0	77	0	260	141	28	87	816	903
08:30	0	24	27	70	33	0	0	7	8	4	7	100	10	0	52	47	25	0	15	0	79	0	267	124	39	128	810	938
08:45	0	21	25	42	19	0	1	5	4	4	14	97	12	0	78	39	32	0	21	0	77	0	218	95	27	128	703	831
Total	0	101	128	230	102	1	1	21	23	10	30	396	35	0	190	153	109	0	82	2	323	0	1007	468	124	428	3108	3536
09:00	0	22	25	66	9	1	0	3	1	2	15	106	23	0	48	40	30	0	41	7	80	0	236	104	11	77	793	870
09:15	0	17	23	41	22	0	0	2	0	1	9	101	18	0	82	54	31	0	37	7	68	0	195	117	7	119	713	832
09:30	0	25	22	51	4	0	0	3	6	0	14	117	14	0	46	46	33	0	44	5	61	0	181	96	7	62	713	775
09:45	0	16	21	45	10	0	0	7	3	1	15	125	12	0	36	49	33	0	22	11	52	0	187	117	20	78	704	782
Total	0	80	91	203	45	1	0	15	10	4	53	449	67	0	212	189	127	0	144	30	261	0	799	434	45	336	2923	3259
10:00	0	17	14	49	6	0	0	0	3	0	14	94	20	0	72	55	35	0	29	3	44	0	140	80	19	100	594	694
10:15	0	21	19	50	15	1	0	2	4	0	12	100	11	0	42	37	35	0	28	8	53	0	132	52	5	70	557	627
10:30	0	13	14	56	16	0	2	2	3	1	16	78	8	0	30	48	27	0	34	5	44	0	115	59	7	59	519	578
10:45	0	18	23	45	24	0	0	2	2	0	22	85	20	0	54	47	26	0	38	6	47	0	131	80	17	101	586	687
Total	0	69	70	200	61	1	2	6	12	1	64	357	59	0	198	187	123	0	129	22	188	0	518	271	48	330	2256	2586
11:00	0	26	30	64	15	0	3	2	4	2	27	99	9	0	82	45	34	0	33	19	41	0	136	46	7	125	599	724
11:15	0	18	28	47	7	0	5	3	6	1	30	78	13	0	52	36	30	0	21	13	41	0	122	53	13	86	531	617
11:30	0	29	16	55	26	0	5	1	5	4	16	80	16	0	52	49	30	0	32	3	40	0	107	37	10	95	518	613
11:45	0	27	42	32	10	3	2	2	2	2	13	80	17	0	52	46	38	0	47	8	42	0	161	26	17	89	580	669
Total	0	100	116	198	58	3	15	8	17	9	86	337	55	0	238	176	132	0	133	43	164	0	526	162	47	395	2228	2623
12:00	0	23	22	53	6	2	0	1	3	1	19	49	11	0	21	36	22	0	8	12	46	0	81	54	4	44	430	474
12:15	0	25	36	50	23	0	0	0	1	0	6	93	12	0	24	51	30	0	23	4	50	0	120	46	0	51	543	594
12:30	0	19	19	76	19	9	3	0	2	3	5	86	13	0	31	61	30	0	19	7	34	0	102	32	17	77	510	587
12:45	0	21	27	59	19	0	1	0	2	0	13	77	16	0	17	56	21	0	32	14	46	0	126	47	7	57	544	601
Total	0	88	104	238	67	11	4	1	8	4	43	305	52	0	93	204	103	0	82	37	176	0	429	179	28	229	2027	2256
13:00	0	20	24	78	14	11	2	0	5	2	16	74	17	0	22	56	32	0	21	4	51	0	124	49	6	48	580	628
13:15	0	26	13	70	21	5	0	0	0	1	13	105	22	0	31	42	28	0	20	1	39	0	105	39	20	74	527	601
13:30	0	27	18	52	21	0	2	0	1	0	9	85	16	0	25	40	24	0	20	8	39	0	104	30	6	60	467	527
13:45	0	19	20	73	14	1	0	0	1	0	15	118	25	0	21	70	32	0	28	9	41	0	91	38	0	44	572	616
Total	0	92	75	273	70	17	4	0	7	3	53	382	80	0	99	208	116	0	89	22	170	0	424	156	32	226	2146	2372

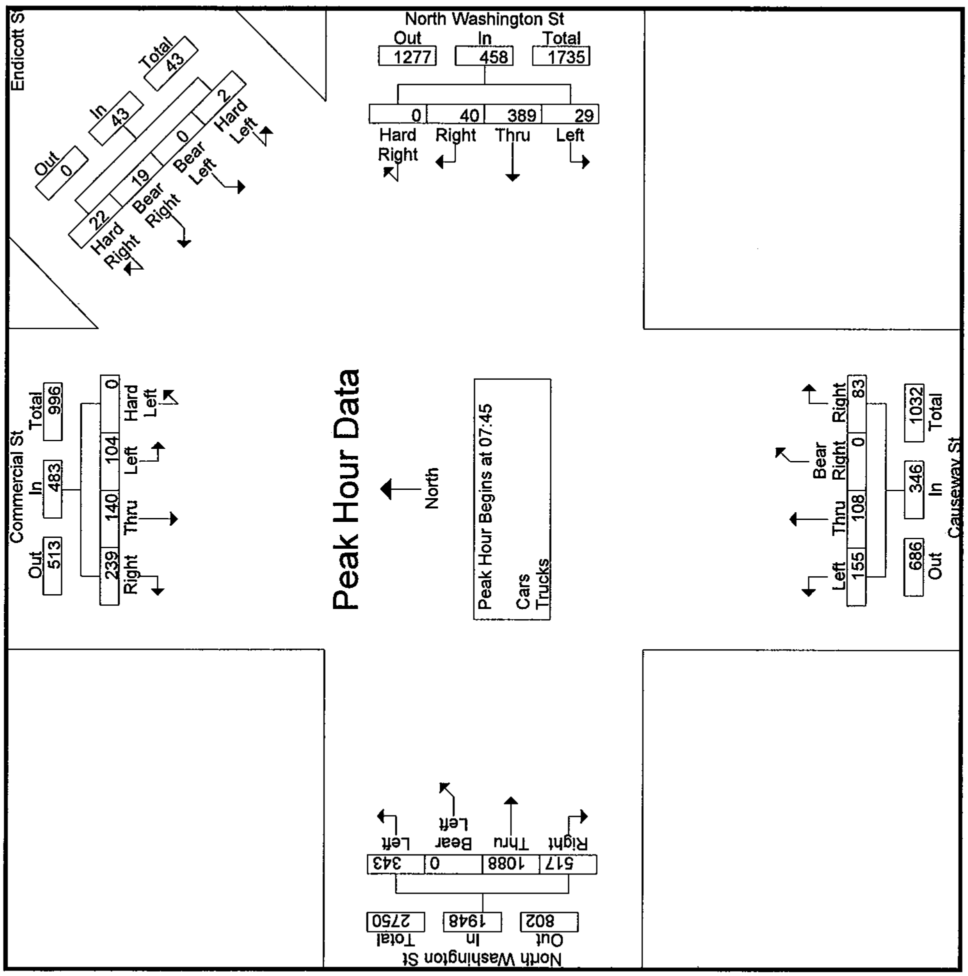
Accurate Counts
978-664-2565

File Name : 61640004
Site Code : 61640004
Start Date : 4/10/2007
Page No : 2

Groups Printed- Cars - Trucks

	Commercial St From North					Endicott St From Northeast					North Washington St From East					Causeway St From South					North Washington St From West							
Start Time	Hard Left	Left	Thru	Right	Peds	Hard Left	Bear Left	Bear Right	Hard Right	Peds	Left	Thru	Right	Hard Right	Peds	Left	Thru	Bear Right	Right	Peds	Left	Bear Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
14:00	0	28	14	51	66	1	1	0	1	1	4	91	13	0	22	66	21	0	23	2	38	0	85	45	5	96	482	578
14:15	0	29	23	83	36	1	0	0	1	2	8	88	16	0	28	37	21	0	19	1	37	0	106	33	0	67	502	569
14:30	0	28	30	82	23	0	0	0	0	1	9	77	15	0	31	45	24	0	21	0	43	0	130	30	2	57	534	591
14:45	0	30	15	66	47	1	0	0	0	1	8	100	9	0	22	49	19	0	13	3	52	0	122	38	4	77	522	599
Total	0	115	82	282	172	3	1	0	2	5	29	356	53	0	103	197	85	0	76	6	170	0	443	146	11	297	2040	2337
15:00	0	25	24	104	5	34	0	0	3	0	8	98	11	0	35	65	12	0	9	4	50	0	136	19	0	44	598	642
15:15	0	26	19	78	12	2	0	0	2	2	6	102	12	0	38	53	28	0	14	1	37	0	128	32	17	70	539	609
15:30	0	27	18	105	16	2	0	0	1	0	7	115	26	0	12	48	36	0	5	2	36	0	120	36	15	45	582	627
15:45	0	21	17	95	15	3	0	0	8	0	8	136	17	0	25	54	24	0	5	6	47	0	144	31	16	62	610	672
Total	0	99	78	382	48	41	0	0	14	2	29	451	66	0	110	220	100	0	33	13	170	0	528	118	48	221	2329	2550
16:00	0	19	27	89	18	1	0	0	2	3	5	127	6	0	18	91	21	0	14	7	37	0	137	31	0	46	607	653
16:15	0	15	19	81	30	6	0	0	0	1	3	128	6	0	26	72	21	0	5	2	40	0	145	27	0	59	568	627
16:30	0	13	28	91	21	0	2	0	1	2	6	115	17	0	21	75	23	0	5	3	41	0	181	39	16	63	637	700
16:45	0	16	21	117	7	0	0	0	0	0	6	128	18	0	33	66	25	0	8	0	42	0	181	43	5	45	671	716
Total	0	63	95	378	76	7	2	0	3	6	20	498	47	0	98	304	90	0	32	12	160	0	644	140	21	213	2483	2696
17:00	0	23	35	115	3	3	0	0	5	1	8	142	11	0	10	88	19	0	3	6	47	0	159	24	0	20	682	702
17:15	0	20	35	206	12	0	0	0	1	1	6	156	12	0	29	56	21	0	0	5	47	0	108	23	0	47	691	738
17:30	0	23	35	148	9	2	0	0	3	2	7	141	9	0	12	61	22	0	1	2	52	0	122	28	2	27	654	681
17:45	0	18	32	115	21	0	0	0	3	0	1	155	20	0	15	84	30	0	4	1	38	0	142	53	1	38	695	733
Total	0	84	137	584	45	5	0	0	12	4	22	594	52	0	66	289	92	0	8	14	184	0	531	128	3	132	2722	2854
Grand Total	0	986	1098	3130	799	94	30	59	123	52	456	4477	627	0	{\fs1 5 159 7}	2250	1175	0	875	214	2257	0	6792	2705	504	3166	27134	30300
Apprch %	0	18.9	21.1	60		30.7	9.8	19.3	40.2		8.2	80.5	11.3	0		52.3	27.3	0	20.3		19.2	0	57.8	23				
Total %	0	3.6	4	11.5		0.3	0.1	0.2	0.5		1.7	16.5	2.3	0		8.3	4.3	0	3.2		8.3	0	25	10		10.4	89.6	
Cars	0	941	1049	3018		94	26	50	117		413	3999	589	0		2113	1121	0	823		2185	0	6352	2529		0	0	28070
% Cars	0	95.4	95.5	96.4	100	100	86.7	84.7	95.1	100	90.6	89.3	93.9	0	67.8	93.9	95.4	0	94.1	100	96.8	0	93.5	93.5	100	0	0	92.6
Trucks	0	45	49	112		0	4	9	6		43	478	38	0		137	54	0	52		72	0	440	176		0	0	2230
% Trucks	0	4.6	4.5	3.6	0	0	13.3	15.3	4.9	0	9.4	10.7	6.1	0	32.2	6.1	4.6	0	5.9	0	3.2	0	6.5	6.5	0	0	0	7.4

	Commercial St From North					Endicott St From Northeast					North Washington St From East					Causeway St From South					North Washington St From West					
Start Time	Hard Left	Left	Thru	Right	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	App. Total	Left	Thru	Right	Hard Right	App. Total	Left	Thru	Bear Right	Right	App. Total	Left	Bear Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 17:45 - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 07:45																										
07:45	0	24	37	51	112	1	0	3	3	7	13	90	17	0	120	41	31	0	22	94	97	0	299	144	540	873
08:00	0	26	42	44	112	0	0	4	5	9	7	103	10	0	120	34	23	0	21	78	90	0	262	108	460	779
08:15	0	30	34	74	138	1	0	5	6	12	2	96	3	0	101	33	29	0	25	87	77	0	260	141	478	816
08:30	0	24	27	70	121	0	0	7	8	15	7	100	10	0	117	47	25	0	15	87	79	0	267	124	470	810
Total Volume	0	104	140	239	483	2	0	19	22	43	29	389	40	0	458	155	108	0	83	346	343	0	1088	517	1948	3278
% App. Total	0	21.5	29	49.5		4.7	0	44.2	51.2		6.3	84.9	8.7	0		44.8	31.2	0	24		17.6	0	55.9	26.5		



Peak Hour Data
North
Peak Hour Begins at 07:45
Cars
Trucks
North Washington St
Out 1277
In 458
Total 1735
Hard Right 0
Right 40
Thru 389
Left 29
Endicott St
Out 0
In 43
Total 43
Hard Right 22
Bear Right 19
Bear Left 0
Hard Left 2
Commercial St
Out 513
In 483
Total 996
Right 239
Thru 140
Left 104
Hard Left 0
Causeway St
Out 686
In 346
Total 1032
Left 155
Thru 108
Bear Right 0
Right 83
North Washington St
Out 802
In 1948
Total 2750
Left 343
Bear Left 0
Thru 1088
Right 517

N/S Street : North Washington Street
E/W Street: Thacher St / Valenti Way
City/State : Boston, MA
Weather : Clear

Accurate Counts
978-664-2565

File Name : 61880001
Site Code : 61880001
Start Date : 8/1/2007
Page No : 1

Groups Printed- Cars - Trucks

	N Washington St From North				Thacher St From East				N Washington St From South				Valenti Way From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00	17	192	0	16	0	0	0	7	50	124	10	1	0	0	0	6	30	393	423
07:15	10	217	1	30	0	0	0	18	60	111	9	1	0	0	0	14	63	408	471
07:30	11	247	4	42	0	0	0	15	64	120	14	2	0	0	0	7	66	460	526
07:45	15	262	4	52	0	0	0	15	83	151	14	0	0	0	0	12	79	529	608
Total	53	918	9	140	0	0	0	55	257	506	47	4	0	0	0	39	238	1790	2028
08:00	10	274	2	58	0	0	0	23	72	144	15	1	0	0	0	8	90	517	607
08:15	17	256	4	58	0	0	0	25	71	146	8	0	0	0	0	8	91	502	593
08:30	3	288	2	49	0	0	0	15	66	157	11	2	0	0	0	10	76	527	603
08:45	17	225	6	45	0	0	0	27	61	142	4	3	0	0	0	7	82	455	537
Total	47	1043	14	210	0	0	0	90	270	589	38	6	0	0	0	33	339	2001	2340
09:00	12	226	4	48	0	0	0	36	42	127	11	0	0	0	0	18	102	422	524
09:15	15	212	7	26	0	0	0	12	72	163	10	4	0	0	0	13	55	479	534
09:30	12	204	7	28	0	0	0	12	51	113	7	1	0	0	0	3	44	394	438
09:45	18	163	5	7	0	0	0	19	44	116	7	0	0	0	0	7	33	353	386
Total	57	805	23	109	0	0	0	79	209	519	35	5	0	0	0	41	234	1648	1882
10:00	22	138	4	32	0	0	0	12	60	115	5	0	0	0	0	7	51	344	395
10:15	11	124	2	27	0	0	0	10	58	130	7	0	0	0	0	6	43	332	375
10:30	9	130	6	15	0	0	0	16	54	115	5	0	0	0	0	4	35	319	354
10:45	5	154	6	22	0	0	0	17	50	117	6	1	0	0	0	10	50	338	388
Total	47	546	18	96	0	0	0	55	222	477	23	1	0	0	0	27	179	1333	1512
11:00	20	145	2	15	0	0	0	17	65	124	5	1	0	0	0	5	38	361	399
11:15	13	123	6	13	0	0	0	22	69	148	10	0	0	0	0	7	42	369	411
11:30	16	171	4	16	0	0	0	21	56	116	7	4	0	0	0	10	51	370	421
11:45	9	112	8	9	0	0	0	15	45	134	6	6	0	0	0	14	44	314	358
Total	58	551	20	53	0	0	0	75	235	522	28	11	0	0	0	36	175	1414	1589
12:00	16	151	3	53	0	0	0	18	51	114	9	5	0	0	0	16	92	344	436
12:15	17	161	7	40	0	0	0	14	72	136	6	0	0	0	0	9	63	399	462
12:30	10	157	4	77	0	0	0	30	56	127	9	0	0	0	0	5	112	363	475
12:45	16	169	6	61	0	0	0	26	56	118	7	0	0	0	0	5	92	372	464
Total	59	638	20	231	0	0	0	88	235	495	31	5	0	0	0	35	359	1478	1837
13:00	9	167	3	77	0	0	0	32	68	139	16	1	0	0	0	11	121	402	523
13:15	9	164	0	44	0	0	0	31	56	136	5	0	0	0	0	16	91	370	461
13:30	14	143	6	47	0	0	0	25	59	112	5	0	0	0	0	12	84	339	423
13:45	11	171	3	45	0	0	0	34	53	124	6	0	0	0	0	9	88	368	456
Total	43	645	12	213	0	0	0	122	236	511	32	1	0	0	0	48	384	1479	1863
14:00	14	168	4	46	0	0	0	30	65	143	8	0	0	0	0	23	99	402	501
14:15	19	165	4	51	0	0	0	36	74	131	6	0	0	0	0	20	107	399	506
14:30	27	182	3	21	0	0	0	29	56	143	9	0	0	0	0	12	62	420	482
14:45	19	220	6	23	0	0	0	17	70	136	8	0	0	0	0	8	48	459	507
Total	79	735	17	141	0	0	0	112	265	553	31	0	0	0	0	63	316	1680	1996
15:00	7	223	8	21	0	0	0	20	65	152	13	0	0	0	0	4	45	468	513
15:15	14	256	3	29	0	0	0	41	63	162	15	0	0	0	0	10	80	513	593
15:30	13	246	4	34	0	0	0	29	76	153	6	0	0	0	0	8	71	498	569
15:45	6	267	5	34	0	0	0	21	74	167	8	0	0	0	0	9	64	527	591
Total	40	992	20	118	0	0	0	111	278	634	42	0	0	0	0	31	260	2006	2266
16:00	11	255	5	22	0	0	0	25	57	145	12	0	0	0	0	8	55	485	540
16:15	8	251	2	38	0	0	0	30	77	169	9	0	0	0	0	19	87	516	603
16:30	15	261	3	34	0	0	0	15	68	167	6	0	0	0	0	4	53	520	573
16:45	21	274	3	58	0	0	0	47	78	162	10	0	0	0	0	9	114	548	662
Total	55	1041	13	152	0	0	0	117	280	643	37	0	0	0	0	40	309	2069	2378
17:00	19	245	2	83	0	0	0	33	68	189	4	0	0	0	0	19	135	527	662
17:15	16	264	0	50	0	0	0	32	84	210	9	0	0	0	0	14	96	583	679
17:30	18	219	2	60	0	0	0	27	56	205	9	0	0	0	0	19	106	509	615
17:45	17	258	1	64	0	0	0	34	55	225	7	0	0	0	0	16	114	563	677
Total	70	986	5	257	0	0	0	126	263	829	29	0	0	0	0	68	451	2182	2633
Grand Total	608	8900	171	1720	0	0	0	1030	2750	6278	373	33	0	0	0	461	3244	19080	22324

Cars	594	8112	143		0	0	0		2497	5630	359		0	0	0		0	0	20579
% Cars	97.7	91.1	83.6	100	0	0	0	100	90.8	89.7	96.2	100	0	0	0	100	0	0	92.2
Trucks	14	788	28		0	0	0		253	648	14		0	0	0		0	0	1745
% Trucks	2.3	8.9	16.4	0	0	0	0	0	9.2	10.3	3.8	0	0	0	0	0	0	0	7.8

	N Washington St From North				Thacher St From East				N Washington St From South				Valenti Way From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 12:30 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45																	
07:45	15	262	4	281	0	0	0	0	83	151	14	248	0	0	0	0	529
08:00	10	274	2	286	0	0	0	0	72	144	15	231	0	0	0	0	517
08:15	17	256	4	277	0	0	0	0	71	146	8	225	0	0	0	0	502
08:30	3	288	2	293	0	0	0	0	66	157	11	234	0	0	0	0	527
Total Volume	45	1080	12	1137	0	0	0	0	292	598	48	938	0	0	0	0	2075
% App. Total	4	95	1.1		0	0	0		31.1	63.8	5.1		0	0	0		
PHF	.662	.938	.750	.970	.000	.000	.000	.000	.880	.952	.800	.946	.000	.000	.000	.000	.981

Peak Hour Analysis From 07:00 to 12:30 - Peak 1 of 1																
Peak Hour for Each Approach Begins at:																
	07:45				07:00				07:45				07:00			
+0 mins.	15	262	4	281	0	0	0	0	83	151	14	248	0	0	0	0
+15 mins.	10	274	2	286	0	0	0	0	72	144	15	231	0	0	0	0
+30 mins.	17	256	4	277	0	0	0	0	71	146	8	225	0	0	0	0
+45 mins.	3	288	2	293	0	0	0	0	66	157	11	234	0	0	0	0
Total Volume	45	1080	12	1137	0	0	0	0	292	598	48	938	0	0	0	0
% App. Total	4	95	1.1		0	0	0		31.1	63.8	5.1		0	0	0	
PHF	.662	.938	.750	.970	.000	.000	.000	.000	.880	.952	.800	.946	.000	.000	.000	.000

Peak Hour Analysis From 12:45 to 17:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 17:00																	
17:00	19	245	2	266	0	0	0	0	68	189	4	261	0	0	0	0	527
17:15	16	264	0	280	0	0	0	0	84	210	9	303	0	0	0	0	583
17:30	18	219	2	239	0	0	0	0	56	205	9	270	0	0	0	0	509
17:45	17	258	1	276	0	0	0	0	55	225	7	287	0	0	0	0	563
Total Volume	70	986	5	1061	0	0	0	0	263	829	29	1121	0	0	0	0	2182
% App. Total	6.6	92.9	0.5		0	0	0		23.5	74	2.6		0	0	0		
PHF	.921	.934	.625	.947	.000	.000	.000	.000	.783	.921	.806	.925	.000	.000	.000	.000	.936

Peak Hour Analysis From 12:45 to 17:45 - Peak 1 of 1																
Peak Hour for Each Approach Begins at:																
	16:30				12:45				17:00				12:45			
+0 mins.	15	261	3	279	0	0	0	0	68	189	4	261	0	0	0	0
+15 mins.	21	274	3	298	0	0	0	0	84	210	9	303	0	0	0	0
+30 mins.	19	245	2	266	0	0	0	0	56	205	9	270	0	0	0	0
+45 mins.	16	264	0	280	0	0	0	0	55	225	7	287	0	0	0	0
Total Volume	71	1044	8	1123	0	0	0	0	263	829	29	1121	0	0	0	0
% App. Total	6.3	93	0.7		0	0	0		23.5	74	2.6		0	0	0	
PHF	.845	.953	.667	.942	.000	.000	.000	.000	.783	.921	.806	.925	.000	.000	.000	.000

N/S Street : North Washington Street	Accurate Counts	File Name : 61880001
E/W Street: Thacher St / Valenti Way	978-664-2565	Site Code : 61880001
City/State : Boston, MA		Start Date : 8/1/2007
Weather : Clear		Page No : 1

Groups Printed- Cars

	N Washington St From North				Thacher St From East				N Washington St From South				Valenti Way From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00	17	171	0	16	0	0	0	7	44	113	10	1	0	0	0	6	30	355	385
07:15	10	193	1	30	0	0	0	18	53	98	8	1	0	0	0	14	63	363	426
07:30	11	215	4	42	0	0	0	15	55	106	13	2	0	0	0	7	66	404	470
07:45	15	238	2	52	0	0	0	15	75	127	14	0	0	0	0	12	79	471	550
Total	53	817	7	140	0	0	0	55	227	444	45	4	0	0	0	39	238	1593	1831
08:00	10	248	2	58	0	0	0	23	66	123	15	1	0	0	0	8	90	464	554
08:15	17	231	4	58	0	0	0	25	64	130	7	0	0	0	0	8	91	453	544
08:30	2	262	2	49	0	0	0	15	59	143	11	2	0	0	0	10	76	479	555
08:45	16	211	6	45	0	0	0	27	54	126	4	3	0	0	0	7	82	417	499
Total	45	952	14	210	0	0	0	90	243	522	37	6	0	0	0	33	339	1813	2152
09:00	12	204	4	48	0	0	0	36	37	109	9	0	0	0	0	18	102	375	477
09:15	15	190	7	26	0	0	0	12	67	145	9	4	0	0	0	13	55	433	488
09:30	12	183	7	28	0	0	0	12	44	99	7	1	0	0	0	3	44	352	396
09:45	18	150	5	7	0	0	0	19	39	100	6	0	0	0	0	7	33	318	351
Total	57	727	23	109	0	0	0	79	187	453	31	5	0	0	0	41	234	1478	1712
10:00	20	119	3	32	0	0	0	12	53	105	5	0	0	0	0	7	51	305	356
10:15	11	108	2	27	0	0	0	10	51	119	7	0	0	0	0	6	43	298	341
10:30	9	116	5	15	0	0	0	16	47	106	5	0	0	0	0	4	35	288	323
10:45	5	134	5	22	0	0	0	17	48	103	6	1	0	0	0	10	50	301	351
Total	45	477	15	96	0	0	0	55	199	433	23	1	0	0	0	27	179	1192	1371
11:00	19	129	1	15	0	0	0	17	54	103	5	1	0	0	0	5	38	311	349
11:15	13	109	6	13	0	0	0	22	64	131	10	0	0	0	0	7	42	333	375
11:30	16	155	3	16	0	0	0	21	52	103	6	4	0	0	0	10	51	335	386
11:45	8	101	8	9	0	0	0	15	43	123	6	6	0	0	0	14	44	289	333
Total	56	494	18	53	0	0	0	75	213	460	27	11	0	0	0	36	175	1268	1443
12:00	16	138	3	53	0	0	0	18	47	102	9	5	0	0	0	16	92	315	407
12:15	17	143	3	40	0	0	0	14	69	125	6	0	0	0	0	9	63	363	426
12:30	10	137	2	77	0	0	0	30	50	116	9	0	0	0	0	5	112	324	436
12:45	16	147	6	61	0	0	0	26	53	106	6	0	0	0	0	5	92	334	426
Total	59	565	14	231	0	0	0	88	219	449	30	5	0	0	0	35	359	1336	1695
13:00	9	154	3	77	0	0	0	32	61	121	15	1	0	0	0	11	121	363	484
13:15	9	153	0	44	0	0	0	31	51	122	5	0	0	0	0	16	91	340	431
13:30	10	128	5	47	0	0	0	25	54	99	5	0	0	0	0	12	84	301	385
13:45	11	154	2	45	0	0	0	34	50	111	6	0	0	0	0	9	88	334	422
Total	39	589	10	213	0	0	0	122	216	453	31	1	0	0	0	48	384	1338	1722
14:00	13	152	2	46	0	0	0	30	62	132	8	0	0	0	0	23	99	369	468
14:15	19	154	4	51	0	0	0	36	68	116	6	0	0	0	0	20	107	367	474
14:30	26	172	2	21	0	0	0	29	51	131	9	0	0	0	0	12	62	391	453
14:45	19	201	6	23	0	0	0	17	66	122	7	0	0	0	0	8	48	421	469
Total	77	679	14	141	0	0	0	112	247	501	30	0	0	0	0	63	316	1548	1864
15:00	7	207	5	21	0	0	0	20	63	136	12	0	0	0	0	4	45	430	475
15:15	14	240	3	29	0	0	0	41	61	140	15	0	0	0	0	10	80	473	553
15:30	12	223	3	34	0	0	0	29	67	136	5	0	0	0	0	8	71	446	517
15:45	5	248	4	34	0	0	0	21	70	155	8	0	0	0	0	9	64	490	554
Total	38	918	15	118	0	0	0	111	261	567	40	0	0	0	0	31	260	1839	2099
16:00	11	234	4	22	0	0	0	25	51	126	11	0	0	0	0	8	55	437	492
16:15	8	232	2	38	0	0	0	30	71	153	9	0	0	0	0	19	87	475	562
16:30	15	242	1	34	0	0	0	15	58	150	6	0	0	0	0	4	53	472	525
16:45	21	258	2	58	0	0	0	47	70	151	10	0	0	0	0	9	114	512	626
Total	55	966	9	152	0	0	0	117	250	580	36	0	0	0	0	40	309	1896	2205
17:00	19	230	1	83	0	0	0	33	59	172	4	0	0	0	0	19	135	485	620
17:15	16	248	0	50	0	0	0	32	75	194	9	0	0	0	0	14	96	542	638
17:30	18	204	2	60	0	0	0	27	52	191	9	0	0	0	0	19	106	476	582
17:45	17	246	1	64	0	0	0	34	49	211	7	0	0	0	0	16	114	531	645
Total	70	928	4	257	0	0	0	126	235	768	29	0	0	0	0	68	451	2034	2485
Grand Total	594	8112	143	1720	0	0	0	1030	2497	5630	359	33	0	0	0	461	3244	17335	20579

	N Washington St From North				Thacher St From East				N Washington St From South				Valenti Way From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 12:30 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45																	
07:45	15	238	2	255	0	0	0	0	75	127	14	216	0	0	0	0	471
08:00	10	248	2	260	0	0	0	0	66	123	15	204	0	0	0	0	464
08:15	17	231	4	252	0	0	0	0	64	130	7	201	0	0	0	0	453
08:30	2	262	2	266	0	0	0	0	59	143	11	213	0	0	0	0	479
Total Volume	44	979	10	1033	0	0	0	0	264	523	47	834	0	0	0	0	1867
% App. Total	4.3	94.8	1		0	0	0		31.7	62.7	5.6		0	0	0		
PHF	.647	.934	.625	.971	.000	.000	.000	.000	.880	.914	.783	.965	.000	.000	.000	.000	.974
Peak Hour Analysis From 07:00 to 12:30 - Peak 1 of 1																	
Peak Hour for Each Approach Begins at:																	
	07:45				07:00				07:45				07:00				
+0 mins.	15	238	2	255	0	0	0	0	75	127	14	216	0	0	0	0	
+15 mins.	10	248	2	260	0	0	0	0	66	123	15	204	0	0	0	0	
+30 mins.	17	231	4	252	0	0	0	0	64	130	7	201	0	0	0	0	
+45 mins.	2	262	2	266	0	0	0	0	59	143	11	213	0	0	0	0	
Total Volume	44	979	10	1033	0	0	0	0	264	523	47	834	0	0	0	0	
% App. Total	4.3	94.8	1		0	0	0		31.7	62.7	5.6		0	0	0		
PHF	.647	.934	.625	.971	.000	.000	.000	.000	.880	.914	.783	.965	.000	.000	.000	.000	
Peak Hour Analysis From 12:45 to 17:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 17:00																	
17:00	19	230	1	250	0	0	0	0	59	172	4	235	0	0	0	0	485
17:15	16	248	0	264	0	0	0	0	75	194	9	278	0	0	0	0	542
17:30	18	204	2	224	0	0	0	0	52	191	9	252	0	0	0	0	476
17:45	17	246	1	264	0	0	0	0	49	211	7	267	0	0	0	0	531
Total Volume	70	928	4	1002	0	0	0	0	235	768	29	1032	0	0	0	0	2034
% App. Total	7	92.6	0.4		0	0	0		22.8	74.4	2.8		0	0	0		
PHF	.921	.935	.500	.949	.000	.000	.000	.000	.783	.910	.806	.928	.000	.000	.000	.000	.938
Peak Hour Analysis From 12:45 to 17:45 - Peak 1 of 1																	
Peak Hour for Each Approach Begins at:																	
	16:30				12:45				17:00				12:45				
+0 mins.	15	242	1	258	0	0	0	0	59	172	4	235	0	0	0	0	
+15 mins.	21	258	2	281	0	0	0	0	75	194	9	278	0	0	0	0	
+30 mins.	19	230	1	250	0	0	0	0	52	191	9	252	0	0	0	0	
+45 mins.	16	248	0	264	0	0	0	0	49	211	7	267	0	0	0	0	
Total Volume	71	978	4	1053	0	0	0	0	235	768	29	1032	0	0	0	0	
% App. Total	6.7	92.9	0.4		0	0	0		22.8	74.4	2.8		0	0	0		
PHF	.845	.948	.500	.937	.000	.000	.000	.000	.783	.910	.806	.928	.000	.000	.000	.000	

N/S Street : North Washington Street
E/W Street: Thacher St / Valenti Way
City/State : Boston, MA
Weather : Clear

Accurate Counts
978-664-2565

File Name : 61880001
Site Code : 61880001
Start Date : 8/1/2007
Page No : 1

Groups Printed- Trucks

	N Washington St From North				Thacher St From East				N Washington St From South				Valenti Way From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00	0	21	0	0	0	0	0	0	6	11	0	0	0	0	0	0	0	38	38
07:15	0	24	0	0	0	0	0	0	7	13	1	0	0	0	0	0	0	45	45
07:30	0	32	0	0	0	0	0	0	9	14	1	0	0	0	0	0	0	56	56
07:45	0	24	2	0	0	0	0	0	8	24	0	0	0	0	0	0	0	58	58
Total	0	101	2	0	0	0	0	0	30	62	2	0	0	0	0	0	0	197	197
08:00	0	26	0	0	0	0	0	0	6	21	0	0	0	0	0	0	0	53	53
08:15	0	25	0	0	0	0	0	0	7	16	1	0	0	0	0	0	0	49	49
08:30	1	26	0	0	0	0	0	0	7	14	0	0	0	0	0	0	0	48	48
08:45	1	14	0	0	0	0	0	0	7	16	0	0	0	0	0	0	0	38	38
Total	2	91	0	0	0	0	0	0	27	67	1	0	0	0	0	0	0	188	188
09:00	0	22	0	0	0	0	0	0	5	18	2	0	0	0	0	0	0	47	47
09:15	0	22	0	0	0	0	0	0	5	18	1	0	0	0	0	0	0	46	46
09:30	0	21	0	0	0	0	0	0	7	14	0	0	0	0	0	0	0	42	42
09:45	0	13	0	0	0	0	0	0	5	16	1	0	0	0	0	0	0	35	35
Total	0	78	0	0	0	0	0	0	22	66	4	0	0	0	0	0	0	170	170
10:00	2	19	1	0	0	0	0	0	7	10	0	0	0	0	0	0	0	39	39
10:15	0	16	0	0	0	0	0	0	7	11	0	0	0	0	0	0	0	34	34
10:30	0	14	1	0	0	0	0	0	7	9	0	0	0	0	0	0	0	31	31
10:45	0	20	1	0	0	0	0	0	2	14	0	0	0	0	0	0	0	37	37
Total	2	69	3	0	0	0	0	0	23	44	0	0	0	0	0	0	0	141	141
11:00	1	16	1	0	0	0	0	0	11	21	0	0	0	0	0	0	0	50	50
11:15	0	14	0	0	0	0	0	0	5	17	0	0	0	0	0	0	0	36	36
11:30	0	16	1	0	0	0	0	0	4	13	1	0	0	0	0	0	0	35	35
11:45	1	11	0	0	0	0	0	0	2	11	0	0	0	0	0	0	0	25	25
Total	2	57	2	0	0	0	0	0	22	62	1	0	0	0	0	0	0	146	146
12:00	0	13	0	0	0	0	0	0	4	12	0	0	0	0	0	0	0	29	29
12:15	0	18	4	0	0	0	0	0	3	11	0	0	0	0	0	0	0	36	36
12:30	0	20	2	0	0	0	0	0	6	11	0	0	0	0	0	0	0	39	39
12:45	0	22	0	0	0	0	0	0	3	12	1	0	0	0	0	0	0	38	38
Total	0	73	6	0	0	0	0	0	16	46	1	0	0	0	0	0	0	142	142
13:00	0	13	0	0	0	0	0	0	7	18	1	0	0	0	0	0	0	39	39
13:15	0	11	0	0	0	0	0	0	5	14	0	0	0	0	0	0	0	30	30
13:30	4	15	1	0	0	0	0	0	5	13	0	0	0	0	0	0	0	38	38
13:45	0	17	1	0	0	0	0	0	3	13	0	0	0	0	0	0	0	34	34
Total	4	56	2	0	0	0	0	0	20	58	1	0	0	0	0	0	0	141	141
14:00	1	16	2	0	0	0	0	0	3	11	0	0	0	0	0	0	0	33	33
14:15	0	11	0	0	0	0	0	0	6	15	0	0	0	0	0	0	0	32	32
14:30	1	10	1	0	0	0	0	0	5	12	0	0	0	0	0	0	0	29	29
14:45	0	19	0	0	0	0	0	0	4	14	1	0	0	0	0	0	0	38	38
Total	2	56	3	0	0	0	0	0	18	52	1	0	0	0	0	0	0	132	132
15:00	0	16	3	0	0	0	0	0	2	16	1	0	0	0	0	0	0	38	38
15:15	0	16	0	0	0	0	0	0	2	22	0	0	0	0	0	0	0	40	40
15:30	1	23	1	0	0	0	0	0	9	17	1	0	0	0	0	0	0	52	52
15:45	1	19	1	0	0	0	0	0	4	12	0	0	0	0	0	0	0	37	37
Total	2	74	5	0	0	0	0	0	17	67	2	0	0	0	0	0	0	167	167
16:00	0	21	1	0	0	0	0	0	6	19	1	0	0	0	0	0	0	48	48
16:15	0	19	0	0	0	0	0	0	6	16	0	0	0	0	0	0	0	41	41
16:30	0	19	2	0	0	0	0	0	10	17	0	0	0	0	0	0	0	48	48
16:45	0	16	1	0	0	0	0	0	8	11	0	0	0	0	0	0	0	36	36
Total	0	75	4	0	0	0	0	0	30	63	1	0	0	0	0	0	0	173	173
17:00	0	15	1	0	0	0	0	0	9	17	0	0	0	0	0	0	0	42	42
17:15	0	16	0	0	0	0	0	0	9	16	0	0	0	0	0	0	0	41	41
17:30	0	15	0	0	0	0	0	0	4	14	0	0	0	0	0	0	0	33	33
17:45	0	12	0	0	0	0	0	0	6	14	0	0	0	0	0	0	0	32	32
Total	0	58	1	0	0	0	0	0	28	61	0	0	0	0	0	0	0	148	148
Grand Total	14	788	28	0	0	0	0	0	253	648	14	0	0	0	0	0	0	1745	1745
Apprch %	1.7	94.9	3.4		0	0	0		27.7	70.8	1.5		0	0	0				
Total %	0.8	45.2	1.6		0	0	0		14.5	37.1	0.8		0	0	0		0	100	

	N Washington St From North				Thacher St From East				N Washington St From South				Valenti Way From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 12:30 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30																	
07:30	0	32	0	32	0	0	0	0	9	14	1	24	0	0	0	0	56
07:45	0	24	2	26	0	0	0	0	8	24	0	32	0	0	0	0	58
08:00	0	26	0	26	0	0	0	0	6	21	0	27	0	0	0	0	53
08:15	0	25	0	25	0	0	0	0	7	16	1	24	0	0	0	0	49
Total Volume	0	107	2	109	0	0	0	0	30	75	2	107	0	0	0	0	216
% App. Total	0	98.2	1.8		0	0	0		28	70.1	1.9		0	0	0		
PHF	.000	.836	.250	.852	.000	.000	.000	.000	.833	.781	.500	.836	.000	.000	.000	.000	.931

Peak Hour Analysis From 07:00 to 12:30 - Peak 1 of 1																
Peak Hour for Each Approach Begins at:																
	07:30				07:00				07:30				07:00			
+0 mins.	0	32	0	32	0	0	0	0	9	14	1	24	0	0	0	0
+15 mins.	0	24	2	26	0	0	0	0	8	24	0	32	0	0	0	0
+30 mins.	0	26	0	26	0	0	0	0	6	21	0	27	0	0	0	0
+45 mins.	0	25	0	25	0	0	0	0	7	16	1	24	0	0	0	0
Total Volume	0	107	2	109	0	0	0	0	30	75	2	107	0	0	0	0
% App. Total	0	98.2	1.8		0	0	0		28	70.1	1.9		0	0	0	
PHF	.000	.836	.250	.852	.000	.000	.000	.000	.833	.781	.500	.836	.000	.000	.000	.000

Peak Hour Analysis From 12:45 to 17:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 15:30																	
15:30	1	23	1	25	0	0	0	0	9	17	1	27	0	0	0	0	52
15:45	1	19	1	21	0	0	0	0	4	12	0	16	0	0	0	0	37
16:00	0	21	1	22	0	0	0	0	6	19	1	26	0	0	0	0	48
16:15	0	19	0	19	0	0	0	0	6	16	0	22	0	0	0	0	41
Total Volume	2	82	3	87	0	0	0	0	25	64	2	91	0	0	0	0	178
% App. Total	2.3	94.3	3.4		0	0	0		27.5	70.3	2.2		0	0	0		
PHF	.500	.891	.750	.870	.000	.000	.000	.000	.694	.842	.500	.843	.000	.000	.000	.000	.856

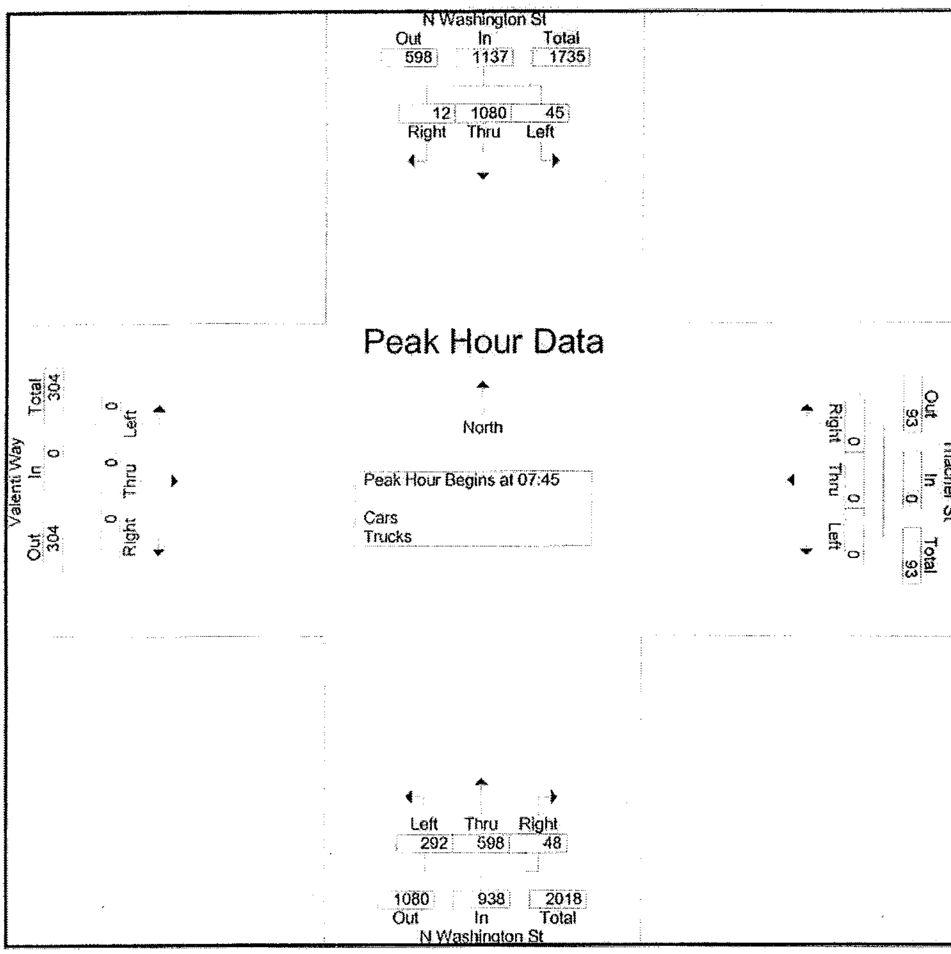
Peak Hour Analysis From 12:45 to 17:45 - Peak 1 of 1																
Peak Hour for Each Approach Begins at:																
	15:30				12:45				16:30				12:45			
+0 mins.	1	23	1	25	0	0	0	0	10	17	0	27	0	0	0	0
+15 mins.	1	19	1	21	0	0	0	0	8	11	0	19	0	0	0	0
+30 mins.	0	21	1	22	0	0	0	0	9	17	0	26	0	0	0	0
+45 mins.	0	19	0	19	0	0	0	0	9	16	0	25	0	0	0	0
Total Volume	2	82	3	87	0	0	0	0	36	61	0	97	0	0	0	0
% App. Total	2.3	94.3	3.4		0	0	0		37.1	62.9	0		0	0	0	
PHF	.500	.891	.750	.870	.000	.000	.000	.000	.900	.897	.000	.898	.000	.000	.000	.000

Accurate Counts
978-664-2565

N/S Street : North Washington Street
E/W Street: Thacher St / Valenti Way
City/State : Boston, MA
Weather : Clear

File Name : 61880001
Site Code : 61880001
Start Date : 8/1/2007
Page No : 1

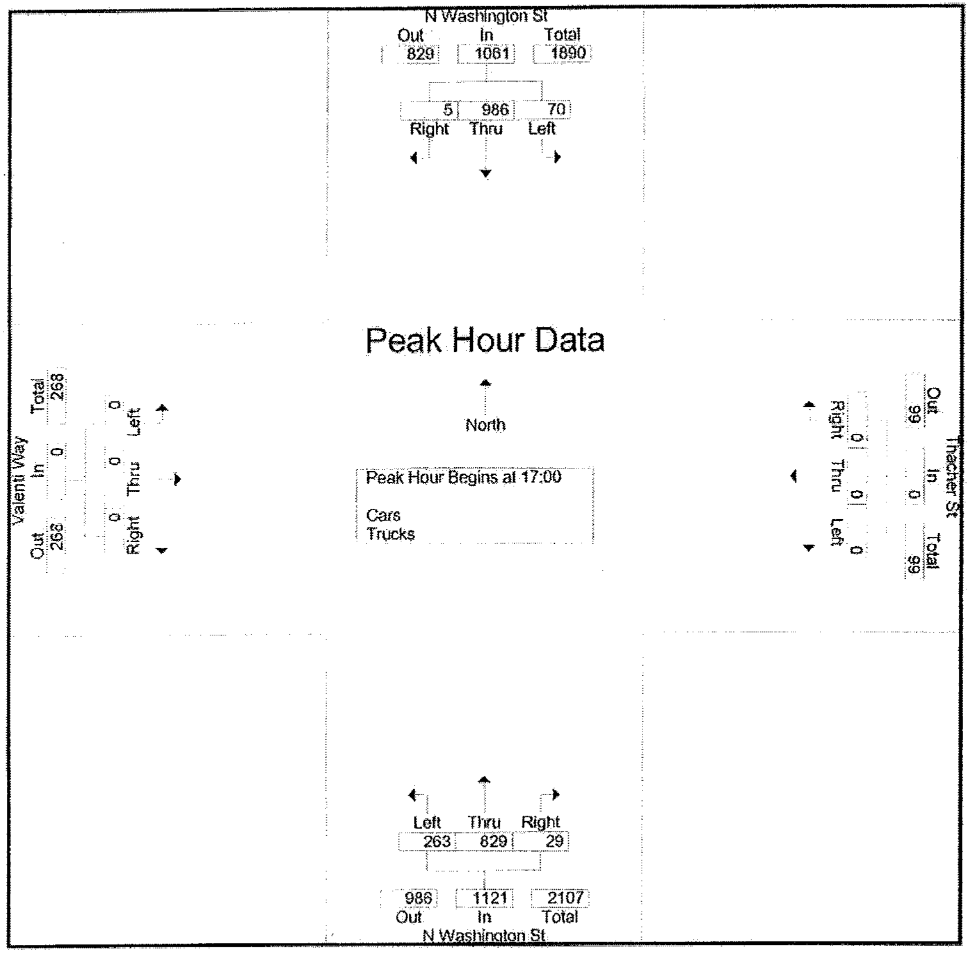
	N Washington St From North				Thacher St From East				N Washington St From South				Valenti Way From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 12:30 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45																	
07:45	15	262	4	281	0	0	0	0	83	151	14	248	0	0	0	0	529
08:00	10	274	2	286	0	0	0	0	72	144	15	231	0	0	0	0	517
08:15	17	256	4	277	0	0	0	0	71	146	8	225	0	0	0	0	502
08:30	3	288	2	293	0	0	0	0	66	157	11	234	0	0	0	0	527
Total Volume	45	1080	12	1137	0	0	0	0	292	598	48	938	0	0	0	0	2075
% App. Total	4	95	1.1		0	0	0		31.1	63.8	5.1		0	0	0		
PHF	.662	.938	.750	.970	.000	.000	.000	.000	.880	.952	.800	.946	.000	.000	.000	.000	.981



	N Washington St From North				Thacher St From East				N Washington St From South				Valenti Way From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:45 to 17:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 17:00																	
17:00	19	245	2	266	0	0	0	0	68	189	4	261	0	0	0	0	527
17:15	16	264	0	280	0	0	0	0	84	210	9	303	0	0	0	0	583
17:30	18	219	2	239	0	0	0	0	56	205	9	270	0	0	0	0	509
17:45	17	258	1	276	0	0	0	0	55	225	7	287	0	0	0	0	563
Total Volume	70	986	5	1061	0	0	0	0	263	829	29	1121	0	0	0	0	2182
% App. Total	6.6	92.9	0.5		0	0	0		23.5	74	2.6		0	0	0		
PHF	.921	.934	.625	.947	.000	.000	.000	.000	.783	.921	.806	.925	.000	.000	.000	.000	.936

Accurate Counts
978-664-2565

File Name : 61880001
Site Code : 61880001
Start Date : 8/1/2007
Page No : 2



N/S Street : North Washington Street
E/W Street: Thacher St / Valenti Way
City/State : Boston, MA
Weather : Clear

Accurate Counts
978-664-2565

File Name : 61880001
Site Code : 61880001
Start Date : 8/1/2007
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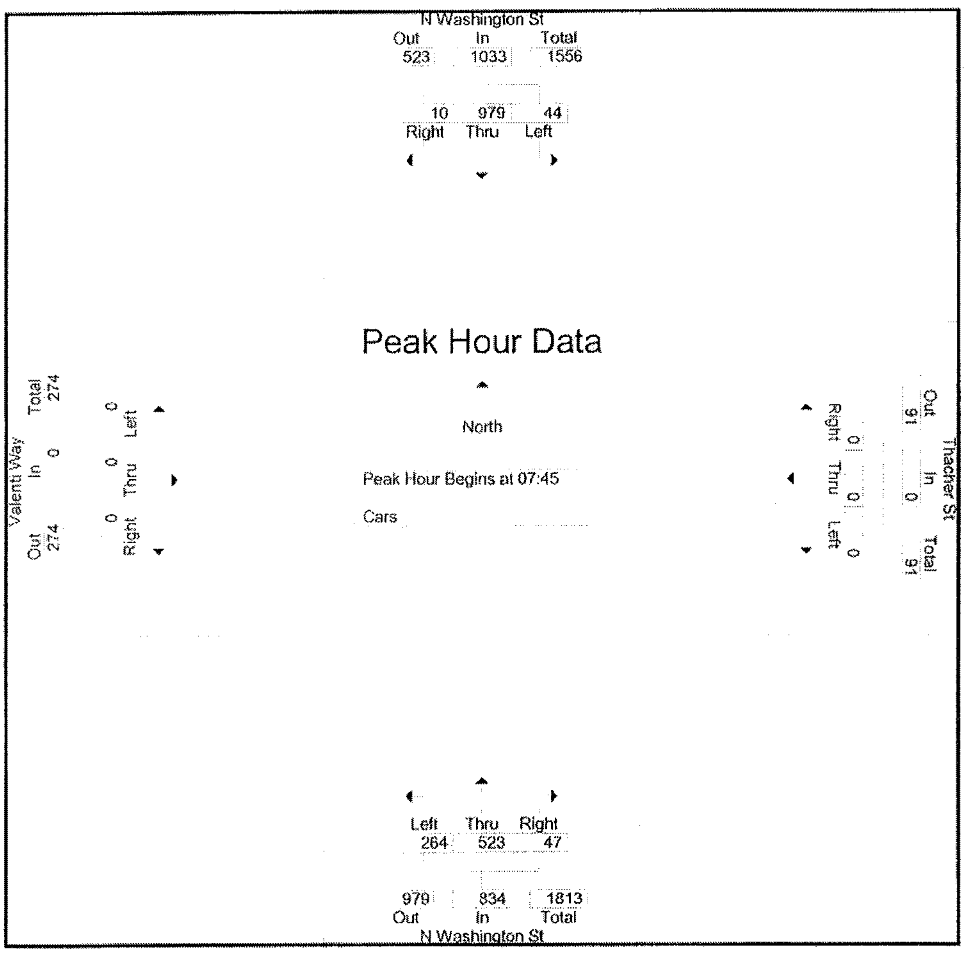
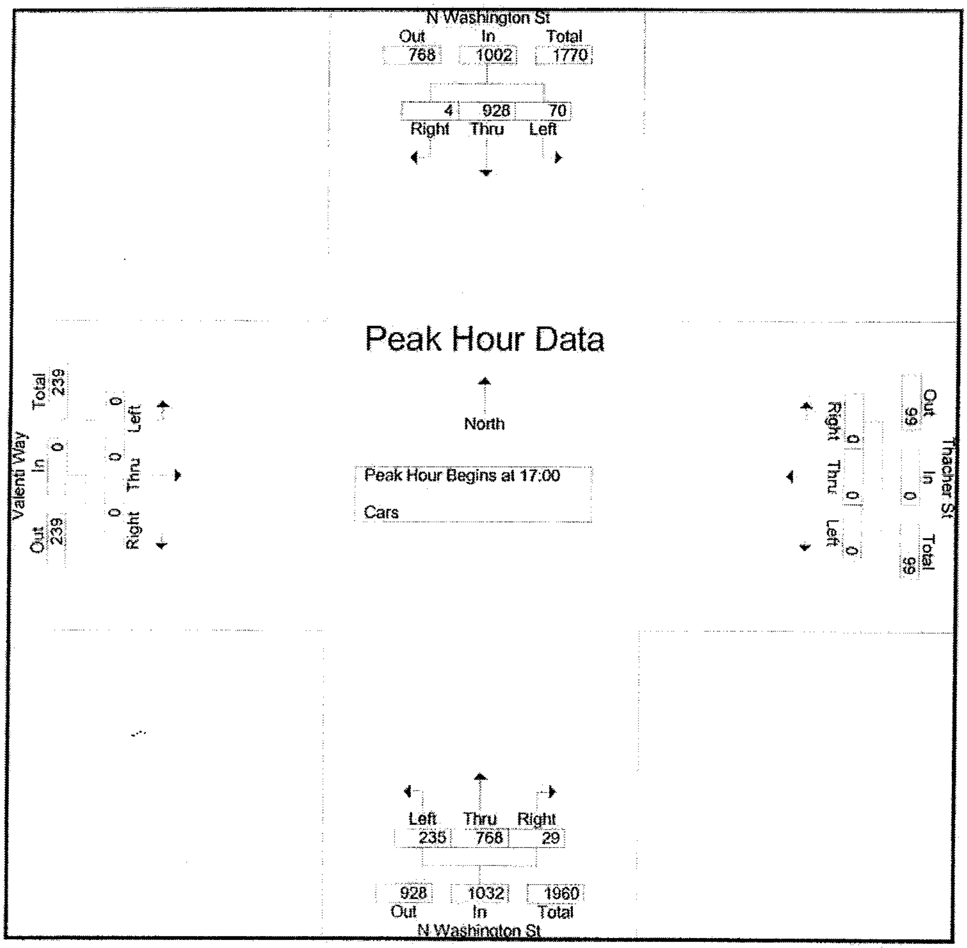
	N Washington St From North				Thacher St From East				N Washington St From South				Valenti Way From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 12:30 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45																	
07:45	15	238	2	255	0	0	0	0	75	127	14	216	0	0	0	0	471
08:00	10	248	2	260	0	0	0	0	66	123	15	204	0	0	0	0	464
08:15	17	231	4	252	0	0	0	0	64	130	7	201	0	0	0	0	453
08:30	2	262	2	266	0	0	0	0	59	143	11	213	0	0	0	0	479
Total Volume	44	979	10	1033	0	0	0	0	264	523	47	834	0	0	0	0	1867
% App. Total	4.3	94.8	1		0	0	0		31.7	62.7	5.6		0	0	0		
PHF	.647	.934	.625	.971	.000	.000	.000	.000	.880	.914	.783	.965	.000	.000	.000	.000	.974



Peak Hour Analysis From 12:45 to 17:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 17:00																	
17:00	19	230	1	250	0	0	0	0	59	172	4	235	0	0	0	0	485
17:15	16	248	0	264	0	0	0	0	75	194	9	278	0	0	0	0	542
17:30	18	204	2	224	0	0	0	0	52	191	9	252	0	0	0	0	476
17:45	17	246	1	264	0	0	0	0	49	211	7	267	0	0	0	0	531
Total Volume	70	928	4	1002	0	0	0	0	235	768	29	1032	0	0	0	0	2034
% App. Total	7	92.6	0.4		0	0	0		22.8	74.4	2.8		0	0	0		
PHF	.921	.935	.500	.949	.000	.000	.000	.000	.783	.910	.806	.928	.000	.000	.000	.000	.938

Accurate Counts
978-664-2565

File Name : 61880001
Site Code : 61880001
Start Date : 8/1/2007
Page No : 2

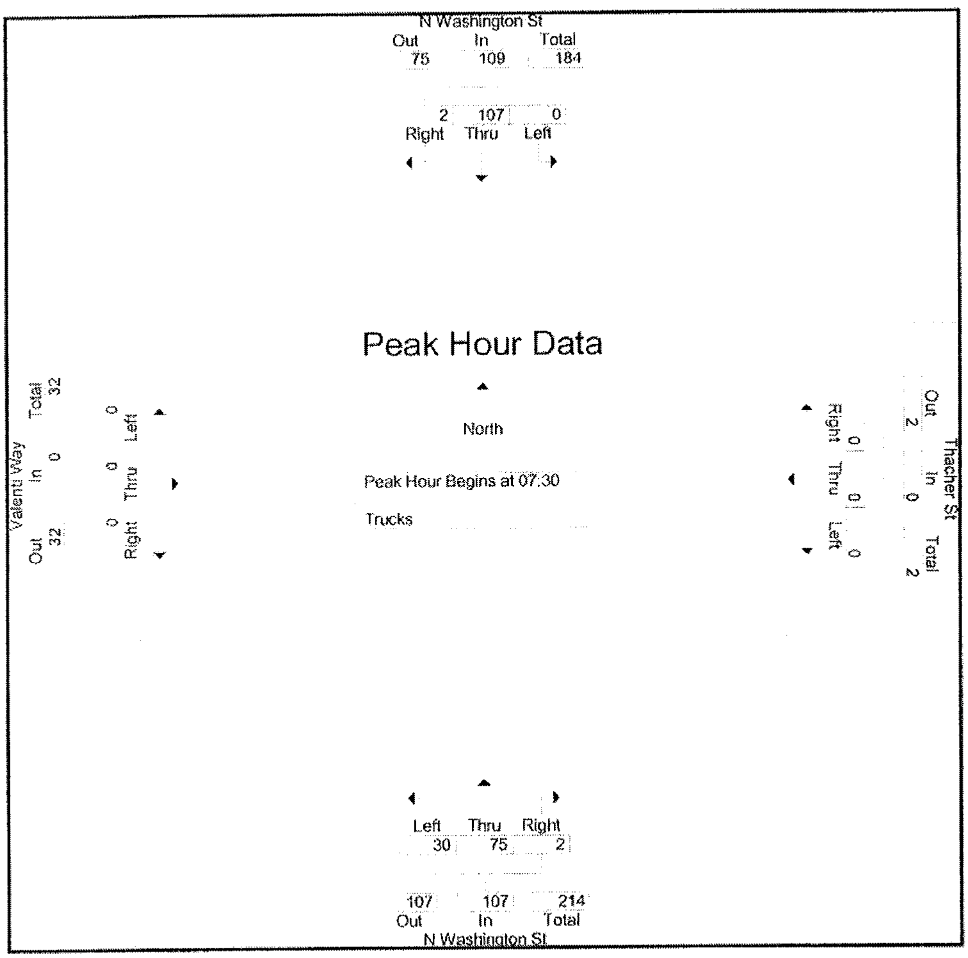


N/S Street : North Washington Street
E/W Street: Thacher St / Valenti Way
City/State : Boston, MA
Weather : Clear

Accurate Counts
978-664-2565

File Name : 61880001
Site Code : 61880001
Start Date : 8/1/2007
Page No : 1

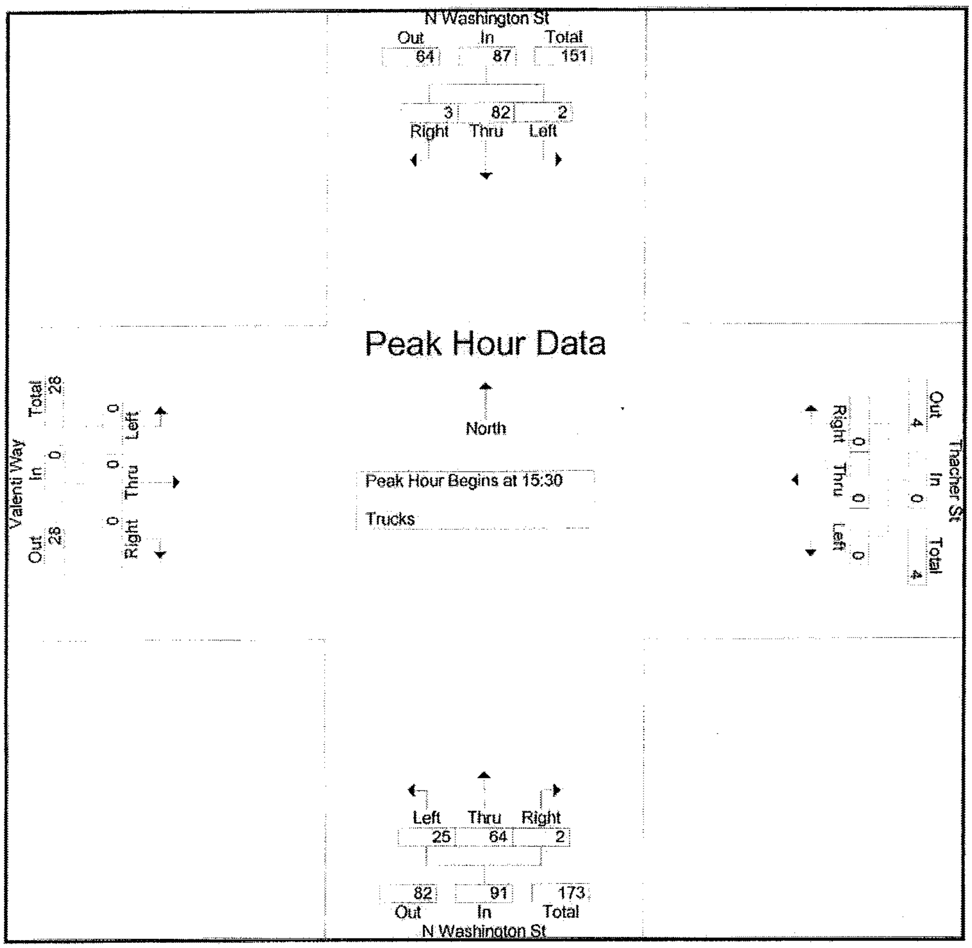
	N Washington St From North				Thacher St From East				N Washington St From South				Valenti Way From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 12:30 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30																	
07:30	0	32	0	32	0	0	0	0	9	14	1	24	0	0	0	0	56
07:45	0	24	2	26	0	0	0	0	8	24	0	32	0	0	0	0	58
08:00	0	26	0	26	0	0	0	0	6	21	0	27	0	0	0	0	53
08:15	0	25	0	25	0	0	0	0	7	16	1	24	0	0	0	0	49
Total Volume	0	107	2	109	0	0	0	0	30	75	2	107	0	0	0	0	216
% App. Total	0	98.2	1.8		0	0	0		28	70.1	1.9		0	0	0		
PHF	.000	.836	.250	.852	.000	.000	.000	.000	.833	.781	.500	.836	.000	.000	.000	.000	.931



	N Washington St From North				Thacher St From East				N Washington St From South				Valenti Way From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:45 to 17:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 15:30																	
15:30	1	23	1	25	0	0	0	0	9	17	1	27	0	0	0	0	52
15:45	1	19	1	21	0	0	0	0	4	12	0	16	0	0	0	0	37
16:00	0	21	1	22	0	0	0	0	6	19	1	26	0	0	0	0	48
16:15	0	19	0	19	0	0	0	0	6	16	0	22	0	0	0	0	41
Total Volume	2	82	3	87	0	0	0	0	25	64	2	91	0	0	0	0	178
% App. Total	2.3	94.3	3.4		0	0	0		27.5	70.3	2.2		0	0	0		
PHF	.500	.891	.750	.870	.000	.000	.000	.000	.694	.842	.500	.843	.000	.000	.000	.000	.856

Accurate Counts
978-664-2565

File Name : 61880001
Site Code : 61880001
Start Date : 8/1/2007
Page No : 2



N/S Street : North Washington Street
E/W Street: Cooper St / Surface Rd
City/State : Boston, MA
Weather : Clear

Accurate Counts
978-664-2565

File Name : 52000002
Site Code : 52000002
Start Date : 5/31/2006
Page No : 1

Groups Printed- Cars - Trucks

	North Washington St From North					Cooper St From East					Cross St From Southeast					North Washington St From South					Surface Rd From West							
Start Time	Left	Bear Left	Thru	Right	Peds	Hard Left	Left	Thru	Right	Peds	Hard Left	Bear Left	Bear Right	Hard Right	Peds	Left	Thru	Right	Hard Right	Peds	Left	Thru	Bear Right	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00	0	0	0	0	0	0	0	0	15	4	0	0	121	0	7	0	0	0	0	0	0	0	0	20	5	16	156	172
07:15	0	0	0	0	0	0	0	0	16	15	0	0	120	0	11	0	0	0	0	0	0	0	0	24	2	28	160	188
07:30	0	0	0	0	0	0	0	0	11	29	0	0	134	0	21	0	0	0	0	0	0	0	0	18	0	50	163	213
07:45	0	0	0	0	0	0	0	0	6	18	0	0	154	0	16	0	0	0	0	0	0	0	0	38	0	34	198	232
Total	0	0	0	0	0	0	0	0	48	66	0	0	529	0	55	0	0	0	0	0	0	0	0	100	7	128	677	805
08:00	0	0	0	0	0	0	0	0	22	16	0	0	153	0	19	0	0	0	0	0	0	0	0	32	2	37	207	244
08:15	0	0	0	0	0	0	0	0	22	28	0	0	181	0	22	0	0	0	0	0	0	0	0	8	1	51	211	262
08:30	0	0	0	0	0	0	0	0	10	31	0	0	162	0	23	0	0	0	0	0	0	0	0	24	0	54	196	250
08:45	0	0	0	0	0	0	0	0	20	6	0	0	173	0	18	0	0	0	0	0	0	0	0	20	0	24	213	237
Total	0	0	0	0	0	0	0	0	74	81	0	0	669	0	82	0	0	0	0	0	0	0	0	84	3	166	827	993
Grand Total	0	0	0	0	0	0	0	0	122	147	0	0	1198	0	137	0	0	0	0	0	0	0	0	184	10	294	1504	1798
Apprch %	0	0	0	0		0	0	0	100		0	0	100	0		0	0	0	0		0	0	0	100				
Total %	0	0	0	0		0	0	0	8.1		0	0	79.7	0		0	0	0	0		0	0	0	12.2		16.4	83.6	
Cars	0	0	0	0		0	0	0	121		0	0	1165	0		0	0	0	0		0	0	0	175		0	0	1755
% Cars	0	0	0	0	0	0	0	0	99.2	100	0	0	97.2	0	100	0	0	0	0	0	0	0	0	95.1	100	0	0	97.6
Trucks	0	0	0	0		0	0	0	1		0	0	33	0		0	0	0	0		0	0	0	9		0	0	43
% Trucks	0	0	0	0	0	0	0	0	0.8	0	0	0	2.8	0	0	0	0	0	0	0	0	0	0	4.9	0	0	0	2.4

	North Washington St From North					Cooper St From East					Cross St From Southeast					North Washington St From South					Surface Rd From West					
Start Time	Left	Bear Left	Thru	Right	App. Total	Hard Left	Left	Thru	Right	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	App. Total	Left	Thru	Right	Hard Right	App. Total	Left	Thru	Bear Right	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 08:00																										
08:00	0	0	0	0	0	0	0	0	22	22	0	0	153	0	153	0	0	0	0	0	0	0	0	32	32	207
08:15	0	0	0	0	0	0	0	0	22	22	0	0	181	0	181	0	0	0	0	0	0	0	0	8	8	211
08:30	0	0	0	0	0	0	0	0	10	10	0	0	162	0	162	0	0	0	0	0	0	0	0	24	24	196
08:45	0	0	0	0	0	0	0	0	20	20	0	0	173	0	173	0	0	0	0	0	0	0	0	20	20	213
Total Volume	0	0	0	0	0	0	0	0	74	74	0	0	669	0	669	0	0	0	0	0	0	0	0	84	84	827
% App. Total	0	0	0	0		0	0	0	100		0	0	100	0		0	0	0	0		0	0	0	100		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.841	.841	.000	.000	.924	.000	.924	.000	.000	.000	.000	.000	.000	.000	.000	.656	.656	.971

Accurate Counts
978-664-2565

File Name : 52000002
Site Code : 52000002
Start Date : 5/31/2006
Page No : 2

	North Washington St From North					Cooper St From East					Cross St From Southeast					North Washington St From South					Surface Rd From West					
Start Time	Left	Bear Left	Thru	Right	App. Total	Hard Left	Left	Thru	Right	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	App. Total	Left	Thru	Right	Hard Right	App. Total	Left	Thru	Bear Right	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																										
Peak Hour for Each Approach Begins at:																										
	07:00					08:00					08:00					07:00					07:15					
+0 mins.	0	0	0	0	0	0	0	0	22	22	0	0	153	0	153	0	0	0	0	0	0	0	0	24	24	
+15 mins.	0	0	0	0	0	0	0	0	22	22	0	0	181	0	181	0	0	0	0	0	0	0	0	18	18	
+30 mins.	0	0	0	0	0	0	0	0	10	10	0	0	162	0	162	0	0	0	0	0	0	0	0	38	38	
+45 mins.	0	0	0	0	0	0	0	0	20	20	0	0	173	0	173	0	0	0	0	0	0	0	0	32	32	
Total Volume	0	0	0	0	0	0	0	0	74	74	0	0	669	0	669	0	0	0	0	0	0	0	0	112	112	
% App. Total	0	0	0	0		0	0	0	100		0	0	100	0		0	0	0	0		0	0	0	100		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.841	.841	.000	.000	.924	.000	.924	.000	.000	.000	.000	.000	.000	.000	.000	.737	.737	

Accurate Counts
978-664-2565

N/S Street : North Washington Street
E/W Street: Cooper St / Surface Rd
City/State : Boston, MA
Weather : Clear

File Name : 52000002
Site Code : 52000002
Start Date : 5/31/2006
Page No : 1

Groups Printed- Cars

	North Washington St From North					Cooper St From East					Cross St From Southeast					North Washington St From South					Surface Rd From West							
Start Time	Left	Bear Left	Thru	Right	Peds	Hard Left	Left	Thru	Right	Peds	Hard Left	Bear Left	Bear Right	Hard Right	Peds	Left	Thru	Right	Hard Right	Peds	Left	Thru	Bear Right	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00	0	0	0	0	0	0	0	0	15	4	0	0	121	0	7	0	0	0	0	0	0	0	0	20	5	16	156	172
07:15	0	0	0	0	0	0	0	0	16	15	0	0	115	0	11	0	0	0	0	0	0	0	0	24	2	28	155	183
07:30	0	0	0	0	0	0	0	0	11	29	0	0	130	0	21	0	0	0	0	0	0	0	0	17	0	50	158	208
07:45	0	0	0	0	0	0	0	0	6	18	0	0	150	0	16	0	0	0	0	0	0	0	0	36	0	34	192	226
Total	0	0	0	0	0	0	0	0	48	66	0	0	516	0	55	0	0	0	0	0	0	0	0	97	7	128	661	789
08:00	0	0	0	0	0	0	0	0	22	16	0	0	150	0	19	0	0	0	0	0	0	0	0	31	2	37	203	240
08:15	0	0	0	0	0	0	0	0	22	28	0	0	175	0	22	0	0	0	0	0	0	0	0	8	1	51	205	256
08:30	0	0	0	0	0	0	0	0	10	31	0	0	158	0	23	0	0	0	0	0	0	0	0	20	0	54	188	242
08:45	0	0	0	0	0	0	0	0	19	6	0	0	166	0	18	0	0	0	0	0	0	0	0	19	0	24	204	228
Total	0	0	0	0	0	0	0	0	73	81	0	0	649	0	82	0	0	0	0	0	0	0	0	78	3	166	800	966
Grand Total	0	0	0	0	0	0	0	0	121	147	0	0	1165	0	137	0	0	0	0	0	0	0	0	175	10	294	1461	1755
Apprch %	0	0	0	0		0	0	0	100		0	0	100	0		0	0	0	0		0	0	0	100				
Total %	0	0	0	0		0	0	0	8.3		0	0	79.7	0		0	0	0	0		0	0	0	12		16.8	83.2	

	North Washington St From North					Cooper St From East					Cross St From Southeast					North Washington St From South					Surface Rd From West					
Start Time	Left	Bear Left	Thru	Right	App. Total	Hard Left	Left	Thru	Right	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	App. Total	Left	Thru	Right	Hard Right	App. Total	Left	Thru	Bear Right	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 08:00																										
08:00	0	0	0	0	0	0	0	0	22	22	0	0	150	0	150	0	0	0	0	0	0	0	0	31	31	203
08:15	0	0	0	0	0	0	0	0	22	22	0	0	175	0	175	0	0	0	0	0	0	0	0	8	8	205
08:30	0	0	0	0	0	0	0	0	10	10	0	0	158	0	158	0	0	0	0	0	0	0	0	20	20	188
08:45	0	0	0	0	0	0	0	0	19	19	0	0	166	0	166	0	0	0	0	0	0	0	0	19	19	204
Total Volume	0	0	0	0	0	0	0	0	73	73	0	0	649	0	649	0	0	0	0	0	0	0	0	78	78	800
% App. Total	0	0	0	0		0	0	0	100		0	0	100	0		0	0	0	0		0	0	0	100		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.830	.830	.000	.000	.927	.000	.927	.000	.000	.000	.000	.000	.000	.000	.000	.629	.629	.976
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																										
Peak Hour for Each Approach Begins at:																										
	07:00					08:00					08:00					07:00					07:15					
+0 mins.	0	0	0	0	0	0	0	0	22	22	0	0	150	0	150	0	0	0	0	0	0	0	0	24	24	
+15 mins.	0	0	0	0	0	0	0	0	22	22	0	0	175	0	175	0	0	0	0	0	0	0	0	17	17	
+30 mins.	0	0	0	0	0	0	0	0	10	10	0	0	158	0	158	0	0	0	0	0	0	0	0	36	36	
+45 mins.	0	0	0	0	0	0	0	0	19	19	0	0	166	0	166	0	0	0	0	0	0	0	0	31	31	

Volume																					
% App. Total	0	0	0	0		0	0	0	100		0	0	100	0		0	0	0	0		0	0	0	100	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.830	.830	.000	.000	.927	.000	.927	.000	.000	.000	.000	.000	.000	.000	.000	.750	.750

Accurate Counts
978-664-2565

N/S Street : North Washington Street
E/W Street: Cooper St / Surface Rd
City/State : Boston, MA
Weather : Clear

File Name : 52000002
Site Code : 52000002
Start Date : 5/31/2006
Page No : 1

Groups Printed- Trucks

	North Washington St From North					Cooper St From East					Cross St From Southeast					North Washington St From South					Surface Rd From West							
Start Time	Left	Bear Left	Thru	Right	Peds	Hard Left	Left	Thru	Right	Peds	Hard Left	Bear Left	Bear Right	Hard Right	Peds	Left	Thru	Right	Hard Right	Peds	Left	Thru	Bear Right	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00	0	0	0	0	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	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5
07:30	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	5	5
07:45	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	2	0	0	6	6
Total	0	0	0	0	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0	0	0	0	0	3	0	0	16	16
08:00	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	1	0	0	4	4
08:15	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	6	6
08:30	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	4	0	0	8	8
08:45	0	0	0	0	0	0	0	0	1	0	0	0	7	0	0	0	0	0	0	0	0	0	0	1	0	0	9	9
Total	0	0	0	0	0	0	0	0	1	0	0	0	20	0	0	0	0	0	0	0	0	0	0	6	0	0	27	27
Grand Total	0	0	0	0	0	0	0	0	1	0	0	0	33	0	0	0	0	0	0	0	0	0	0	9	0	0	43	43
Apprch %	0	0	0	0		0	0	0	100		0	0	100	0		0	0	0	0		0	0	0	100				
Total %	0	0	0	0		0	0	0	2.3		0	0	76.7	0		0	0	0	0		0	0	0	20.9		0	100	

	North Washington St From North					Cooper St From East					Cross St From Southeast					North Washington St From South					Surface Rd From West					
Start Time	Left	Bear Left	Thru	Right	App. Total	Hard Left	Left	Thru	Right	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	App. Total	Left	Thru	Right	Hard Right	App. Total	Left	Thru	Bear Right	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 08:00																										
08:00	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0	0	0	1	1	4
08:15	0	0	0	0	0	0	0	0	0	0	0	0	6	0	6	0	0	0	0	0	0	0	0	0	0	6
08:30	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	4	4	8
08:45	0	0	0	0	0	0	0	0	1	1	0	0	7	0	7	0	0	0	0	0	0	0	0	1	1	9
Total Volume	0	0	0	0	0	0	0	0	1	1	0	0	20	0	20	0	0	0	0	0	0	0	0	6	6	27
% App. Total	0	0	0	0		0	0	0	100		0	0	100	0		0	0	0	0		0	0	0	100		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.250	.250	.000	.000	.714	.000	.714	.000	.000	.000	.000	.000	.000	.000	.000	.375	.375	.750

Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:00					08:00					08:00					07:00					07:45				
+0 mins.	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0	0	0	2	2
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	6	0	6	0	0	0	0	0	0	0	0	1	1
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0
+45 mins.	0	0	0	0	0	0	0	0	1	1	0	0	7	0	7	0	0	0	0	0	0	0	0	4	4

Volume																									
% App. Total	0	0	0	0		0	0	0	100		0	0	100	0		0	0	0	0		0	0	0	100	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.250	.250	.000	.000	.714	.000	.714	.000	.000	.000	.000	.000	.000	.000	.000	.438	.438

Accurate Counts
978-664-2565

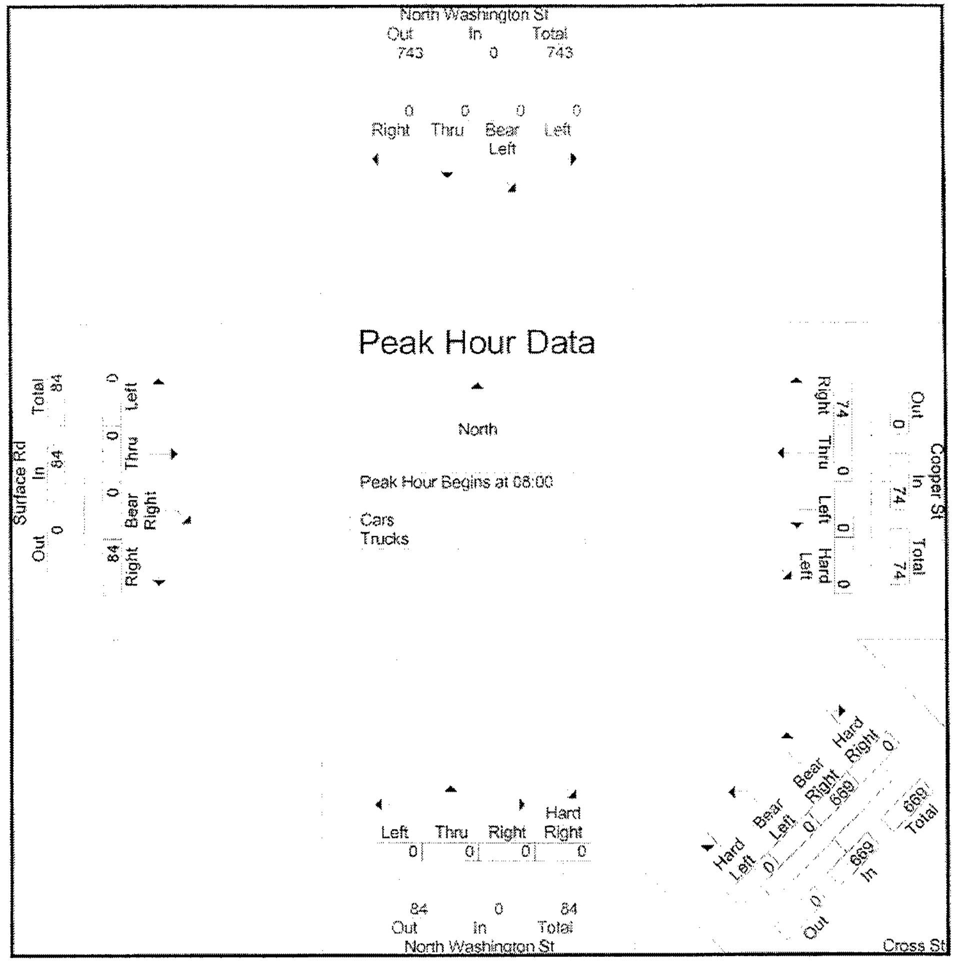
N/S Street : North Washington Street
E/W Street: Cooper St / Surface Rd
City/State : Boston, MA
Weather : Clear

File Name : 52000002
Site Code : 52000002
Start Date : 5/31/2006
Page No : 1

	North Washington St From North					Cooper St From East					Cross St From Southeast					North Washington St From South					Surface Rd From West					
Start Time	Left	Bear Left	Thru	Right	App. Total	Hard Left	Left	Thru	Right	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	App. Total	Left	Thru	Right	Hard Right	App. Total	Left	Thru	Bear Right	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 08:00																										
08:00	0	0	0	0	0	0	0	0	22	22	0	0	153	0	153	0	0	0	0	0	0	0	0	32	32	207
08:15	0	0	0	0	0	0	0	0	22	22	0	0	181	0	181	0	0	0	0	0	0	0	0	8	8	211
08:30	0	0	0	0	0	0	0	0	10	10	0	0	162	0	162	0	0	0	0	0	0	0	0	24	24	196
08:45	0	0	0	0	0	0	0	0	20	20	0	0	173	0	173	0	0	0	0	0	0	0	0	20	20	213
Total Volume	0	0	0	0	0	0	0	0	74	74	0	0	669	0	669	0	0	0	0	0	0	0	0	84	84	827
% App. Total	0	0	0	0		0	0	0	100		0	0	100	0		0	0	0	0		0	0	0	100		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.841	.841	.000	.000	.924	.000	.924	.000	.000	.000	.000	.000	.000	.000	.000	.656	.656	.971

Accurate Counts
978-664-2565

File Name : 52000002
Site Code : 52000002
Start Date : 5/31/2006
Page No : 2



N/S Street : North Washington Street
E/W Street: Cooper St / Surface Rd
City/State : Boston, MA
Weather : Clear

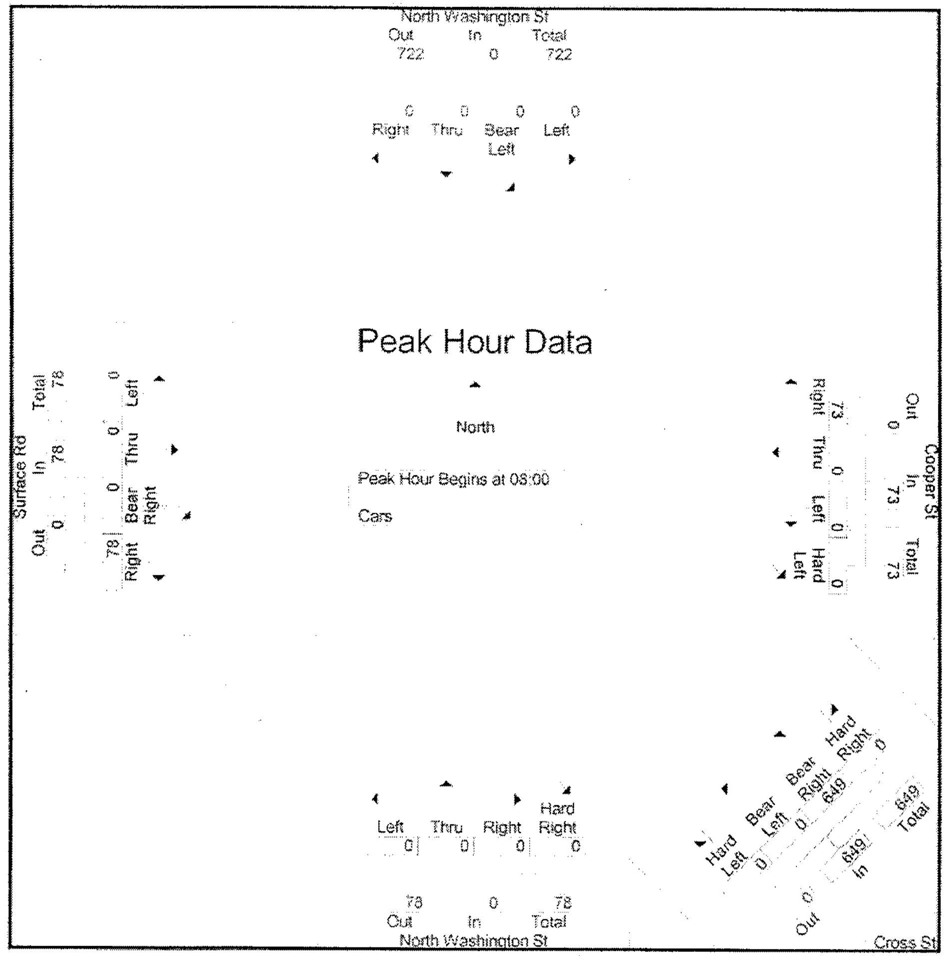
Accurate Counts
978-664-2565

File Name : 52000002
Site Code : 52000002
Start Date : 5/31/2006
Page No : 1

	North Washington St From North					Cooper St From East					Cross St From Southeast					North Washington St From South					Surface Rd From West					
Start Time	Left	Bear Left	Thru	Right	App. Total	Hard Left	Left	Thru	Right	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	App. Total	Left	Thru	Right	Hard Right	App. Total	Left	Thru	Bear Right	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 08:00																										
08:00	0	0	0	0	0	0	0	0	22	22	0	0	150	0	150	0	0	0	0	0	0	0	0	31	31	203
08:15	0	0	0	0	0	0	0	0	22	22	0	0	175	0	175	0	0	0	0	0	0	0	0	8	8	205
08:30	0	0	0	0	0	0	0	0	10	10	0	0	158	0	158	0	0	0	0	0	0	0	0	20	20	188
08:45	0	0	0	0	0	0	0	0	19	19	0	0	166	0	166	0	0	0	0	0	0	0	0	19	19	204
Total Volume	0	0	0	0	0	0	0	0	73	73	0	0	649	0	649	0	0	0	0	0	0	0	0	78	78	800
% App. Total	0	0	0	0		0	0	0	100		0	0	100	0		0	0	0	0		0	0	0	100		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.830	.830	.000	.000	.927	.000	.927	.000	.000	.000	.000	.000	.000	.000	.000	.629	.629	.976

Accurate Counts
978-664-2565

File Name : 52000002
Site Code : 52000002
Start Date : 5/31/2006
Page No : 2



Accurate Counts
978-664-2565

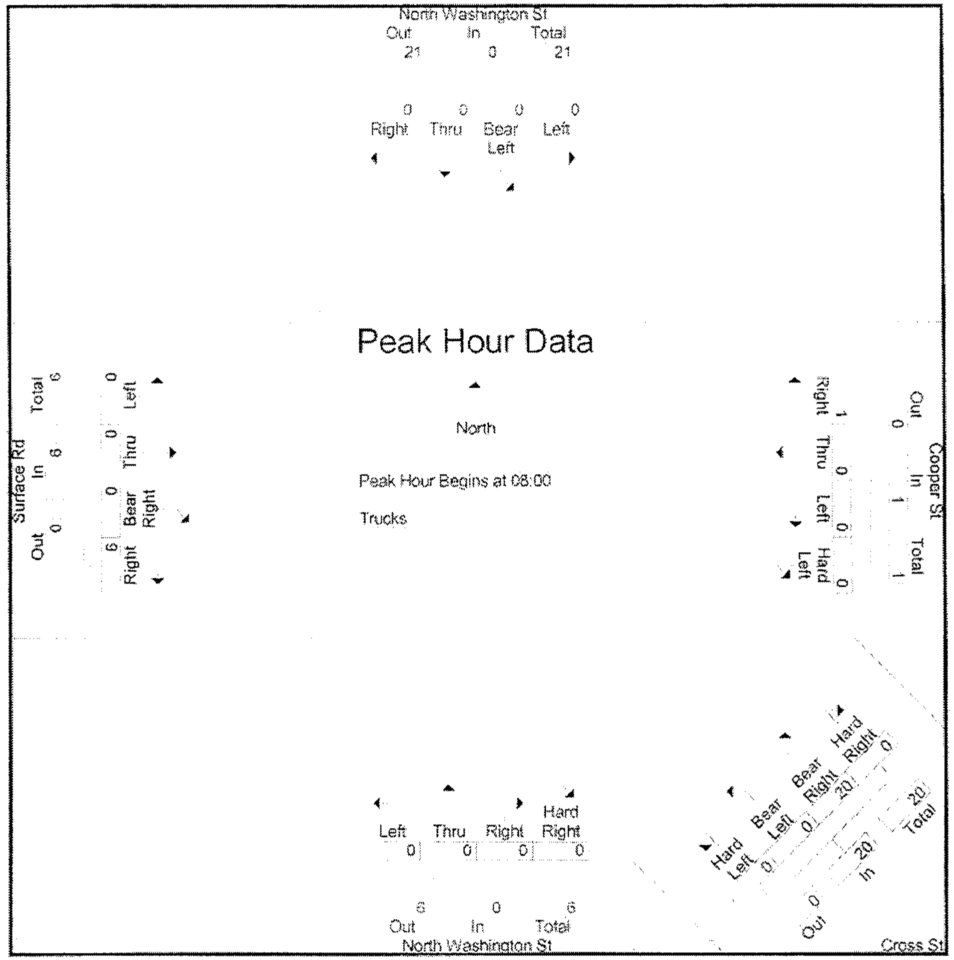
N/S Street : North Washington Street
E/W Street: Cooper St / Surface Rd
City/State : Boston, MA
Weather : Clear

File Name : 52000002
Site Code : 52000002
Start Date : 5/31/2006
Page No : 1

	North Washington St From North					Cooper St From East					Cross St From Southeast					North Washington St From South					Surface Rd From West					
Start Time	Left	Bear Left	Thru	Right	App. Total	Hard Left	Left	Thru	Right	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	App. Total	Left	Thru	Right	Hard Right	App. Total	Left	Thru	Bear Right	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 08:00																										
08:00	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0	0	0	1	1	4
08:15	0	0	0	0	0	0	0	0	0	0	0	0	6	0	6	0	0	0	0	0	0	0	0	0	0	6
08:30	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	4	4	8
08:45	0	0	0	0	0	0	0	0	1	1	0	0	7	0	7	0	0	0	0	0	0	0	0	1	1	9
Total Volume	0	0	0	0	0	0	0	0	1	1	0	0	20	0	20	0	0	0	0	0	0	0	0	6	6	27
% App. Total	0	0	0	0		0	0	0	100		0	0	100	0		0	0	0	0		0	0	0	100		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.250	.250	.000	.000	.714	.000	.714	.000	.000	.000	.000	.000	.000	.000	.000	.375	.375	.750

Accurate Counts
978-664-2565

File Name : 52000002
Site Code : 52000002
Start Date : 5/31/2006
Page No : 2



Accurate Counts
978-664-2565

N/S Street : North Washington Street
E/W Street: Cooper St / Surface Rd
City/State : Boston, MA
Weather : Clear

File Name : 52000002
Site Code : 52000002
Start Date : 5/31/2006
Page No : 1

Groups Printed- Cars - Trucks

	North Washington St From North					Cooper St From East					Cross St From Southeast					North Washington St From South					Surface Rd From West							
Start Time	Left	Bear Left	Thru	Right	Peds	Hard Left	Left	Thru	Right	Peds	Hard Left	Bear Left	Bear Right	Hard Right	Peds	Left	Thru	Right	Hard Right	Peds	Left	Thru	Bear Right	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
16:00	0	0	0	0	0	0	0	0	15	27	0	0	180	0	19	0	0	0	0	0	0	0	0	20	0	46	215	261
16:15	0	0	0	0	0	0	0	0	26	27	0	0	155	0	23	0	0	0	0	0	0	0	0	23	1	51	204	255
16:30	0	0	0	0	0	0	0	0	18	21	0	0	178	0	15	0	0	0	0	0	0	0	0	30	1	37	226	263
16:45	0	0	0	0	0	0	0	0	14	25	0	0	190	0	19	0	0	0	0	0	0	0	0	26	4	48	230	278
Total	0	0	0	0	0	0	0	0	73	100	0	0	703	0	76	0	0	0	0	0	0	0	0	99	6	182	875	1057
17:00	0	0	0	0	0	0	0	0	7	39	0	0	220	0	34	0	0	0	0	0	0	0	0	19	0	73	246	319
17:15	0	0	0	0	0	0	0	0	19	27	0	0	190	0	31	0	0	0	0	0	0	0	0	21	0	58	230	288
17:30	0	0	0	0	0	0	0	0	11	30	0	0	178	0	21	0	0	0	0	0	0	0	0	6	0	51	195	246
17:45	0	0	0	0	0	0	0	0	25	30	0	0	182	0	21	0	0	0	0	0	0	0	0	0	0	51	207	258
Total	0	0	0	0	0	0	0	0	62	126	0	0	770	0	107	0	0	0	0	0	0	0	0	46	0	233	878	1111
Grand Total	0	0	0	0	0	0	0	0	135	226	0	0	1473	0	183	0	0	0	0	0	0	0	0	145	6	415	1753	2168
Apprch %	0	0	0	0		0	0	0	100		0	0	100	0		0	0	0	0		0	0	0	100				
Total %	0	0	0	0		0	0	0	7.7		0	0	84	0		0	0	0	0		0	0	0	8.3		19.1	80.9	
Cars	0	0	0	0		0	0	0	135		0	0	1457	0		0	0	0	0		0	0	0	142		0	0	2149
% Cars	0	0	0	0	0	0	0	0	100	100	0	0	98.9	0	100	0	0	0	0	0	0	0	0	97.9	100	0	0	99.1
Trucks	0	0	0	0		0	0	0	0		0	0	16	0		0	0	0	0		0	0	0	3		0	0	19
% Trucks	0	0	0	0	0	0	0	0	0	0	0	0	1.1	0	0	0	0	0	0	0	0	0	0	2.1	0	0	0	0.9

	North Washington St From North					Cooper St From East					Cross St From Southeast					North Washington St From South					Surface Rd From West					
Start Time	Left	Bear Left	Thru	Right	App. Total	Hard Left	Left	Thru	Right	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	App. Total	Left	Thru	Right	Hard Right	App. Total	Left	Thru	Bear Right	Right	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 16:30																										
16:30	0	0	0	0	0	0	0	0	18	18	0	0	178	0	178	0	0	0	0	0	0	0	0	30	30	226
16:45	0	0	0	0	0	0	0	0	14	14	0	0	190	0	190	0	0	0	0	0	0	0	0	26	26	230
17:00	0	0	0	0	0	0	0	0	7	7	0	0	220	0	220	0	0	0	0	0	0	0	0	19	19	246
17:15	0	0	0	0	0	0	0	0	19	19	0	0	190	0	190	0	0	0	0	0	0	0	0	21	21	230
Total Volume	0	0	0	0	0	0	0	0	58	58	0	0	778	0	778	0	0	0	0	0	0	0	0	96	96	932
% App. Total	0	0	0	0		0	0	0	100		0	0	100	0		0	0	0	0		0	0	0	100		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.763	.763	.000	.000	.884	.000	.884	.000	.000	.000	.000	.000	.000	.000	.000	.800	.800	.947

Accurate Counts
978-664-2565

File Name : 52000002
Site Code : 52000002
Start Date : 5/31/2006
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	North Washington St From North					Cooper St From East					Cross St From Southeast					North Washington St From South					Surface Rd From West					
Start Time	Left	Bear Left	Thru	Righ t	App. Total	Hard Left	Left	Thru	Righ t	App. Total	Hard Left	Bear Left	Bear Rig ht	Hard Rig ht	App. Total	Left	Thru	Righ t	Hard Rig ht	App. Total	Left	Thru	Bear Rig ht	Righ t	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																										
Peak Hour for Each Approach Begins at:																										
	16:00					16:00					16:30					16:00					16:00					
+0 mins.	0	0	0	0	0	0	0	0	15	15	0	0	178	0	178	0	0	0	0	0	0	0	0	20	20	
+15 mins.	0	0	0	0	0	0	0	0	26	26	0	0	190	0	190	0	0	0	0	0	0	0	0	23	23	
+30 mins.	0	0	0	0	0	0	0	0	18	18	0	0	220	0	220	0	0	0	0	0	0	0	0	30	30	
+45 mins.	0	0	0	0	0	0	0	0	14	14	0	0	190	0	190	0	0	0	0	0	0	0	0	26	26	
Total Volume	0	0	0	0	0	0	0	0	73	73	0	0	778	0	778	0	0	0	0	0	0	0	0	99	99	
% App. Total	0	0	0	0		0	0	0	100		0	0	100	0		0	0	0	0		0	0	0	100		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.702	.702	.000	.000	.884	.000	.884	.000	.000	.000	.000	.000	.000	.000	.000	.825	.825	

N/S Street : North Washington Street
E/W Street: Cooper St / Surface Rd
City/State : Boston, MA
Weather : Clear

Accurate Counts
978-664-2565

File Name : 52000002
Site Code : 52000002
Start Date : 5/31/2006
Page No : 1

Groups Printed- Cars

	North Washington St From North					Cooper St From East					Cross St From Southeast					North Washington St From South					Surface Rd From West							
Start Time	Left	Bear Left	Thru	Right	Peds	Hard Left	Left	Thru	Right	Peds	Hard Left	Bear Left	Bear Right	Hard Right	Peds	Left	Thru	Right	Hard Right	Peds	Left	Thru	Bear Right	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
16:00	0	0	0	0	0	0	0	0	15	27	0	0	178	0	19	0	0	0	0	0	0	0	0	19	0	46	212	258
16:15	0	0	0	0	0	0	0	0	26	27	0	0	154	0	23	0	0	0	0	0	0	0	0	23	1	51	203	254
16:30	0	0	0	0	0	0	0	0	18	21	0	0	175	0	15	0	0	0	0	0	0	0	0	30	1	37	223	260
16:45	0	0	0	0	0	0	0	0	14	25	0	0	190	0	19	0	0	0	0	0	0	0	0	26	4	48	230	278
Total	0	0	0	0	0	0	0	0	73	100	0	0	697	0	76	0	0	0	0	0	0	0	0	98	6	182	868	1050
17:00	0	0	0	0	0	0	0	0	7	39	0	0	216	0	34	0	0	0	0	0	0	0	0	19	0	73	242	315
17:15	0	0	0	0	0	0	0	0	19	27	0	0	189	0	31	0	0	0	0	0	0	0	0	20	0	58	228	286
17:30	0	0	0	0	0	0	0	0	11	30	0	0	174	0	21	0	0	0	0	0	0	0	0	5	0	51	190	241
17:45	0	0	0	0	0	0	0	0	25	30	0	0	181	0	21	0	0	0	0	0	0	0	0	0	0	51	206	257
Total	0	0	0	0	0	0	0	0	62	126	0	0	760	0	107	0	0	0	0	0	0	0	0	44	0	233	866	1099
Grand Total	0	0	0	0	0	0	0	0	135	226	0	0	1457	0	183	0	0	0	0	0	0	0	0	142	6	415	1734	2149
Apprch %	0	0	0	0		0	0	0	100		0	0	100	0		0	0	0	0		0	0	0	100				
Total %	0	0	0	0		0	0	0	7.8		0	0	84	0		0	0	0	0		0	0	0	8.2		19.3	80.7	

Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 16:30

	North Washington St From North					Cooper St From East					Cross St From Southeast					North Washington St From South					Surface Rd From West					
Start Time	Left	Bear Left	Thru	Right	App. Total	Hard Left	Left	Thru	Right	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	App. Total	Left	Thru	Right	Hard Right	App. Total	Left	Thru	Bear Right	Right	App. Total	Int. Total
16:30	0	0	0	0	0	0	0	0	18	18	0	0	175	0	175	0	0	0	0	0	0	0	0	30	30	223
16:45	0	0	0	0	0	0	0	0	14	14	0	0	190	0	190	0	0	0	0	0	0	0	0	26	26	230
17:00	0	0	0	0	0	0	0	0	7	7	0	0	216	0	216	0	0	0	0	0	0	0	0	19	19	242
17:15	0	0	0	0	0	0	0	0	19	19	0	0	189	0	189	0	0	0	0	0	0	0	0	20	20	228
Total Volume	0	0	0	0	0	0	0	0	58	58	0	0	770	0	770	0	0	0	0	0	0	0	0	95	95	923
% App. Total	0	0	0	0		0	0	0	100		0	0	100	0		0	0	0	0		0	0	0	100		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.763	.763	.000	.000	.891	.000	.891	.000	.000	.000	.000	.000	.000	.000	.000	.792	.792	.954

Accurate Counts
978-664-2565

File Name : 52000002
Site Code : 52000002
Start Date : 5/31/2006
Page No : 2

	North Washington St From North					Cooper St From East					Cross St From Southeast					North Washington St From South					Surface Rd From West					
Start Time	Left	Bear Left	Thru	Right	App. Total	Hard Left	Left	Thru	Right	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	App. Total	Left	Thru	Right	Hard Right	App. Total	Left	Thru	Bear Right	Right	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																										
Peak Hour for Each Approach Begins at:																										
	16:00					16:00					16:30					16:00					16:00					
+0 mins.	0	0	0	0	0	0	0	0	15	15	0	0	175	0	175	0	0	0	0	0	0	0	0	19	19	
+15 mins.	0	0	0	0	0	0	0	0	26	26	0	0	190	0	190	0	0	0	0	0	0	0	0	23	23	
+30 mins.	0	0	0	0	0	0	0	0	18	18	0	0	216	0	216	0	0	0	0	0	0	0	0	30	30	
+45 mins.	0	0	0	0	0	0	0	0	14	14	0	0	189	0	189	0	0	0	0	0	0	0	0	26	26	
Total Volume	0	0	0	0	0	0	0	0	73	73	0	0	770	0	770	0	0	0	0	0	0	0	0	98	98	
% App. Total	0	0	0	0		0	0	0	100		0	0	100	0		0	0	0	0		0	0	0	100		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.702	.702	.000	.000	.891	.000	.891	.000	.000	.000	.000	.000	.000	.000	.000	.817	.817	

Accurate Counts
978-664-2565

N/S Street : North Washington Street
E/W Street: Cooper St / Surface Rd
City/State : Boston, MA
Weather : Clear

File Name : 52000002
Site Code : 52000002
Start Date : 5/31/2006
Page No : 1

Groups Printed- Trucks

	North Washington St From North					Cooper St From East					Cross St From Southeast					North Washington St From South					Surface Rd From West							
Start Time	Left	Bear Left	Thru	Right	Peds	Hard Left	Left	Thru	Right	Peds	Hard Left	Bear Left	Bear Right	Hard Right	Peds	Left	Thru	Right	Hard Right	Peds	Left	Thru	Bear Right	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
16:00	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	0	0	3	3
16:15	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	1	1
16:30	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3
16:45	0	0	0	0	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	6	0	0	0	0	0	0	0	0	0	0	1	0	0	7	7
17:00	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	4	4
17:15	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	2	2
17:30	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	5	5
17:45	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	1	1
Total	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	2	0	0	12	12
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	3	0	0	19	19
Apprch %	0	0	0	0		0	0	0	0		0	0	100	0		0	0	0	0		0	0	0	100				
Total %	0	0	0	0		0	0	0	0		0	0	84.2	0		0	0	0	0		0	0	0	15.8		0	100	

	North Washington St From North					Cooper St From East					Cross St From Southeast					North Washington St From South					Surface Rd From West					
Start Time	Left	Bear Left	Thru	Right	App. Total	Hard Left	Left	Thru	Right	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	App. Total	Left	Thru	Right	Hard Right	App. Total	Left	Thru	Bear Right	Right	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 17:00																										
17:00	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	4
17:15	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	1	2
17:30	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	1	1	5
17:45	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	10	0	10	0	0	0	0	0	0	0	0	2	2	12
% App. Total	0	0	0	0		0	0	0	0		0	0	100	0		0	0	0	0		0	0	0	100		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.625	.000	.625	.000	.000	.000	.000	.000	.000	.000	.000	.500	.500	.600

Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	16:00					16:00					17:00					16:00					16:45				
+0 mins.	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	1	1
+45 mins.	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	1

Volume																									
% App. Total	0	0	0	0		0	0	0	0		0	0	100	0		0	0	0	0		0	0	0	100	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	625	.000	.625	.000	.000	.000	.000	.000	.000	.000	.000	.500	.500

Accurate Counts
978-664-2565

N/S Street : North Washington Street
E/W Street: Cooper St / Surface Rd
City/State : Boston, MA
Weather : Clear

File Name : 52000002
Site Code : 52000002
Start Date : 5/31/2006
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	North Washington St From North					Cooper St From East					Cross St From Southeast					North Washington St From South					Surface Rd From West					
Start Time	Left	Bear Left	Thru	Right	App. Total	Hard Left	Left	Thru	Right	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	App. Total	Left	Thru	Right	Hard Right	App. Total	Left	Thru	Bear Right	Right	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 16:30																										
16:30	0	0	0	0	0	0	0	0	18	18	0	0	178	0	178	0	0	0	0	0	0	0	0	30	30	226
16:45	0	0	0	0	0	0	0	0	14	14	0	0	190	0	190	0	0	0	0	0	0	0	0	26	26	230
17:00	0	0	0	0	0	0	0	0	7	7	0	0	220	0	220	0	0	0	0	0	0	0	0	19	19	246
17:15	0	0	0	0	0	0	0	0	19	19	0	0	190	0	190	0	0	0	0	0	0	0	0	21	21	230
Total Volume	0	0	0	0	0	0	0	0	58	58	0	0	778	0	778	0	0	0	0	0	0	0	0	96	96	932
% App. Total	0	0	0	0		0	0	0	100		0	0	100	0		0	0	0	0		0	0	0	100		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.763	.763	.000	.000	.884	.000	.884	.000	.000	.000	.000	.000	.000	.000	.000	.800	.800	.947

File Name : 52000002
Site Code : 52000002
Start Date : 5/31/2006
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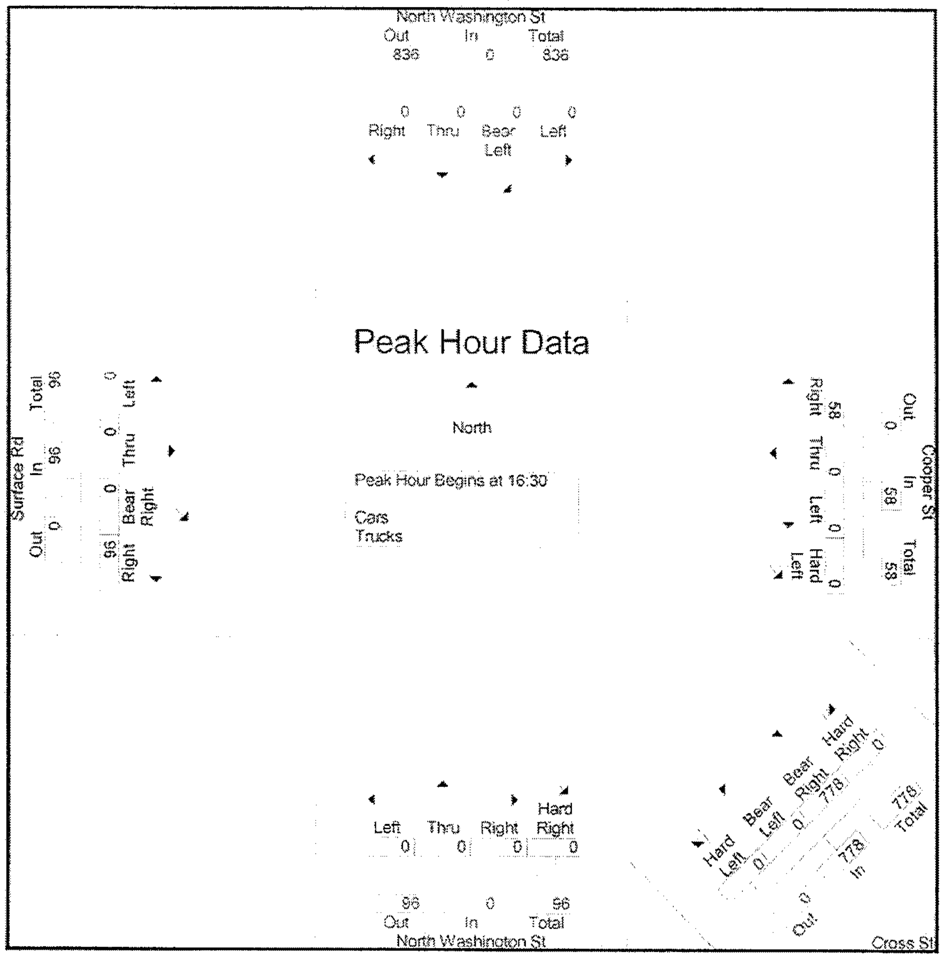


Accurate Counts
978-664-2565

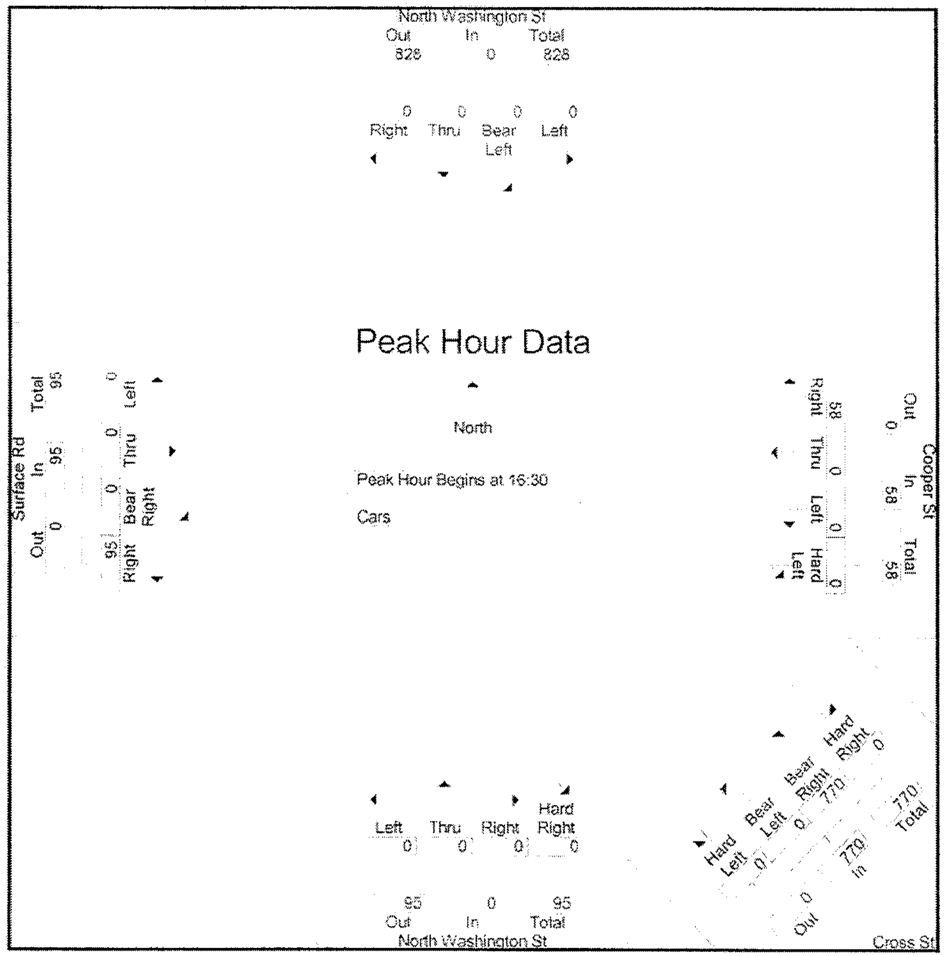
N/S Street : North Washington Street
E/W Street: Cooper St / Surface Rd
City/State : Boston, MA
Weather : Clear

File Name : 52000002
Site Code : 52000002
Start Date : 5/31/2006
Page No : 1

	North Washington St From North					Cooper St From East					Cross St From Southeast					North Washington St From South					Surface Rd From West					
Start Time	Left	Bear Left	Thru	Right	App. Total	Hard Left	Left	Thru	Right	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	App. Total	Left	Thru	Right	Hard Right	App. Total	Left	Thru	Bear Right	Right	App. Total	Int Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 16:30																										
16:30	0	0	0	0	0	0	0	0	18	18	0	0	175	0	175	0	0	0	0	0	0	0	0	30	30	223
16:45	0	0	0	0	0	0	0	0	14	14	0	0	190	0	190	0	0	0	0	0	0	0	0	26	26	230
17:00	0	0	0	0	0	0	0	0	7	7	0	0	216	0	216	0	0	0	0	0	0	0	0	19	19	242
17:15	0	0	0	0	0	0	0	0	19	19	0	0	189	0	189	0	0	0	0	0	0	0	0	20	20	228
Total Volume	0	0	0	0	0	0	0	0	58	58	0	0	770	0	770	0	0	0	0	0	0	0	0	95	95	923
% App. Total	0	0	0	0		0	0	0	100		0	0	100	0		0	0	0	0		0	0	0	100		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.763	.763	.000	.000	.891	.000	.891	.000	.000	.000	.000	.000	.000	.000	.000	.792	.792	.954

Accurate Counts
978-664-2565

File Name : 52000002
Site Code : 52000002
Start Date : 5/31/2006
Page No : 2



Accurate Counts
978-664-2565

N/S Street : North Washington Street
E/W Street: Cooper St / Surface Rd
City/State : Boston, MA
Weather : Clear

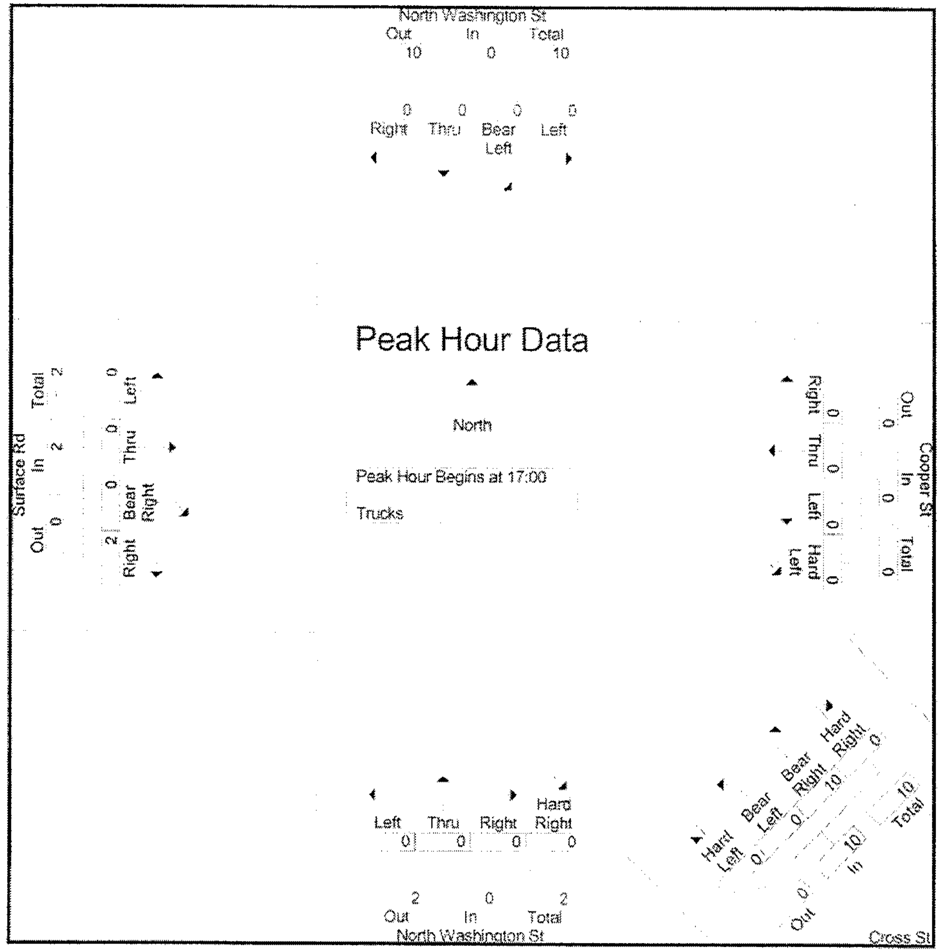
File Name : 52000002
Site Code : 52000002
Start Date : 5/31/2006
Page No : 1

Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 17:00

	North Washington St From North					Cooper St From East					Cross St From Southeast					North Washington St From South					Surface Rd From West					
Start Time	Left	Bear Left	Thru	Right	App. Total	Hard Left	Left	Thru	Right	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	App. Total	Left	Thru	Right	Hard Right	App. Total	Left	Thru	Bear Right	Right	App. Total	Int. Total
17:00	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	4
17:15	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	1	2
17:30	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	1	1	5
17:45	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	10	0	10	0	0	0	0	0	0	0	0	2	2	12
% App. Total	0	0	0	0		0	0	0	0		0	0	100	0		0	0	0	0		0	0	0	100		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.625	.000	.625	.000	.000	.000	.000	.000	.000	.000	.000	.500	.500	.600

Accurate Counts
978-664-2565

File Name : 52000002
Site Code : 52000002
Start Date : 5/31/2006
Page No : 2



N/S Street : North Washington Street
E/W Street: New Chardon St / Rt 93 Ramp
City/State : Boston, MA
Weather : Clear

Accurate Counts
978-664-2565

File Name : 61880002
Site Code : 61880002
Start Date : 8/1/2007
Page No : 1

Groups Printed- Cars - Trucks

	N Washington St From North					Route 93 Off Ramp From East					Route 93 On Ramp From Southeast					N Washington St From South					New Chardon St From West							
Start Time	Left	Bear Left	Thru	Right	Peds	Hard Left	Left	Thru	Right	Peds	Hard Left	Bear Left	Bear Right	Hard Right	Peds	Left	Thru	Right	Hard Right	Peds	Left	Thru	Bear Right	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00	0	116	28	82	9	21	13	64	23	0	0	0	0	0	0	0	0	0	0	0	0	0	70	5	20	29	422	451
07:15	0	141	46	84	5	14	3	84	48	0	0	0	0	0	0	0	0	0	0	0	0	0	80	10	21	26	510	536
07:30	0	200	44	93	13	17	8	93	41	0	0	0	0	0	0	0	0	0	0	0	0	0	74	10	23	36	580	616
07:45	0	206	37	97	15	19	9	84	51	0	0	0	0	0	0	0	0	0	0	0	0	0	79	8	27	42	590	632
Total	0	663	155	356	42	71	33	325	163	0	0	0	0	0	0	0	0	0	0	0	0	0	303	33	91	133	2102	2235
08:00	0	195	59	116	16	11	3	110	31	0	0	0	0	0	0	0	0	0	0	0	0	0	95	10	26	42	630	672
08:15	0	196	56	94	30	9	9	90	37	0	0	0	0	0	0	0	0	0	0	0	0	0	91	15	37	67	597	664
08:30	0	193	50	122	16	20	6	103	52	0	0	0	0	0	0	0	0	0	0	0	0	0	96	15	27	43	657	700
08:45	0	142	43	111	25	14	8	101	45	0	0	0	0	0	0	0	0	0	0	0	0	0	83	6	39	64	553	617
Total	0	726	208	443	87	54	26	404	165	0	0	0	0	0	0	0	0	0	0	0	0	0	365	46	129	216	2437	2653
09:00	0	134	43	85	11	9	4	83	29	0	0	0	0	0	0	0	0	0	0	0	0	0	93	18	27	38	498	536
09:15	0	125	54	109	17	12	5	60	44	0	0	0	0	0	0	0	0	0	0	0	0	0	110	9	22	39	528	567
09:30	0	126	44	100	14	10	0	51	17	0	0	0	0	0	0	0	0	0	0	0	0	0	100	6	17	31	454	485
09:45	0	130	31	67	9	12	5	52	25	0	0	0	0	0	0	0	0	0	0	0	0	0	96	18	14	23	436	459
Total	0	515	172	361	51	43	14	246	115	0	0	0	0	0	0	0	0	0	0	0	0	0	399	51	80	131	1916	2047
10:00	0	104	30	61	14	8	5	64	26	0	0	0	0	0	0	0	0	0	0	0	0	0	81	16	12	26	395	421
10:15	0	105	36	72	7	7	4	53	35	0	0	0	0	0	0	0	0	0	0	0	0	0	107	12	12	19	431	450
10:30	0	107	30	56	20	7	0	51	17	0	0	0	0	0	0	0	0	0	0	0	0	0	105	14	19	39	387	426
10:45	0	129	27	60	8	8	4	58	27	0	0	0	0	0	0	0	0	0	0	0	0	0	114	19	11	19	446	465
Total	0	445	123	249	49	30	13	226	105	0	0	0	0	0	0	0	0	0	0	0	0	0	407	61	54	103	1659	1762
11:00	0	116	46	53	4	5	3	63	45	0	0	0	0	0	0	0	0	0	0	0	0	0	116	10	5	9	457	466
11:15	0	118	23	59	12	9	0	57	48	0	0	0	0	0	0	0	0	0	0	0	0	0	112	27	14	26	453	479
11:30	0	131	44	68	18	9	2	62	38	0	0	0	0	0	0	0	0	0	0	0	0	0	94	9	21	39	457	496
11:45	0	125	27	53	13	8	4	42	48	0	0	0	0	0	0	0	0	0	0	0	0	0	90	11	15	28	408	436
Total	0	490	140	233	47	31	9	224	179	0	0	0	0	0	0	0	0	0	0	0	0	0	412	57	55	102	1775	1877
12:00	0	120	31	63	7	6	1	45	46	0	0	0	0	0	0	0	0	0	0	0	0	0	115	18	5	12	445	457
12:15	0	129	33	63	12	9	4	53	25	0	0	0	0	0	0	0	0	0	0	0	0	0	67	14	13	25	397	422
12:30	0	92	31	68	0	5	3	35	25	0	0	0	0	0	0	0	0	0	0	0	0	0	108	8	13	13	375	388
12:45	0	112	42	62	0	10	2	54	35	0	0	0	0	0	0	0	0	0	0	0	0	0	93	6	20	20	416	436
Total	0	453	137	256	19	30	10	187	131	0	0	0	0	0	0	0	0	0	0	0	0	0	383	46	51	70	1633	1703
13:00	0	129	34	66	0	9	2	54	39	0	0	0	0	0	0	0	0	0	0	0	0	0	116	17	30	30	466	496
13:15	0	135	39	59	0	15	4	59	23	0	0	0	0	0	0	0	0	0	0	0	0	0	122	16	31	31	472	503
13:30	0	145	29	34	0	13	2	68	22	0	0	0	0	0	0	0	0	0	0	0	0	0	130	9	16	16	452	468
13:45	0	126	26	55	0	4	1	73	34	0	0	0	0	0	0	0	0	0	0	0	0	0	123	9	16	16	451	467
Total	0	535	128	214	0	41	9	254	118	0	0	0	0	0	0	0	0	0	0	0	0	0	491	51	93	93	1841	1934
14:00	0	153	29	54	0	12	3	46	24	0	0	0	0	0	0	0	0	0	0	0	0	0	137	10	42	42	468	510
14:15	0	164	31	54	6	10	1	65	30	0	0	0	0	0	0	0	0	0	0	0	0	0	158	18	18	24	531	555
14:30	0	155	33	56	0	5	2	62	30	0	0	0	0	0	0	0	0	0	0	0	0	0	157	15	32	32	515	547
14:45	0	197	38	41	0	9	1	82	35	0	0	0	0	0	0	0	0	0	0	0	0	0	152	8	23	23	563	586
Total	0	669	131	205	6	36	7	255	119	0	0	0	0	0	0	0	0	0	0	0	0	0	604	51	115	121	2077	2198

Accurate Counts
978-664-2565

File Name : 61880002
Site Code : 61880002
Start Date : 8/1/2007
Page No : 2

Groups Printed- Cars - Trucks

	N Washington St From North					Route 93 Off Ramp From East					Route 93 On Ramp From Southeast					N Washington St From South					New Chardon St From West							
Start Time	Left	Bear Left	Thru	Right	Peds	Hard Left	Left	Thru	Right	Peds	Hard Left	Bear Left	Bear Right	Hard Right	Peds	Left	Thru	Right	Hard Right	Peds	Left	Thru	Bear Right	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
15:00	0	203	42	72	5	9	2	55	28	0	0	0	0	0	0	0	0	0	0	0	0	0	198	14	32	37	623	660
15:15	0	229	34	61	6	13	1	47	40	0	0	0	0	0	0	0	0	0	0	0	0	0	199	14	17	23	638	661
15:30	0	216	51	57	5	8	2	57	29	0	0	0	0	0	0	0	0	0	0	0	0	0	210	12	27	32	642	674
15:45	0	244	46	90	4	5	2	55	27	0	0	0	0	0	0	0	0	0	0	0	0	0	227	7	21	25	703	728
Total	0	892	173	280	20	35	7	214	124	0	0	0	0	0	0	0	0	0	0	0	0	0	834	47	97	117	2606	2723
16:00	0	220	43	73	6	4	2	59	27	0	0	0	0	0	0	0	0	0	0	0	0	0	225	5	37	43	658	701
16:15	0	243	32	82	4	6	1	59	31	0	0	0	0	0	0	0	0	0	0	0	0	0	272	12	27	31	738	769
16:30	0	232	48	71	0	7	1	73	40	0	0	0	0	0	0	0	0	0	0	0	0	0	248	5	18	18	725	743
16:45	0	237	53	79	7	10	0	84	38	0	0	0	0	0	0	0	0	0	0	0	0	0	251	12	40	47	764	811
Total	0	932	176	305	17	27	4	275	136	0	0	0	0	0	0	0	0	0	0	0	0	0	996	34	122	139	2885	3024
17:00	0	267	36	82	14	4	2	41	22	0	0	0	0	0	0	0	0	0	0	0	0	0	243	8	38	52	705	757
17:15	0	221	40	93	4	3	1	79	43	0	0	0	0	0	0	0	0	0	0	0	0	0	269	8	57	61	757	818
17:30	0	215	17	75	0	6	0	75	43	0	0	0	0	0	0	0	0	0	0	0	0	0	260	14	27	27	705	732
17:45	0	275	35	78	9	4	1	62	46	0	0	0	0	0	0	0	0	0	0	0	0	0	253	15	35	44	769	813
Total	0	978	128	328	27	17	4	257	154	0	0	0	0	0	0	0	0	0	0	0	0	0	1025	45	157	184	2936	3120
Grand Total	0	7298	1671	3230	365	415	136	2867	1509	0	0	0	0	0	0	0	0	0	0	0	0	0	6219	522	{\fs1 5 104 4}	1409	23867	25276
Apprch %	0	59.8	13.7	26.5		8.4	2.8	58.2	30.6		0	0	0	0		0	0	0	0		0	0	92.3	7.7				
Total %	0	30.6	7	13.5		1.7	0.6	12	6.3		0	0	0	0		0	0	0	0		0	0	26.1	2.2		5.6	94.4	
Cars	0	7030	1263	2893		386	133	2833	1442		0	0	0	0		0	0	0	0		0	0	6052	484		0	0	23925
% Cars	0	96.3	75.6	89.6	100	93	97.8	98.8	95.6	0	0	0	0	0	0	0	0	0	0	0	0	0	97.3	92.7	100	0	0	94.7
Trucks	0	268	408	337		29	3	34	67		0	0	0	0		0	0	0	0		0	0	167	38		0	0	1351
% Trucks	0	3.7	24.4	10.4	0	7	2.2	1.2	4.4	0	0	0	0	0	0	0	0	0	0	0	0	0	2.7	7.3	0	0	0	5.3

	N Washington St From North					Route 93 Off Ramp From East					Route 93 On Ramp From Southeast					N Washington St From South					New Chardon St From West					
Start Time	Left	Bear Left	Thru	Right	App. Total	Hard Left	Left	Thru	Right	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	App. Total	Left	Thru	Right	Hard Right	App. Total	Left	Thru	Bear Right	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 11:45 - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 07:45																										
07:45	0	206	37	97	340	19	9	84	51	163	0	0	0	0	0	0	0	0	0	0	0	0	79	8	87	590
08:00	0	195	59	116	370	11	3	110	31	155	0	0	0	0	0	0	0	0	0	0	0	0	95	10	105	630
08:15	0	196	56	94	346	9	9	90	37	145	0	0	0	0	0	0	0	0	0	0	0	0	91	15	106	597
08:30	0	193	50	122	365	20	6	103	52	181	0	0	0	0	0	0	0	0	0	0	0	0	96	15	111	657
Total Volume	0	790	202	429	1421	59	27	387	171	644	0	0	0	0	0	0	0	0	0	0	0	0	361	48	409	2474
% App. Total	0	55.6	14.2	30.2		9.2	4.2	60.1	26.6		0	0	0	0		0	0	0	0		0	0	88.3	11.7		
PHF	.000	.959	.856	.879	.960	.738	.750	.880	.822	.890	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.940	.800	.921	.941

	N Washington St From North					Route 93 Off Ramp From East					Route 93 On Ramp From Southeast					N Washington St From South					New Chardon St From West					
Start Time	Left	Bear Left	Thru	Right	App. Total	Hard Left	Left	Thru	Right	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	App. Total	Left	Thru	Right	Hard Right	App. Total	Left	Thru	Bear Right	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 11:45 - Peak 1 of 1																										
Peak Hour for Each Approach Begins at:																										
	07:45					08:00					07:00					07:00					10:30					
+0 mins.	0	206	37	97	340	11	3	110	31	155	0	0	0	0	0	0	0	0	0	0	0	0	105	14	119	
+15 mins.	0	195	59	116	370	9	9	90	37	145	0	0	0	0	0	0	0	0	0	0	0	0	114	19	133	
+30 mins.	0	196	56	94	346	20	6	103	52	181	0	0	0	0	0	0	0	0	0	0	0	0	116	10	126	
+45 mins.	0	193	50	122	365	14	8	101	45	168	0	0	0	0	0	0	0	0	0	0	0	0	112	27	139	
Total Volume	0	790	202	429	1421	54	26	404	165	649	0	0	0	0	0	0	0	0	0	0	0	0	447	70	517	
% App. Total	0	55.6	14.2	30.2		8.3	4	62.2	25.4		0	0	0	0		0	0	0	0		0	0	86.5	13.5		
PHF	.000	.959	.856	.879	.960	.675	.722	.918	.793	.896	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.963	.648	.930	
Peak Hour Analysis From 12:00 to 17:45 - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 16:30																										
16:30	0	232	48	71	351	7	1	73	40	121	0	0	0	0	0	0	0	0	0	0	0	0	248	5	253	725
16:45	0	237	53	79	369	10	0	84	38	132	0	0	0	0	0	0	0	0	0	0	0	0	251	12	263	764
17:00	0	267	36	82	385	4	2	41	22	69	0	0	0	0	0	0	0	0	0	0	0	0	243	8	251	705
17:15	0	221	40	93	354	3	1	79	43	126	0	0	0	0	0	0	0	0	0	0	0	0	269	8	277	757
Total Volume	0	957	177	325	1459	24	4	277	143	448	0	0	0	0	0	0	0	0	0	0	0	0	1011	33	1044	2951
% App. Total	0	65.6	12.1	22.3		5.4	0.9	61.8	31.9		0	0	0	0		0	0	0	0		0	0	96.8	3.2		
PHF	.000	.896	.835	.874	.947	.600	.500	.824	.831	.848	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.940	.688	.942	.966
Peak Hour Analysis From 12:00 to 17:45 - Peak 1 of 1																										
Peak Hour for Each Approach Begins at:																										
	16:15					16:45					12:00					12:00					17:00					
+0 mins.	0	243	32	82	357	10	0	84	38	132	0	0	0	0	0	0	0	0	0	0	0	0	243	8	251	
+15 mins.	0	232	48	71	351	4	2	41	22	69	0	0	0	0	0	0	0	0	0	0	0	0	269	8	277	
+30 mins.	0	237	53	79	369	3	1	79	43	126	0	0	0	0	0	0	0	0	0	0	0	0	260	14	274	
+45 mins.	0	267	36	82	385	6	0	75	43	124	0	0	0	0	0	0	0	0	0	0	0	0	253	15	268	
Total Volume	0	979	169	314	1462	23	3	279	146	451	0	0	0	0	0	0	0	0	0	0	0	0	1025	45	1070	
% App. Total	0	67	11.6	21.5		5.1	0.7	61.9	32.4		0	0	0	0		0	0	0	0		0	0	95.8	4.2		
PHF	.000	.917	.797	.957	.949	.575	.375	.830	.849	.854	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.953	.750	.966	

N/S Street : North Washington Street
E/W Street: New Chardon St / Rt 93 Ramp
City/State : Boston, MA
Weather : Clear

Accurate Counts
978-664-2565

File Name : 61880002
Site Code : 61880002
Start Date : 8/1/2007
Page No : 1

Groups Printed- Cars

	N Washington St From North					Route 93 Off Ramp From East					Route 93 On Ramp From Southeast					N Washington St From South					New Chardon St From West							
Start Time	Left	Bear Left	Thru	Right	Peds	Hard Left	Left	Thru	Right	Peds	Hard Left	Bear Left	Bear Right	Hard Right	Peds	Left	Thru	Right	Hard Right	Peds	Left	Thru	Bear Right	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00	0	109	17	72	9	21	13	64	21	0	0	0	0	0	0	0	0	0	0	0	0	0	61	4	20	29	382	411
07:15	0	130	39	75	5	13	2	84	45	0	0	0	0	0	0	0	0	0	0	0	0	0	75	10	21	26	473	499
07:30	0	184	36	76	13	16	8	91	39	0	0	0	0	0	0	0	0	0	0	0	0	0	71	10	23	36	531	567
07:45	0	197	28	85	15	17	9	83	48	0	0	0	0	0	0	0	0	0	0	0	0	0	74	8	27	42	549	591
Total	0	620	120	308	42	67	32	322	153	0	0	0	0	0	0	0	0	0	0	0	0	0	281	32	91	133	1935	2068
08:00	0	184	50	103	16	8	3	109	30	0	0	0	0	0	0	0	0	0	0	0	0	0	91	9	26	42	587	629
08:15	0	188	46	83	30	8	9	86	33	0	0	0	0	0	0	0	0	0	0	0	0	0	88	13	37	67	554	621
08:30	0	182	40	111	16	18	6	103	49	0	0	0	0	0	0	0	0	0	0	0	0	0	90	13	27	43	612	655
08:45	0	138	30	101	25	14	8	99	41	0	0	0	0	0	0	0	0	0	0	0	0	0	79	5	39	64	515	579
Total	0	692	166	398	87	48	26	397	153	0	0	0	0	0	0	0	0	0	0	0	0	0	348	40	129	216	2268	2484
09:00	0	125	34	80	11	7	4	83	27	0	0	0	0	0	0	0	0	0	0	0	0	0	89	17	27	38	466	504
09:15	0	121	40	99	17	9	5	60	42	0	0	0	0	0	0	0	0	0	0	0	0	0	107	9	22	39	492	531
09:30	0	117	33	91	14	9	0	51	14	0	0	0	0	0	0	0	0	0	0	0	0	0	96	5	17	31	416	447
09:45	0	122	22	66	9	10	4	51	23	0	0	0	0	0	0	0	0	0	0	0	0	0	92	17	14	23	407	430
Total	0	485	129	336	51	35	13	245	106	0	0	0	0	0	0	0	0	0	0	0	0	0	384	48	80	131	1781	1912
10:00	0	95	24	55	14	6	5	62	24	0	0	0	0	0	0	0	0	0	0	0	0	0	78	16	12	26	365	391
10:15	0	95	24	64	7	7	4	51	33	0	0	0	0	0	0	0	0	0	0	0	0	0	105	11	12	19	394	413
10:30	0	97	25	48	20	6	0	50	16	0	0	0	0	0	0	0	0	0	0	0	0	0	98	13	19	39	353	392
10:45	0	117	22	53	8	8	4	55	25	0	0	0	0	0	0	0	0	0	0	0	0	0	112	18	11	19	414	433
Total	0	404	95	220	49	27	13	218	98	0	0	0	0	0	0	0	0	0	0	0	0	0	393	58	54	103	1526	1629
11:00	0	105	34	49	4	5	3	60	38	0	0	0	0	0	0	0	0	0	0	0	0	0	114	10	5	9	418	427
11:15	0	111	15	54	12	8	0	56	43	0	0	0	0	0	0	0	0	0	0	0	0	0	109	25	14	26	421	447
11:30	0	121	38	62	18	8	2	62	33	0	0	0	0	0	0	0	0	0	0	0	0	0	93	9	21	39	428	467
11:45	0	122	19	47	13	6	3	40	45	0	0	0	0	0	0	0	0	0	0	0	0	0	87	11	15	28	380	408
Total	0	459	106	212	47	27	8	218	159	0	0	0	0	0	0	0	0	0	0	0	0	0	403	55	55	102	1647	1749
12:00	0	114	25	58	7	6	1	45	43	0	0	0	0	0	0	0	0	0	0	0	0	0	113	17	5	12	422	434
12:15	0	123	22	57	12	7	4	52	24	0	0	0	0	0	0	0	0	0	0	0	0	0	65	14	13	25	368	393
12:30	0	87	22	57	0	5	3	34	24	0	0	0	0	0	0	0	0	0	0	0	0	0	107	6	13	13	345	358
12:45	0	109	32	52	0	10	2	54	35	0	0	0	0	0	0	0	0	0	0	0	0	0	89	5	20	20	388	408
Total	0	433	101	224	19	28	10	185	126	0	0	0	0	0	0	0	0	0	0	0	0	0	374	42	51	70	1523	1593
13:00	0	127	25	62	0	9	2	54	39	0	0	0	0	0	0	0	0	0	0	0	0	0	109	14	30	30	441	471
13:15	0	131	29	53	0	13	4	59	23	0	0	0	0	0	0	0	0	0	0	0	0	0	114	16	31	31	442	473
13:30	0	141	25	28	0	13	2	68	22	0	0	0	0	0	0	0	0	0	0	0	0	0	127	8	16	16	434	450
13:45	0	122	16	48	0	4	1	73	34	0	0	0	0	0	0	0	0	0	0	0	0	0	121	6	16	16	425	441
Total	0	521	95	191	0	39	9	254	118	0	0	0	0	0	0	0	0	0	0	0	0	0	471	44	93	93	1742	1835
14:00	0	151	26	42	0	12	3	46	24	0	0	0	0	0	0	0	0	0	0	0	0	0	134	10	42	42	448	490
14:15	0	163	24	48	6	10	1	65	28	0	0	0	0	0	0	0	0	0	0	0	0	0	157	15	18	24	511	535
14:30	0	152	26	52	0	5	2	62	30	0	0	0	0	0	0	0	0	0	0	0	0	0	155	14	32	32	498	530
14:45	0	190	27	35	0	9	1	79	34	0	0	0	0	0	0	0	0	0	0	0	0	0	147	7	23	23	529	552
Total	0	656	103	177	6	36	7	252	116	0	0	0	0	0	0	0	0	0	0	0	0	0	593	46	115	121	1986	2107

Accurate Counts
978-664-2565

File Name : 61880002
Site Code : 61880002
Start Date : 8/1/2007
Page No : 2

Groups Printed- Cars

	N Washington St From North					Route 93 Off Ramp From East					Route 93 On Ramp From Southeast					N Washington St From South					New Chardon St From West							
Start Time	Left	Bear Left	Thru	Right	Peds	Hard Left	Left	Thru	Right	Peds	Hard Left	Bear Left	Bear Right	Hard Right	Peds	Left	Thru	Right	Hard Right	Peds	Left	Thru	Bear Right	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
15:00	0	199	35	66	5	9	2	55	28	0	0	0	0	0	0	0	0	0	0	0	0	0	193	14	32	37	601	638
15:15	0	225	27	55	6	13	1	47	40	0	0	0	0	0	0	0	0	0	0	0	0	0	196	13	17	23	617	640
15:30	0	208	38	52	5	8	2	57	29	0	0	0	0	0	0	0	0	0	0	0	0	0	206	12	27	32	612	644
15:45	0	238	38	83	4	5	2	54	27	0	0	0	0	0	0	0	0	0	0	0	0	0	224	7	21	25	678	703
Total	0	870	138	256	20	35	7	213	124	0	0	0	0	0	0	0	0	0	0	0	0	0	819	46	97	117	2508	2625
16:00	0	218	27	65	6	4	2	58	27	0	0	0	0	0	0	0	0	0	0	0	0	0	223	5	37	43	629	672
16:15	0	241	23	74	4	6	1	59	31	0	0	0	0	0	0	0	0	0	0	0	0	0	267	12	27	31	714	745
16:30	0	228	34	62	0	7	1	72	40	0	0	0	0	0	0	0	0	0	0	0	0	0	241	3	18	18	688	706
16:45	0	233	40	73	7	10	0	84	38	0	0	0	0	0	0	0	0	0	0	0	0	0	248	12	40	47	738	785
Total	0	920	124	274	17	27	4	273	136	0	0	0	0	0	0	0	0	0	0	0	0	0	979	32	122	139	2769	2908
17:00	0	266	25	74	14	4	2	41	22	0	0	0	0	0	0	0	0	0	0	0	0	0	238	6	38	52	678	730
17:15	0	221	24	84	4	3	1	79	43	0	0	0	0	0	0	0	0	0	0	0	0	0	266	8	57	61	729	790
17:30	0	210	11	66	0	6	0	75	42	0	0	0	0	0	0	0	0	0	0	0	0	0	254	12	27	27	676	703
17:45	0	273	26	73	9	4	1	61	46	0	0	0	0	0	0	0	0	0	0	0	0	0	249	15	35	44	748	792
Total	0	970	86	297	27	17	4	256	153	0	0	0	0	0	0	0	0	0	0	0	0	0	1007	41	157	184	2831	3015
Grand Total	0	7030	1263	2893	365	386	133	2833	1442	0	0	0	0	0	0	0	0	0	0	0	0	0	6052	484	{\fs1 5 104 4}	1409	22516	23925
Apprch %	0	62.8	11.3	25.9		8.1	2.8	59.1	30.1		0	0	0	0		0	0	0	0		0	0	92.6	7.4				
Total %	0	31.2	5.6	12.8		1.7	0.6	12.6	6.4		0	0	0	0		0	0	0	0		0	0	26.9	2.1		5.9	94.1	

	N Washington St From North					Route 93 Off Ramp From East					Route 93 On Ramp From Southeast					N Washington St From South					New Chardon St From West					
Start Time	Left	Bear Left	Thru	Right	App. Total	Hard Left	Left	Thru	Right	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	App. Total	Left	Thru	Right	Hard Right	App. Total	Left	Thru	Bear Right	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 11:45 - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 07:45																										
07:45	0	197	28	85	310	17	9	83	48	157	0	0	0	0	0	0	0	0	0	0	0	0	74	8	82	549
08:00	0	184	50	103	337	8	3	109	30	150	0	0	0	0	0	0	0	0	0	0	0	0	91	9	100	587
08:15	0	188	46	83	317	8	9	86	33	136	0	0	0	0	0	0	0	0	0	0	0	0	88	13	101	554
08:30	0	182	40	111	333	18	6	103	49	176	0	0	0	0	0	0	0	0	0	0	0	0	90	13	103	612
Total Volume	0	751	164	382	1297	51	27	381	160	619	0	0	0	0	0	0	0	0	0	0	0	0	343	43	386	2302
% App. Total	0	57.9	12.6	29.5		8.2	4.4	61.6	25.8		0	0	0	0		0	0	0	0		0	0	88.9	11.1		
PHF	.000	.953	.820	.860	.962	.708	.750	.874	.816	.879	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.942	.827	.937	.940

Peak Hour Analysis From 07:00 to 11:45 - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	N Washington St From North					Route 93 Off Ramp From East					Route 93 On Ramp From Southeast					N Washington St From South					New Chardon St From West				
	07:45					08:00					07:00					07:00					10:30				
+0 mins.	0	197	28	85	310	8	3	109	30	150	0	0	0	0	0	0	0	0	0	0	0	0	98	13	111
+15 mins.	0	184	50	103	337	8	9	86	33	136	0	0	0	0	0	0	0	0	0	0	0	0	112	18	130
+30 mins.	0	188	46	83	317	18	6	103	49	176	0	0	0	0	0	0	0	0	0	0	0	0	114	10	124
+45 mins.	0	182	40	111	333	14	8	99	41	162	0	0	0	0	0	0	0	0	0	0	0	0	109	25	134
Total Volume	0	751	164	382	1297	48	26	397	153	624	0	0	0	0	0	0	0	0	0	0	0	0	433	66	499

PHF	.000	.953	.820	.860	.962	.667	.722	.911	.781	.886	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.950	.660	.931	

Peak Hour Analysis From 12:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 16:30

16:30	0	228	34	62	324	7	1	72	40	120	0	0	0	0	0	0	0	0	0	0	0	0	241	3	244	688
16:45	0	233	40	73	346	10	0	84	38	132	0	0	0	0	0	0	0	0	0	0	0	0	248	12	260	738
17:00	0	266	25	74	365	4	2	41	22	69	0	0	0	0	0	0	0	0	0	0	0	0	238	6	244	678
17:15	0	221	24	84	329	3	1	79	43	126	0	0	0	0	0	0	0	0	0	0	0	0	266	8	274	729
Total Volume	0	948	123	293	1364	24	4	276	143	447	0	0	0	0	0	0	0	0	0	0	0	0	993	29	1022	2833
% App. Total	0	69.5	9	21.5		5.4	0.9	61.7	32		0	0	0	0		0	0	0	0		0	0	97.2	2.8		
PHF	.000	.891	.769	.872	.934	.600	.500	.821	.831	.847	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.933	.604	.932	.960

Peak Hour Analysis From 12:00 to 17:45 - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	16:15					16:45					12:00					12:00					17:00				
+0 mins.	0	241	23	74	338	10	0	84	38	132	0	0	0	0	0	0	0	0	0	0	0	0	238	6	244
+15 mins.	0	228	34	62	324	4	2	41	22	69	0	0	0	0	0	0	0	0	0	0	0	0	266	8	274
+30 mins.	0	233	40	73	346	3	1	79	43	126	0	0	0	0	0	0	0	0	0	0	0	0	254	12	266
+45 mins.	0	266	25	74	365	6	0	75	42	123	0	0	0	0	0	0	0	0	0	0	0	0	249	15	264
Total Volume	0	968	122	283	1373	23	3	279	145	450	0	0	0	0	0	0	0	0	0	0	0	0	1007	41	1048
% App. Total	0	70.5	8.9	20.6		5.1	0.7	62	32.2		0	0	0	0		0	0	0	0		0	0	96.1	3.9	
PHF	.000	.910	.763	.956	.940	.575	.375	.830	.843	.852	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.946	.683	.956

N/S Street : North Washington Street
E/W Street: New Chardon St / Rt 93 Ramp
City/State : Boston, MA
Weather : Clear

Accurate Counts
978-664-2565

File Name : 61880002
Site Code : 61880002
Start Date : 8/1/2007
Page No : 1

Groups Printed- Trucks

	N Washington St From North					Route 93 Off Ramp From East					Route 93 On Ramp From Southeast					N Washington St From South					New Chardon St From West							
Start Time	Left	Bear Left	Thru	Right	Peds	Hard Left	Left	Thru	Right	Peds	Hard Left	Bear Left	Bear Right	Hard Right	Peds	Left	Thru	Right	Hard Right	Peds	Left	Thru	Bear Right	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00	0	7	11	10	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	9	1	0	0	40	40
07:15	0	11	7	9	0	1	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	37	37
07:30	0	16	8	17	0	1	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	49	49
07:45	0	9	9	12	0	2	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	41	41
Total	0	43	35	48	0	4	1	3	10	0	0	0	0	0	0	0	0	0	0	0	0	0	22	1	0	0	167	167
08:00	0	11	9	13	0	3	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	0	43	43
08:15	0	8	10	11	0	1	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	0	0	43	43
08:30	0	11	10	11	0	2	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	6	2	0	0	45	45
08:45	0	4	13	10	0	0	0	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	0	38	38
Total	0	34	42	45	0	6	0	7	12	0	0	0	0	0	0	0	0	0	0	0	0	0	17	6	0	0	169	169
09:00	0	9	9	5	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	0	32	32
09:15	0	4	14	10	0	3	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	36	36
09:30	0	9	11	9	0	1	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	0	38	38
09:45	0	8	9	1	0	2	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	0	29	29
Total	0	30	43	25	0	8	1	1	9	0	0	0	0	0	0	0	0	0	0	0	0	0	15	3	0	0	135	135
10:00	0	9	6	6	0	2	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	30	30
10:15	0	10	12	8	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	37	37
10:30	0	10	5	8	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	7	1	0	0	34	34
10:45	0	12	5	7	0	0	0	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	32	32
Total	0	41	28	29	0	3	0	8	7	0	0	0	0	0	0	0	0	0	0	0	0	0	14	3	0	0	133	133
11:00	0	11	12	4	0	0	0	3	7	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	39	39
11:15	0	7	8	5	0	1	0	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	0	0	32	32
11:30	0	10	6	6	0	1	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	29	29
11:45	0	3	8	6	0	2	1	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	28	28
Total	0	31	34	21	0	4	1	6	20	0	0	0	0	0	0	0	0	0	0	0	0	0	9	2	0	0	128	128
12:00	0	6	6	5	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	23	23
12:15	0	6	11	6	0	2	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	29	29
12:30	0	5	9	11	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	30	30
12:45	0	3	10	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	0	28	28
Total	0	20	36	32	0	2	0	2	5	0	0	0	0	0	0	0	0	0	0	0	0	0	9	4	0	0	110	110
13:00	0	2	9	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	3	0	0	25	25
13:15	0	4	10	6	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	30	30
13:30	0	4	4	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0	18	18
13:45	0	4	10	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	0	0	26	26
Total	0	14	33	23	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	7	0	0	99	99
14:00	0	2	3	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	20	20
14:15	0	1	7	6	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	0	20	20
14:30	0	3	7	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	17	17
14:45	0	7	11	6	0	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1	0	0	34	34
Total	0	13	28	28	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	11	5	0	0	91	91

Accurate Counts
978-664-2565

File Name : 61880002
Site Code : 61880002
Start Date : 8/1/2007
Page No : 2

Groups Printed- Trucks

	N Washington St From North					Route 93 Off Ramp From East					Route 93 On Ramp From Southeast					N Washington St From South					New Chardon St From West							
Start Time	Left	Bear Left	Thru	Right	Peds	Hard Left	Left	Thru	Right	Peds	Hard Left	Bear Left	Bear Right	Hard Right	Peds	Left	Thru	Right	Hard Right	Peds	Left	Thru	Bear Right	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
15:00	0	4	7	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	22	22
15:15	0	4	7	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0	21	21
15:30	0	8	13	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	30	30
15:45	0	6	8	7	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	25	25
Total	0	22	35	24	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	1	0	0	98	98
16:00	0	2	16	8	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	29	29
16:15	0	2	9	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	24	24
16:30	0	4	14	9	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	2	0	0	37	37
16:45	0	4	13	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	26	26
Total	0	12	52	31	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	2	0	0	116	116
17:00	0	1	11	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	2	0	0	27	27
17:15	0	0	16	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	28	28
17:30	0	5	6	9	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	6	2	0	0	29	29
17:45	0	2	9	5	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	21	21
Total	0	8	42	31	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	18	4	0	0	105	105
Grand Total	0	268	408	337	0	29	3	34	67	0	0	0	0	0	0	0	0	0	0	0	0	0	167	38	0	0	1351	1351
Apprch %	0	26.5	40.3	33.3		21.8	2.3	25.6	50.4		0	0	0	0		0	0	0	0		0	0	81.5	18.5				
Total %	0	19.8	30.2	24.9		2.1	0.2	2.5	5		0	0	0	0		0	0	0	0		0	0	12.4	2.8		0	100	

	N Washington St From North					Route 93 Off Ramp From East					Route 93 On Ramp From Southeast					N Washington St From South					New Chardon St From West					
Start Time	Left	Bear Left	Thru	Right	App. Total	Hard Left	Left	Thru	Right	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	App. Total	Left	Thru	Right	Hard Right	App. Total	Left	Thru	Bear Right	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 11:45 - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 07:30																										
07:30	0	16	8	17	41	1	0	2	2	5	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	49
07:45	0	9	9	12	30	2	0	1	3	6	0	0	0	0	0	0	0	0	0	0	0	0	5	0	5	41
08:00	0	11	9	13	33	3	0	1	1	5	0	0	0	0	0	0	0	0	0	0	0	0	4	1	5	43
08:15	0	8	10	11	29	1	0	4	4	9	0	0	0	0	0	0	0	0	0	0	0	0	3	2	5	43
Total Volume	0	44	36	53	133	7	0	8	10	25	0	0	0	0	0	0	0	0	0	0	0	0	15	3	18	176
% App. Total	0	33.1	27.1	39.8		28	0	32	40		0	0	0	0		0	0	0	0		0	0	83.3	16.7		
PHF	.000	.688	.900	.779	.811	.583	.000	.500	.625	.694	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.750	.375	.900	.898

Peak Hour Analysis From 07:00 to 11:45 - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:30					11:00					07:00					07:00					07:00				
+0 mins.	0	16	8	17	41	0	0	3	7	10	0	0	0	0	0	0	0	0	0	0	0	0	9	1	10
+15 mins.	0	9	9	12	30	1	0	1	5	7	0	0	0	0	0	0	0	0	0	0	0	0	5	0	5
+30 mins.	0	11	9	13	33	1	0	0	5	6	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3
+45 mins.	0	8	10	11	29	2	1	2	3	8	0	0	0	0	0	0	0	0	0	0	0	0	5	0	5
Total Volume	0	44	36	53	133	4	1	6	20	31	0	0	0	0	0	0	0	0	0	0	0	0	22	1	23
% App. Total	0	33.1	27.1	39.8		12.9	3.2	19.4	64.5		0	0	0	0		0	0	0	0		0	0	95.7	4.3	
PHF	.000	.688	.900	.779	.811	.500	.250	.500	.714	.775	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.611	.250	.575

Accurate Counts
978-664-2565

File Name : 61880002
Site Code : 61880002
Start Date : 8/1/2007
Page No : 3

	N Washington St From North					Route 93 Off Ramp From East					Route 93 On Ramp From Southeast					N Washington St From South					New Chardon St From West					
Start Time	Left	Bear Left	Thru	Right	App. Total	Hard Left	Left	Thru	Right	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	App. Total	Left	Thru	Right	Hard Right	App. Total	Left	Thru	Bear Right	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 to 17:45 - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 16:30																										
16:30	0	4	14	9	27	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	7	2	9	37
16:45	0	4	13	6	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	26
17:00	0	1	11	8	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	2	7	27
17:15	0	0	16	9	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	28
Total Volume	0	9	54	32	95	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	18	4	22	118
% App. Total	0	9.5	56.8	33.7		0	0	100	0		0	0	0	0		0	0	0	0		0	0	81.8	18.2		
PHF	.000	.563	.844	.889	.880	.000	.000	.250	.000	.250	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.643	.500	.611	.797

	N Washington St From North					Route 93 Off Ramp From East					Route 93 On Ramp From Southeast					N Washington St From South					New Chardon St From West				
Peak Hour Analysis From 12:00 to 17:45 - Peak 1 of 1																									
Peak Hour for Each Approach Begins at:																									
	16:00					12:00					12:00					12:00					12:45				
+0 mins.	0	2	16	8	26	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	4	1	5
+15 mins.	0	2	9	8	19	2	0	1	1	4	0	0	0	0	0	0	0	0	0	0	0	0	7	3	10
+30 mins.	0	4	14	9	27	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	8	0	8
+45 mins.	0	4	13	6	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	4
Total Volume	0	12	52	31	95	2	0	2	5	9	0	0	0	0	0	0	0	0	0	0	0	0	22	5	27
% App. Total	0	12.6	54.7	32.6		22.2	0	22.2	55.6		0	0	0	0		0	0	0	0		0	0	81.5	18.5	
PHF	.000	.750	.813	.861	.880	.250	.000	.500	.417	.563	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.688	.417	.675

N/S Street : North Washington Street
E/W Street: New Chardon St / Rt 93 Ramp
City/State : Boston, MA
Weather : Clear

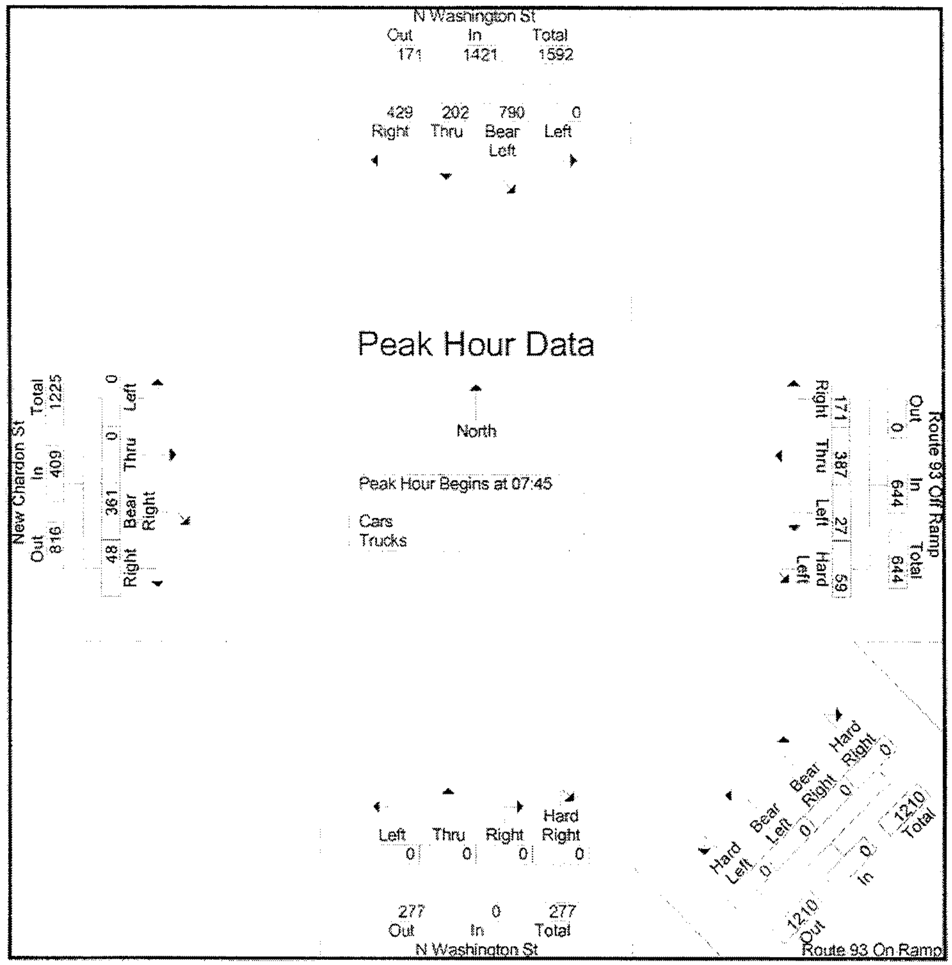
Accurate Counts
978-664-2565

File Name : 61880002
Site Code : 61880002
Start Date : 8/1/2007
Page No : 1

	N Washington St From North					Route 93 Off Ramp From East					Route 93 On Ramp From Southeast					N Washington St From South					New Chardon St From West					
Start Time	Left	Bear Left	Thru	Right	App. Total	Hard Left	Left	Thru	Right	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	App. Total	Left	Thru	Right	Hard Right	App. Total	Left	Thru	Bear Right	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 11:45 - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 07:45																										
07:45	0	206	37	97	340	19	9	84	51	163	0	0	0	0	0	0	0	0	0	0	0	0	79	8	87	590
08:00	0	195	59	116	370	11	3	110	31	155	0	0	0	0	0	0	0	0	0	0	0	0	95	10	105	630
08:15	0	196	56	94	346	9	9	90	37	145	0	0	0	0	0	0	0	0	0	0	0	0	91	15	106	597
08:30	0	193	50	122	365	20	6	103	52	181	0	0	0	0	0	0	0	0	0	0	0	0	96	15	111	657
Total Volume	0	790	202	429	1421	59	27	387	171	644	0	0	0	0	0	0	0	0	0	0	0	0	361	48	409	2474
% App. Total	0	55.6	14.2	30.2		9.2	4.2	60.1	26.6		0	0	0	0		0	0	0	0		0	0	88.3	11.7		
PHF	.000	.959	.856	.879	.960	.738	.750	.880	.822	.890	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.940	.800	.921	.941

Accurate Counts
978-664-2565

File Name : 61880002
Site Code : 61880002
Start Date : 8/1/2007
Page No : 2

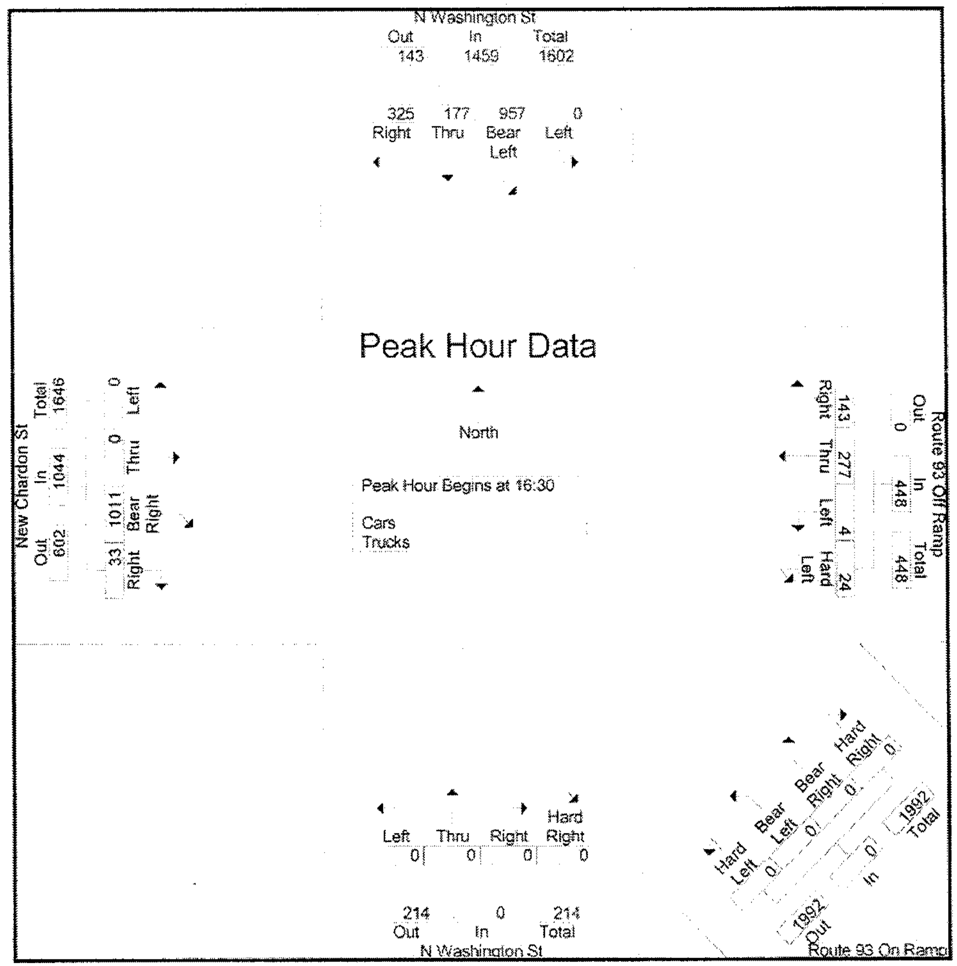


Peak Hour Analysis From 12:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 16:30

16:30	0	232	48	71	351	7	1	73	40	121	0	0	0	0	0	0	0	0	0	0	0	0	248	5	253	725
16:45	0	237	53	79	369	10	0	84	38	132	0	0	0	0	0	0	0	0	0	0	0	0	251	12	263	764
17:00	0	267	36	82	385	4	2	41	22	69	0	0	0	0	0	0	0	0	0	0	0	0	243	8	251	705
17:15	0	221	40	93	354	3	1	79	43	126	0	0	0	0	0	0	0	0	0	0	0	0	269	8	277	757
Total Volume	0	957	177	325	1459	24	4	277	143	448	0	0	0	0	0	0	0	0	0	0	0	0	1011	33	1044	2951
% App. Total	0	65.6	12.1	22.3		5.4	0.9	61.8	31.9		0	0	0	0		0	0	0	0		0	0	96.8	3.2		
PHF	.000	.896	.835	.874	.947	.600	.500	.824	.831	.848	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.940	.688	.942	.966

Accurate Counts
978-664-2565

File Name : 61880002
Site Code : 61880002
Start Date : 8/1/2007
Page No : 3



N/S Street : North Washington Street
E/W Street: New Chardon St / Rt 93 Ramp
City/State : Boston, MA
Weather : Clear

Accurate Counts
978-664-2565

File Name : 61880002
Site Code : 61880002
Start Date : 8/1/2007
Page No : 1

	N Washington St From North					Route 93 Off Ramp From East					Route 93 On Ramp From Southeast					N Washington St From South					New Chardon St From West					
Start Time	Left	Bear Left	Thru	Right	App. Total	Hard Left	Left	Thru	Right	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	App. Total	Left	Thru	Right	Hard Right	App. Total	Left	Thru	Bear Right	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 11:45 - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 07:45																										
07:45	0	197	28	85	310	17	9	83	48	157	0	0	0	0	0	0	0	0	0	0	0	0	74	8	82	549
08:00	0	184	50	103	337	8	3	109	30	150	0	0	0	0	0	0	0	0	0	0	0	0	91	9	100	587
08:15	0	188	46	83	317	8	9	86	33	136	0	0	0	0	0	0	0	0	0	0	0	0	88	13	101	554
08:30	0	182	40	111	333	18	6	103	49	176	0	0	0	0	0	0	0	0	0	0	0	0	90	13	103	612
Total Volume	0	751	164	382	1297	51	27	381	160	619	0	0	0	0	0	0	0	0	0	0	0	0	343	43	386	2302
% App. Total	0	57.9	12.6	29.5		8.2	4.4	61.6	25.8		0	0	0	0		0	0	0	0		0	0	88.9	11.1		
PHF	.000	.953	.820	.860	.962	.708	.750	.874	.816	.879	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.942	.827	.937	.940

Accurate Counts
978-664-2565

File Name : 61880002
Site Code : 61880002
Start Date : 8/1/2007
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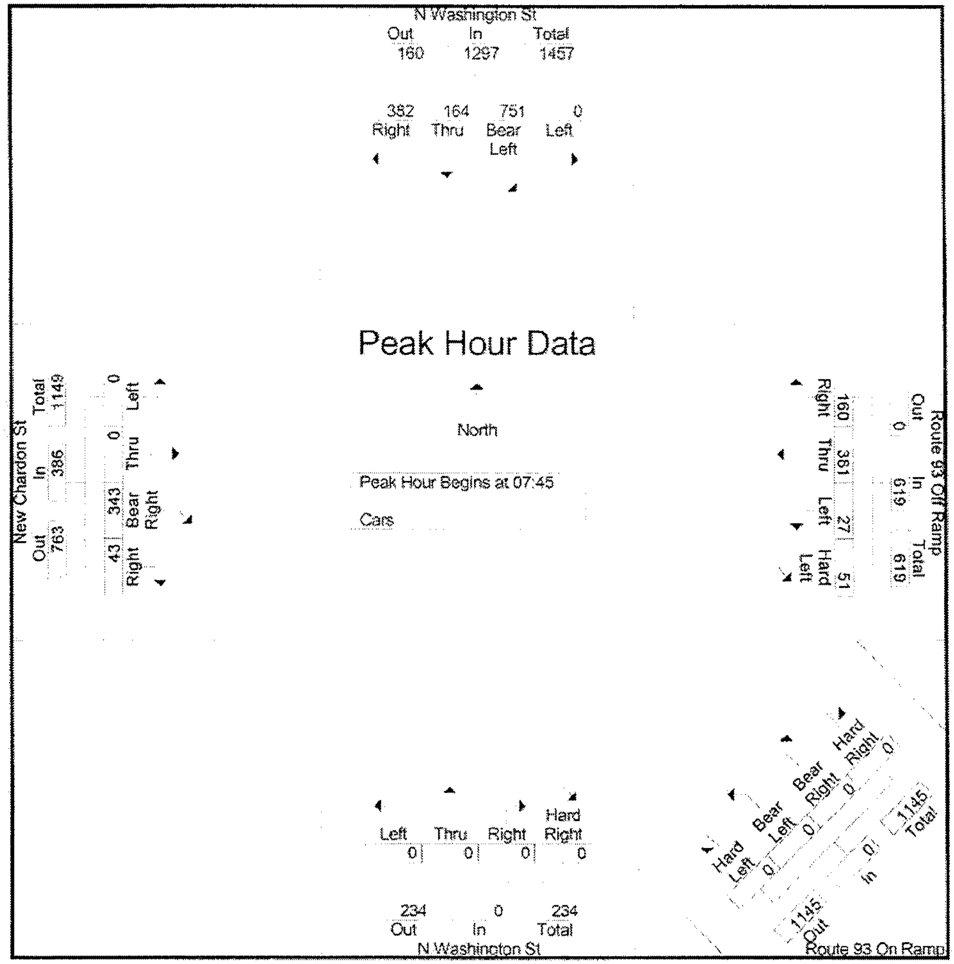

Peak Hour Analysis From 12:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 16:30

16:30	0	228	34	62	324	7	1	72	40	120	0	0	0	0	0	0	0	0	0	0	0	0	241	3	244	688
16:45	0	233	40	73	346	10	0	84	38	132	0	0	0	0	0	0	0	0	0	0	0	0	248	12	260	738
17:00	0	266	25	74	365	4	2	41	22	69	0	0	0	0	0	0	0	0	0	0	0	0	238	6	244	678
17:15	0	221	24	84	329	3	1	79	43	126	0	0	0	0	0	0	0	0	0	0	0	0	266	8	274	729
Total Volume	0	948	123	293	1364	24	4	276	143	447	0	0	0	0	0	0	0	0	0	0	0	0	993	29	1022	2833
% App. Total	0	69.5	9	21.5		5.4	0.9	61.7	32		0	0	0	0		0	0	0	0		0	0	97.2	2.8		
PHF	.000	.891	.769	.872	.934	.600	.500	.821	.831	.847	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.933	.604	.932	.960

Accurate Counts
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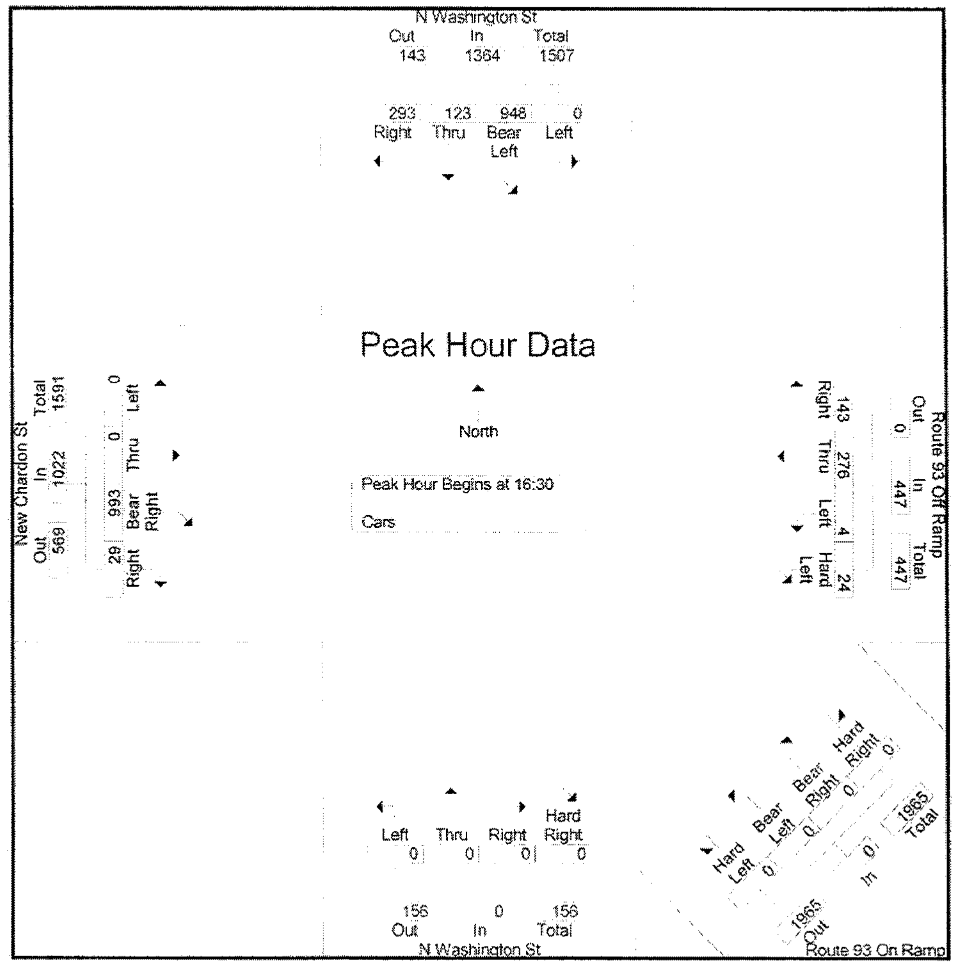
File Name : 61880002
Site Code : 61880002
Start Date : 8/1/2007
Page No : 3

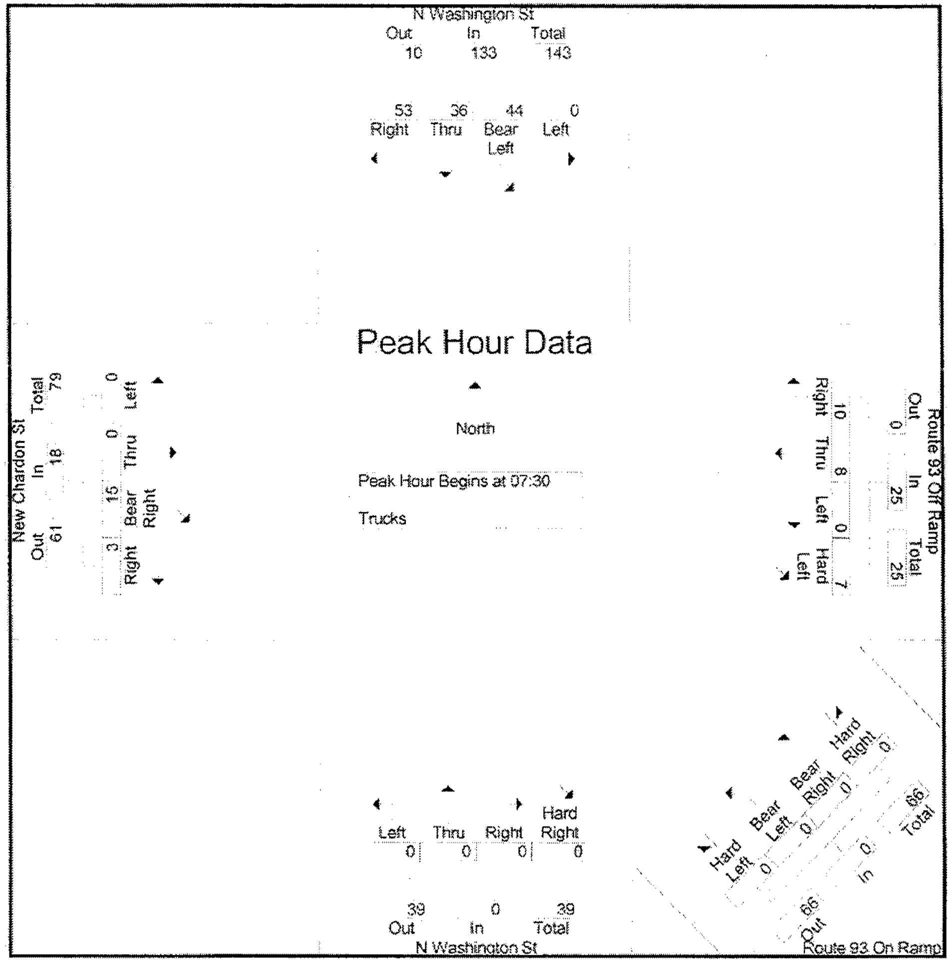


N/S Street : North Washington Street
E/W Street: New Chardon St / Rt 93 Ramp
City/State : Boston, MA
Weather : Clear

Accurate Counts
978-664-2565

File Name : 61880002
Site Code : 61880002
Start Date : 8/1/2007
Page No : 1

	N Washington St From North					Route 93 Off Ramp From East					Route 93 On Ramp From Southeast					N Washington St From South					New Chardon St From West					
Start Time	Left	Bear Left	Thru	Right	App. Total	Hard Left	Left	Thru	Right	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	App. Total	Left	Thru	Right	Hard Right	App. Total	Left	Thru	Bear Right	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 11:45 - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 07:30																										
07:30	0	16	8	17	41	1	0	2	2	5	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	49
07:45	0	9	9	12	30	2	0	1	3	6	0	0	0	0	0	0	0	0	0	0	0	0	5	0	5	41
08:00	0	11	9	13	33	3	0	1	1	5	0	0	0	0	0	0	0	0	0	0	0	0	4	1	5	43
08:15	0	8	10	11	29	1	0	4	4	9	0	0	0	0	0	0	0	0	0	0	0	0	3	2	5	43
Total Volume	0	44	36	53	133	7	0	8	10	25	0	0	0	0	0	0	0	0	0	0	0	0	15	3	18	176
% App. Total	0	33.1	27.1	39.8		28	0	32	40		0	0	0	0		0	0	0	0		0	0	83.3	16.7		
PHF	.000	.688	.900	.779	.811	.583	.000	.500	.625	.694	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.750	.375	.900	.898

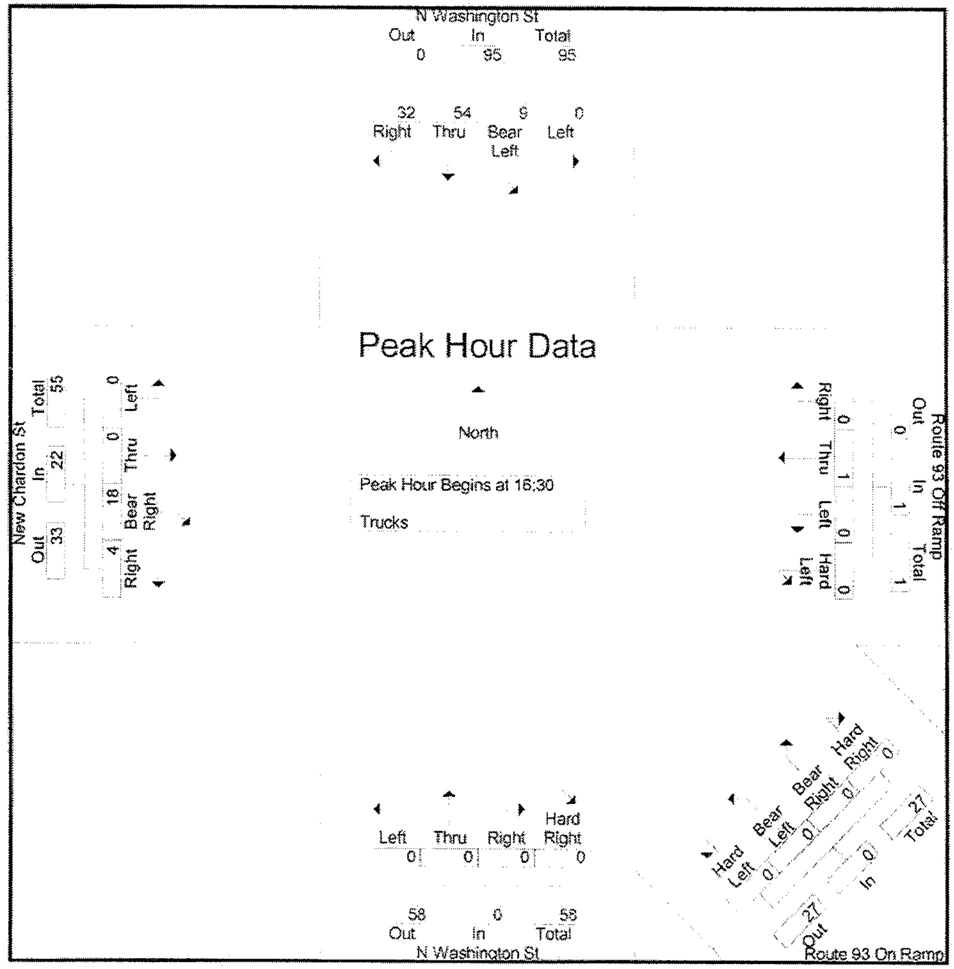


Peak Hour Analysis From 12:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 16:30

16:30	0	4	14	9	27	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	7	2	9	37
16:45	0	4	13	6	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	26
17:00	0	1	11	8	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	2	7	27
17:15	0	0	16	9	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	28
Total Volume	0	9	54	32	95	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	18	4	22	118
% App. Total	0	9.5	56.8	33.7		0	0	100	0		0	0	0	0		0	0	0	0		0	0	81.8	18.2		
PHF	.000	.563	.844	.889	.880	.000	.000	.250	.000	.250	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.643	.500	.611	.797

Accurate Counts
978-664-2565

File Name : 61
Site Code : 61
Start Date : 8/
Page No : 3



Accurate Counts
978-664-2565

N/S Street : North Washington Street
E/W Street: Medford Street
City/State : Boston, MA
Weather : Clear

File Name : 06040002
Site Code : 06040002
Start Date : 9/26/2006
Page No : 1

Groups Printed- Cars - Trucks

	North Washington St From North			North Washington St From South			Medford St From West					
Start Time	Thru	Right	Peds	Left	Thru	Peds	Left	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00	134	5	0	7	77	0	0	0	0	0	223	223
07:15	204	4	2	13	102	0	0	0	1	3	323	326
07:30	276	3	2	10	116	0	0	0	11	13	405	418
07:45	316	5	1	12	116	1	0	0	5	7	449	456
Total	930	17	5	42	411	1	0	0	17	23	1400	1423
08:00	320	6	3	16	121	0	0	0	2	5	463	468
08:15	373	2	0	22	137	0	0	0	13	13	534	547
08:30	366	6	0	17	142	0	0	0	5	5	531	536
08:45	289	1	1	11	121	0	0	0	6	7	422	429
Total	1348	15	4	66	521	0	0	0	26	30	1950	1980
Grand Total	2278	32	9	108	932	1	0	0	43	53	3350	3403
Apprch %	98.6	1.4		10.4	89.6		0	0				
Total %	68	1		3.2	27.8		0	0		1.6	98.4	
Cars	2101	31		104	800		0	0		0	0	3089
% Cars	92.2	96.9	100	96.3	85.8	100	0	0	100	0	0	90.8
Trucks	177	1		4	132		0	0		0	0	314
% Trucks	7.8	3.1	0	3.7	14.2	0	0	0	0	0	0	9.2

	North Washington St From North			North Washington St From South			Medford St From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:45										
07:45	316	5	321	12	116	128	0	0	0	449
08:00	320	6	326	16	121	137	0	0	0	463
08:15	373	2	375	22	137	159	0	0	0	534
08:30	366	6	372	17	142	159	0	0	0	531
Total Volume	1375	19	1394	67	516	583	0	0	0	1977
% App. Total	98.6	1.4		11.5	88.5		0	0		
PHF	.922	.792	.929	.761	.908	.917	.000	.000	.000	.926

Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:45			08:00			07:00		
+0 mins.	316	5	321	16	121	137	0	0	0
+15 mins.	320	6	326	22	137	159	0	0	0
+30 mins.	373	2	375	17	142	159	0	0	0
+45 mins.	366	6	372	11	121	132	0	0	0
Total Volume	1375	19	1394	66	521	587	0	0	0
% App. Total	98.6	1.4		11.2	88.8		0	0	
PHF	.922	.792	.929	.750	.917	.923	.000	.000	.000

Accurate Counts
978-664-2565

N/S Street : North Washington Street
E/W Street: Medford Street
City/State : Boston, MA
Weather : Clear

File Name : 06040002
Site Code : 06040002
Start Date : 9/26/2006
Page No : 1

Groups Printed- Cars

	North Washington St From North			North Washington St From South			Medford St From West					
Start Time	Thru	Right	Peds	Left	Thru	Peds	Left	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00	127	5	0	7	66	0	0	0	0	0	205	205
07:15	183	4	2	11	87	0	0	0	1	3	285	288
07:30	244	2	2	9	98	0	0	0	11	13	353	366
07:45	289	5	1	12	95	1	0	0	5	7	401	408
Total	843	16	5	39	346	1	0	0	17	23	1244	1267
08:00	294	6	3	15	101	0	0	0	2	5	416	421
08:15	349	2	0	22	120	0	0	0	13	13	493	506
08:30	352	6	0	17	130	0	0	0	5	5	505	510
08:45	263	1	1	11	103	0	0	0	6	7	378	385
Total	1258	15	4	65	454	0	0	0	26	30	1792	1822
Grand Total	2101	31	9	104	800	1	0	0	43	53	3036	3089
Apprch %	98.5	1.5		11.5	88.5		0	0				
Total %	69.2	1		3.4	26.4		0	0		1.7	98.3	

	North Washington St From North			North Washington St From South			Medford St From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:45										
07:45	289	5	294	12	95	107	0	0	0	401
08:00	294	6	300	15	101	116	0	0	0	416
08:15	349	2	351	22	120	142	0	0	0	493
08:30	352	6	358	17	130	147	0	0	0	505
Total Volume	1284	19	1303	66	446	512	0	0	0	1815
% App. Total	98.5	1.5		12.9	87.1		0	0		
PHF	.912	.792	.910	.750	.858	.871	.000	.000	.000	.899

Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:45			08:00			07:00		
+0 mins.	289	5	294	15	101	116	0	0	0
+15 mins.	294	6	300	22	120	142	0	0	0
+30 mins.	349	2	351	17	130	147	0	0	0
+45 mins.	352	6	358	11	103	114	0	0	0
Total Volume	1284	19	1303	65	454	519	0	0	0
% App. Total	98.5	1.5		12.5	87.5		0	0	
PHF	.912	.792	.910	.739	.873	.883	.000	.000	.000

N/S Street : North Washington Street
E/W Street: Medford Street
City/State : Boston, MA
Weather : Clear

Accurate Counts
978-664-2565

File Name : 06040002
Site Code : 06040002
Start Date : 9/26/2006
Page No : 1

Groups Printed- Trucks

	North Washington St From North			North Washington St From South			Medford St From West					
Start Time	Thru	Right	Peds	Left	Thru	Peds	Left	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00	7	0	0	0	11	0	0	0	0	0	18	18
07:15	21	0	0	2	15	0	0	0	0	0	38	38
07:30	32	1	0	1	18	0	0	0	0	0	52	52
07:45	27	0	0	0	21	0	0	0	0	0	48	48
Total	87	1	0	3	65	0	0	0	0	0	156	156
08:00	26	0	0	1	20	0	0	0	0	0	47	47
08:15	24	0	0	0	17	0	0	0	0	0	41	41
08:30	14	0	0	0	12	0	0	0	0	0	26	26
08:45	26	0	0	0	18	0	0	0	0	0	44	44
Total	90	0	0	1	67	0	0	0	0	0	158	158
Grand Total	177	1	0	4	132	0	0	0	0	0	314	314
Apprch %	99.4	0.6		2.9	97.1		0	0				
Total %	56.4	0.3		1.3	42		0	0		0	100	

	North Washington St From North			North Washington St From South			Medford St From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:30										
07:30	32	1	33	1	18	19	0	0	0	52
07:45	27	0	27	0	21	21	0	0	0	48
08:00	26	0	26	1	20	21	0	0	0	47
08:15	24	0	24	0	17	17	0	0	0	41
Total Volume	109	1	110	2	76	78	0	0	0	188
% App. Total	99.1	0.9		2.6	97.4		0	0		
PHF	.852	.250	.833	.500	.905	.929	.000	.000	.000	.904

Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1
Peak Hour for Each Approach Begins at:

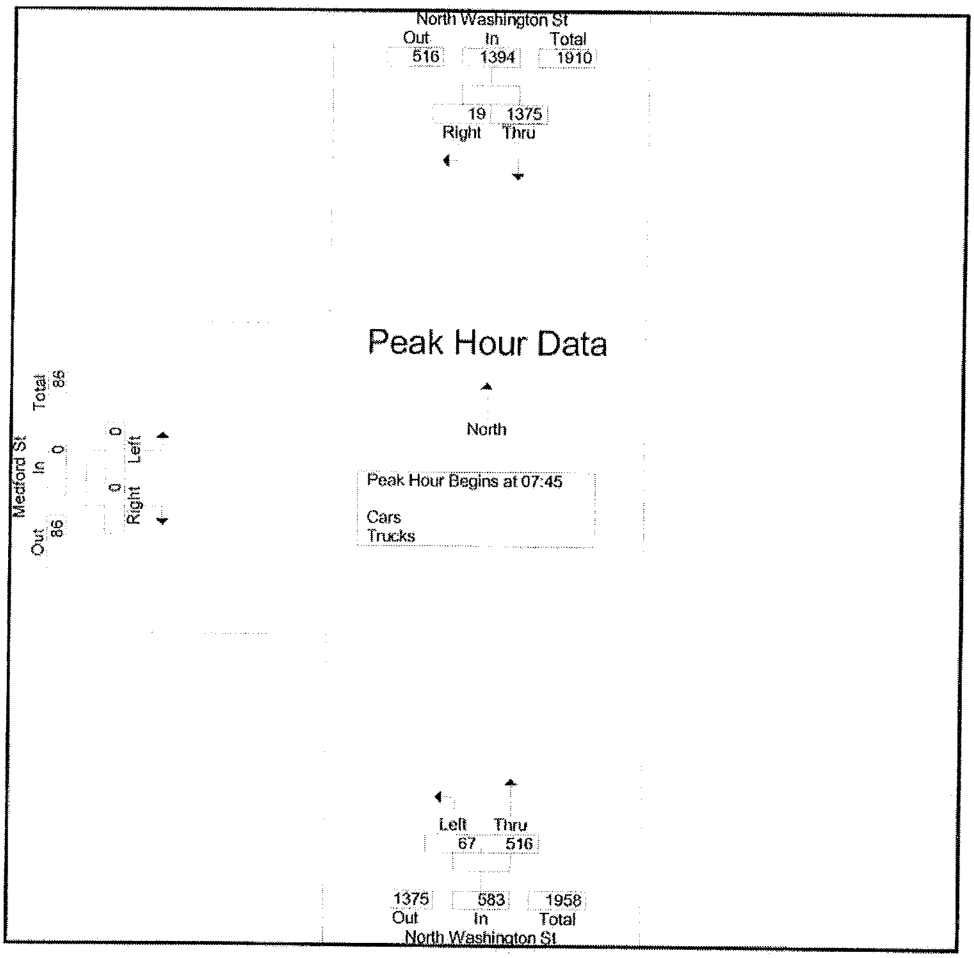
	07:30			07:15			07:00		
+0 mins.	32	1	33	2	15	17	0	0	0
+15 mins.	27	0	27	1	18	19	0	0	0
+30 mins.	26	0	26	0	21	21	0	0	0
+45 mins.	24	0	24	1	20	21	0	0	0
Total Volume	109	1	110	4	74	78	0	0	0
% App. Total	99.1	0.9		5.1	94.9		0	0	
PHF	.852	.250	.833	.500	.881	.929	.000	.000	.000

Accurate Counts
978-664-2565

N/S Street : North Washington Street
E/W Street: Medford Street
City/State : Boston, MA
Weather : Clear

File Name : 06040002
Site Code : 06040002
Start Date : 9/26/2006
Page No : 1

	North Washington St From North			North Washington St From South			Medford St From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:45										
07:45	316	5	321	12	116	128	0	0	0	449
08:00	320	6	326	16	121	137	0	0	0	463
08:15	373	2	375	22	137	159	0	0	0	534
08:30	366	6	372	17	142	159	0	0	0	531
Total Volume	1375	19	1394	67	516	583	0	0	0	1977
% App. Total	98.6	1.4		11.5	88.5		0	0		
PHF	.922	.792	.929	.761	.908	.917	.000	.000	.000	.926

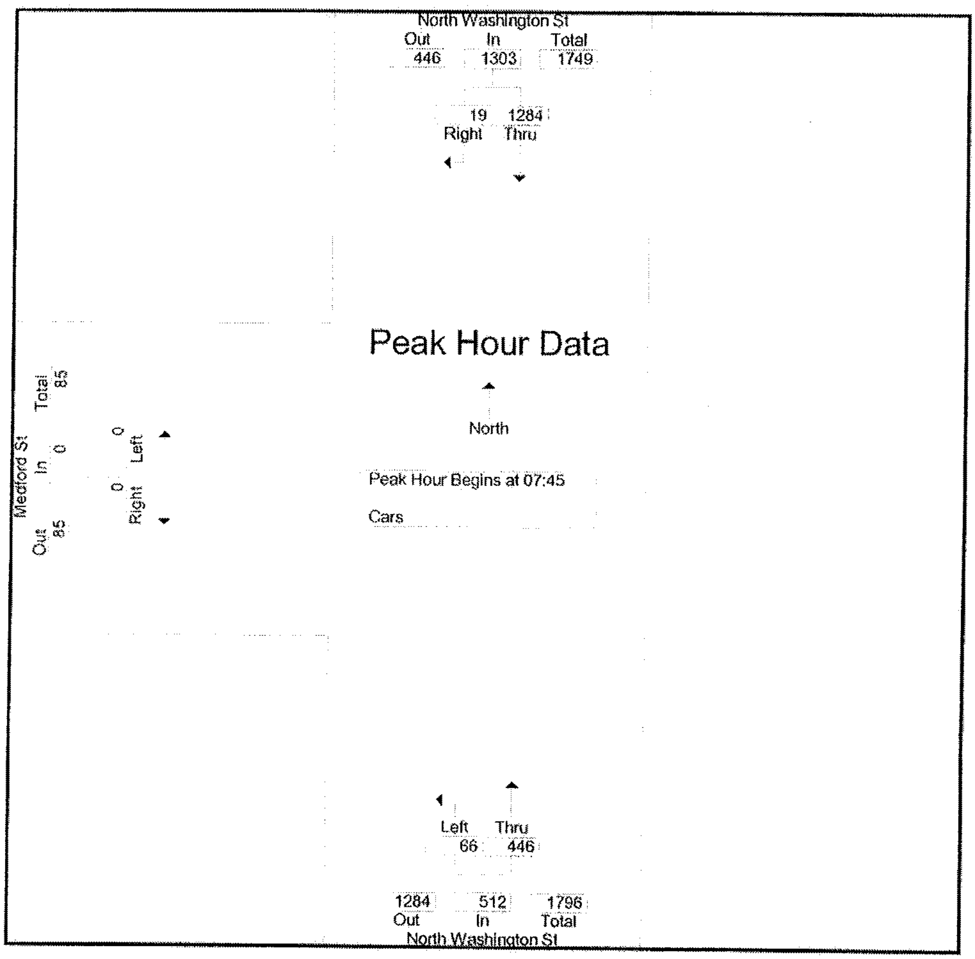


Accurate Counts
978-664-2565

N/S Street : North Washington Street
E/W Street: Medford Street
City/State : Boston, MA
Weather : Clear

File Name : 06040002
Site Code : 06040002
Start Date : 9/26/2006
Page No : 1

	North Washington St From North			North Washington St From South			Medford St From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:45										
07:45	289	5	294	12	95	107	0	0	0	401
08:00	294	6	300	15	101	116	0	0	0	416
08:15	349	2	351	22	120	142	0	0	0	493
08:30	352	6	358	17	130	147	0	0	0	505
Total Volume	1284	19	1303	66	446	512	0	0	0	1815
% App. Total	98.5	1.5		12.9	87.1		0	0		
PHF	.912	.792	.910	.750	.858	.871	.000	.000	.000	.899

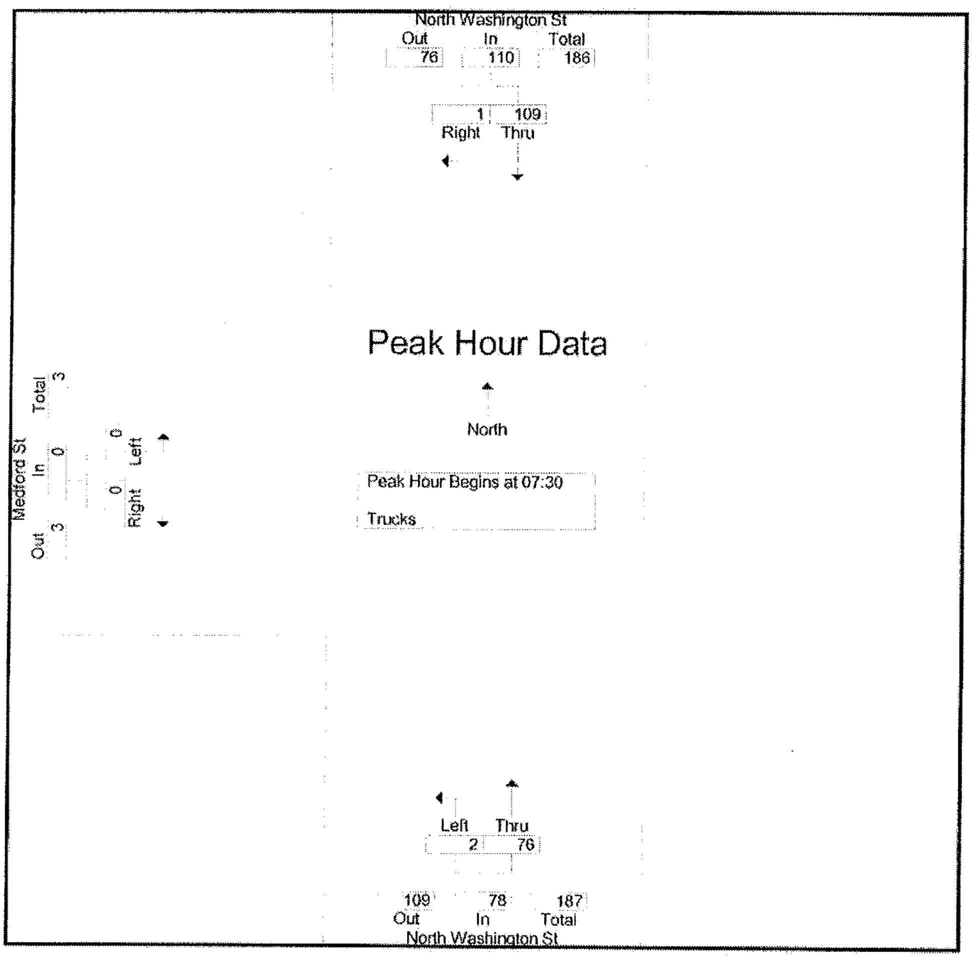


Accurate Counts
978-664-2565

N/S Street : North Washington Street
E/W Street: Medford Street
City/State : Boston, MA
Weather : Clear

File Name : 06040002
Site Code : 06040002
Start Date : 9/26/2006
Page No : 1

	North Washington St From North			North Washington St From South			Medford St From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:30										
07:30	32	1	33	1	18	19	0	0	0	52
07:45	27	0	27	0	21	21	0	0	0	48
08:00	26	0	26	1	20	21	0	0	0	47
08:15	24	0	24	0	17	17	0	0	0	41
Total Volume	109	1	110	2	76	78	0	0	0	188
% App. Total	99.1	0.9		2.6	97.4		0	0		
PHF	.852	.250	.833	.500	.905	.929	.000	.000	.000	.904



Accurate Counts
978-664-2565

N/S Street : North Washington Street
E/W Street: Medford Street
City/State : Boston, MA
Weather : Clear

File Name : 06040002
Site Code : 06040002
Start Date : 9/26/2006
Page No : 1

Groups Printed- Cars - Trucks

	North Washington St From North			North Washington St From South			Medford St From West					
Start Time	Thru	Right	Peds	Left	Thru	Peds	Left	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
16:00	237	5	2	9	121	0	0	0	9	11	372	383
16:15	215	3	2	12	143	3	0	0	7	12	373	385
16:30	238	4	2	5	152	0	0	0	8	10	399	409
16:45	261	5	1	12	131	3	0	0	3	7	409	416
Total	951	17	7	38	547	6	0	0	27	40	1553	1593
17:00	234	8	1	9	160	0	0	0	23	24	411	435
17:15	228	2	2	14	148	0	0	0	13	15	392	407
17:30	255	2	1	10	146	1	0	0	10	12	413	425
17:45	239	1	2	15	167	0	0	0	8	10	422	432
Total	956	13	6	48	621	1	0	0	54	61	1638	1699
Grand Total	1907	30	13	86	1168	7	0	0	81	101	3191	3292
Apprch %	98.5	1.5		6.9	93.1		0	0				
Total %	59.8	0.9		2.7	36.6		0	0		3.1	96.9	
Cars	1757	30		84	1017		0	0		0	0	2989
% Cars	92.1	100	100	97.7	87.1	100	0	0	100	0	0	90.8
Trucks	150	0		2	151		0	0		0	0	303
% Trucks	7.9	0	0	2.3	12.9	0	0	0	0	0	0	9.2

	North Washington St From North			North Washington St From South			Medford St From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 17:00										
17:00	234	8	242	9	160	169	0	0	0	411
17:15	228	2	230	14	148	162	0	0	0	392
17:30	255	2	257	10	146	156	0	0	0	413
17:45	239	1	240	15	167	182	0	0	0	422
Total Volume	956	13	969	48	621	669	0	0	0	1638
% App. Total	98.7	1.3		7.2	92.8		0	0		
PHF	.937	.406	.943	.800	.930	.919	.000	.000	.000	.970

Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	16:45			17:00			16:00		
+0 mins.	261	5	266	9	160	169	0	0	0
+15 mins.	234	8	242	14	148	162	0	0	0
+30 mins.	228	2	230	10	146	156	0	0	0
+45 mins.	255	2	257	15	167	182	0	0	0
Total Volume	978	17	995	48	621	669	0	0	0
% App. Total	98.3	1.7		7.2	92.8		0	0	
PHF	.937	.531	.935	.800	.930	.919	.000	.000	.000

Accurate Counts
978-664-2565

N/S Street : North Washington Street
E/W Street: Medford Street
City/State : Boston, MA
Weather : Clear

File Name : 06040002
Site Code : 06040002
Start Date : 9/26/2006
Page No : 1

Groups Printed- Cars

	North Washington St From North			North Washington St From South			Medford St From West					
Start Time	Thru	Right	Peds	Left	Thru	Peds	Left	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
16:00	211	5	2	9	108	0	0	0	9	11	333	344
16:15	199	3	2	12	121	3	0	0	7	12	335	347
16:30	215	4	2	5	128	0	0	0	8	10	352	362
16:45	237	5	1	12	106	3	0	0	3	7	360	367
Total	862	17	7	38	463	6	0	0	27	40	1380	1420
17:00	219	8	1	8	142	0	0	0	23	24	377	401
17:15	210	2	2	14	132	0	0	0	13	15	358	373
17:30	244	2	1	10	130	1	0	0	10	12	386	398
17:45	222	1	2	14	150	0	0	0	8	10	387	397
Total	895	13	6	46	554	1	0	0	54	61	1508	1569
Grand Total	1757	30	13	84	1017	7	0	0	81	101	2888	2989
Apprch %	98.3	1.7		7.6	92.4		0	0				
Total %	60.8	1		2.9	35.2		0	0		3.4	96.6	

	North Washington St From North			North Washington St From South			Medford St From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 17:00										
17:00	219	8	227	8	142	150	0	0	0	377
17:15	210	2	212	14	132	146	0	0	0	358
17:30	244	2	246	10	130	140	0	0	0	386
17:45	222	1	223	14	150	164	0	0	0	387
Total Volume	895	13	908	46	554	600	0	0	0	1508
% App. Total	98.6	1.4		7.7	92.3		0	0		
PHF	.917	.406	.923	.821	.923	.915	.000	.000	.000	.974

Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	16:45			17:00			16:00		
+0 mins.	237	5	242	8	142	150	0	0	0
+15 mins.	219	8	227	14	132	146	0	0	0
+30 mins.	210	2	212	10	130	140	0	0	0
+45 mins.	244	2	246	14	150	164	0	0	0
Total Volume	910	17	927	46	554	600	0	0	0
% App. Total	98.2	1.8		7.7	92.3		0	0	
PHF	.932	.531	.942	.821	.923	.915	.000	.000	.000

Accurate Counts
978-664-2565

N/S Street : North Washington Street
E/W Street: Medford Street
City/State : Boston, MA
Weather : Clear

File Name : 06040002
Site Code : 06040002
Start Date : 9/26/2006
Page No : 1

Groups Printed- Trucks

	North Washington St From North			North Washington St From South			Medford St From West					
Start Time	Thru	Right	Peds	Left	Thru	Peds	Left	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
16:00	26	0	0	0	13	0	0	0	0	0	39	39
16:15	16	0	0	0	22	0	0	0	0	0	38	38
16:30	23	0	0	0	24	0	0	0	0	0	47	47
16:45	24	0	0	0	25	0	0	0	0	0	49	49
Total	89	0	0	0	84	0	0	0	0	0	173	173
17:00	15	0	0	1	18	0	0	0	0	0	34	34
17:15	18	0	0	0	16	0	0	0	0	0	34	34
17:30	11	0	0	0	16	0	0	0	0	0	27	27
17:45	17	0	0	1	17	0	0	0	0	0	35	35
Total	61	0	0	2	67	0	0	0	0	0	130	130
Grand Total	150	0	0	2	151	0	0	0	0	0	303	303
Apprch %	100	0		1.3	98.7		0	0				
Total %	49.5	0		0.7	49.8		0	0		0	100	

	North Washington St From North			North Washington St From South			Medford St From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 16:00										
16:00	26	0	26	0	13	13	0	0	0	39
16:15	16	0	16	0	22	22	0	0	0	38
16:30	23	0	23	0	24	24	0	0	0	47
16:45	24	0	24	0	25	25	0	0	0	49
Total Volume	89	0	89	0	84	84	0	0	0	173
% App. Total	100	0		0	100		0	0		
PHF	.856	.000	.856	.000	.840	.840	.000	.000	.000	.883

Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Each Approach Begins at:

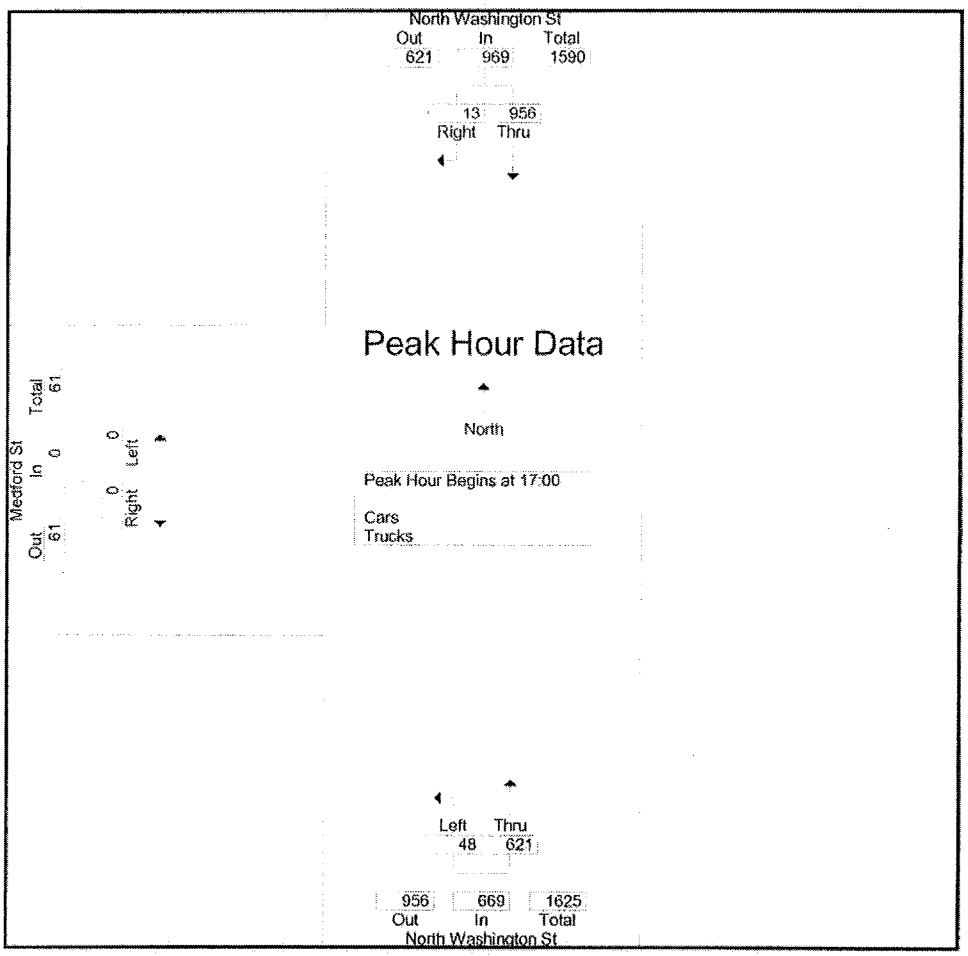
	16:00			16:15			16:00		
+0 mins.	26	0	26	0	22	22	0	0	0
+15 mins.	16	0	16	0	24	24	0	0	0
+30 mins.	23	0	23	0	25	25	0	0	0
+45 mins.	24	0	24	1	18	19	0	0	0
Total Volume	89	0	89	1	89	90	0	0	0
% App. Total	100	0		1.1	98.9		0	0	
PHF	.856	.000	.856	.250	.890	.900	.000	.000	.000

Accurate Counts
978-664-2565

N/S Street : North Washington Street
E/W Street: Medford Street
City/State : Boston, MA
Weather : Clear

File Name : 06040002
Site Code : 06040002
Start Date : 9/26/2006
Page No : 1

	North Washington St From North			North Washington St From South			Medford St From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 17:00										
17:00	234	8	242	9	160	169	0	0	0	411
17:15	228	2	230	14	148	162	0	0	0	392
17:30	255	2	257	10	146	156	0	0	0	413
17:45	239	1	240	15	167	182	0	0	0	422
Total Volume	956	13	969	48	621	669	0	0	0	1638
% App. Total	98.7	1.3		7.2	92.8		0	0		
PHF	.937	.406	.943	.800	.930	.919	.000	.000	.000	.970

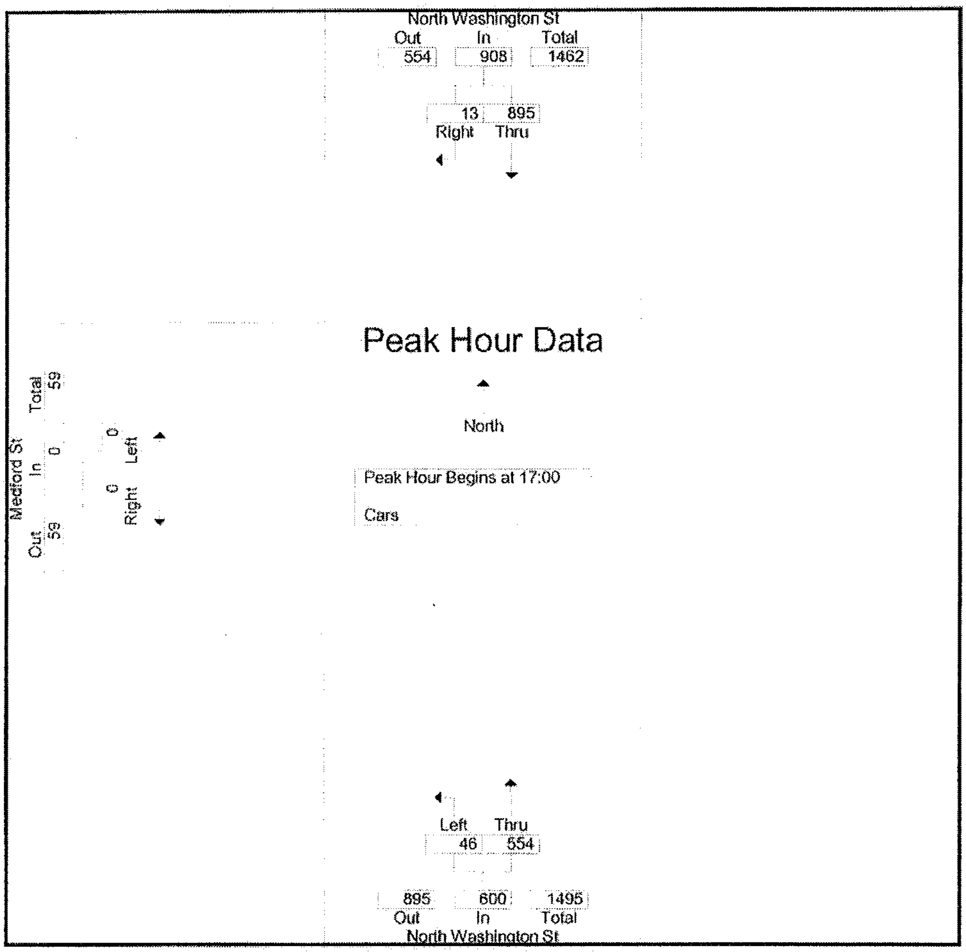


Accurate Counts
978-664-2565

N/S Street : North Washington Street
E/W Street: Medford Street
City/State : Boston, MA
Weather : Clear

File Name : 06040002
Site Code : 06040002
Start Date : 9/26/2006
Page No : 1

	North Washington St From North			North Washington St From South			Medford St From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 17:00										
17:00	219	8	227	8	142	150	0	0	0	377
17:15	210	2	212	14	132	146	0	0	0	358
17:30	244	2	246	10	130	140	0	0	0	386
17:45	222	1	223	14	150	164	0	0	0	387
Total Volume	895	13	908	46	554	600	0	0	0	1508
% App. Total	98.6	1.4		7.7	92.3		0	0		
PHF	.917	.406	.923	.821	.923	.915	.000	.000	.000	.974

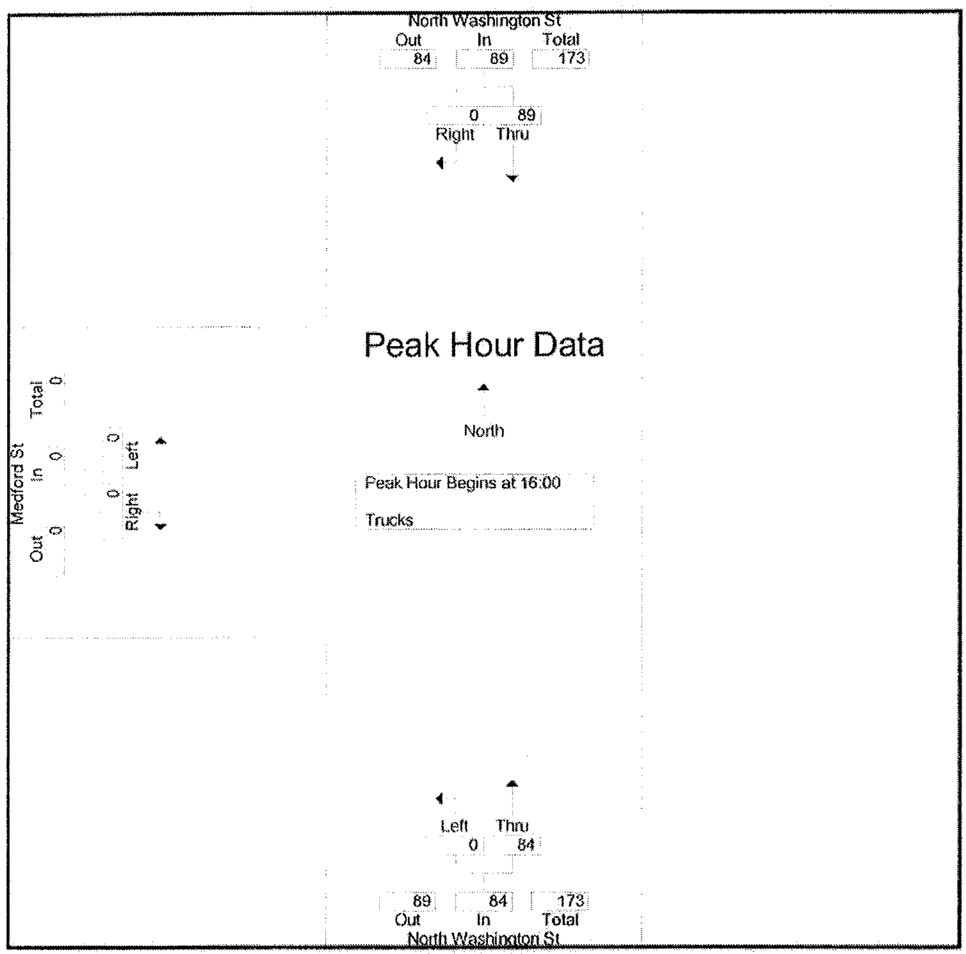


Accurate Counts
978-664-2565

N/S Street : North Washington Street
E/W Street: Medford Street
City/State : Boston, MA
Weather : Clear

File Name : 06040002
Site Code : 06040002
Start Date : 9/26/2006
Page No : 1

	North Washington St From North			North Washington St From South			Medford St From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 16:00										
16:00	26	0	26	0	13	13	0	0	0	39
16:15	16	0	16	0	22	22	0	0	0	38
16:30	23	0	23	0	24	24	0	0	0	47
16:45	24	0	24	0	25	25	0	0	0	49
Total Volume	89	0	89	0	84	84	0	0	0	173
% App. Total	100	0		0	100		0	0		
PHF	.856	.000	.856	.000	.840	.840	.000	.000	.000	.883



Accurate Counts
978-664-2565

N/S Street : Canal Street
E/W Street: Causeway Street
City/State : Boston, MA
Weather : Clear

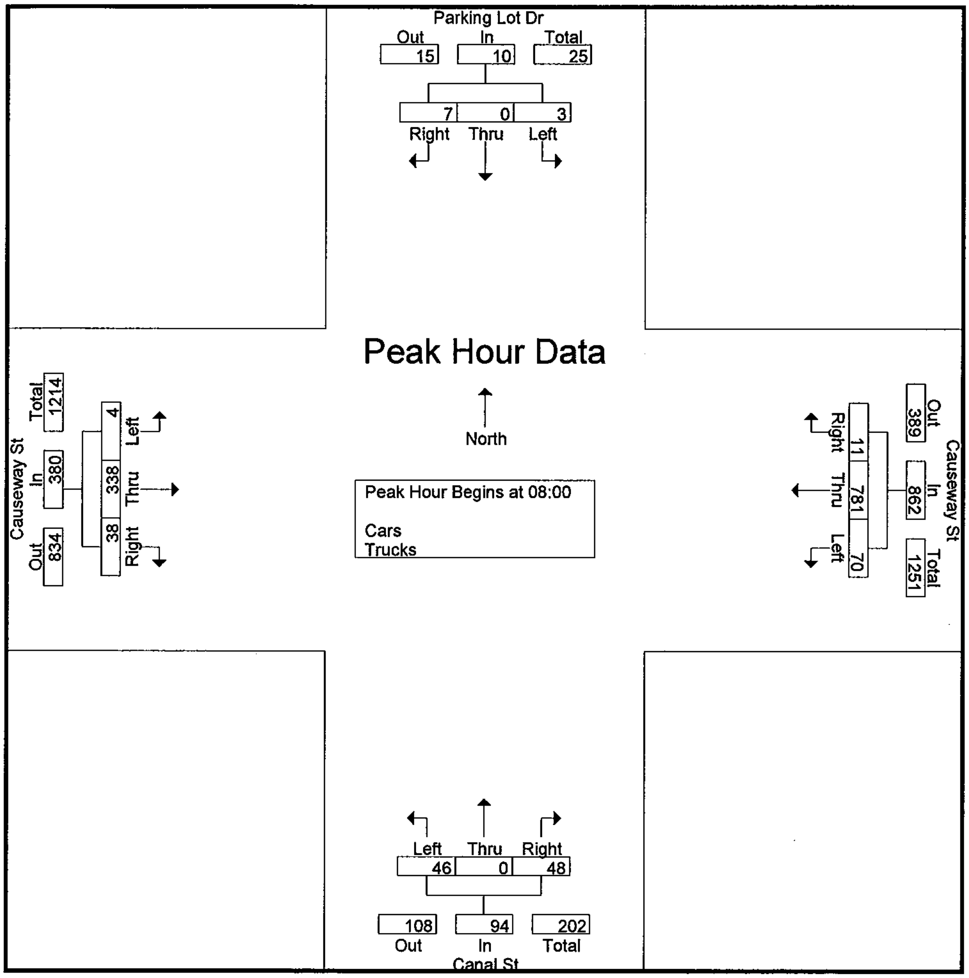
File Name : 51680001
Site Code : 51680001
Start Date : 10/6/2005
Page No : 1

Groups Printed- Cars - Trucks

	Parking Lot Dr From North				Causeway St From East				Canal St From South				Causeway St From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00	1	0	0	21	15	128	1	16	10	0	11	111	0	64	4	21	169	234	403
07:15	0	0	0	29	4	151	0	12	4	0	9	147	0	67	2	35	223	237	460
07:30	0	0	0	54	7	142	0	14	4	0	9	138	0	66	6	24	230	234	464
07:45	0	0	0	54	14	193	4	25	8	0	12	198	0	96	10	34	311	337	648
Total	1	0	0	158	40	614	5	67	26	0	41	594	0	293	22	114	933	1042	1975
08:00	0	0	3	44	11	188	4	30	12	0	9	260	2	93	5	38	372	327	699
08:15	1	0	0	63	21	202	1	18	8	0	15	298	1	88	8	42	421	345	766
08:30	1	0	2	73	10	190	4	18	13	0	14	236	0	68	14	49	376	316	692
08:45	1	0	2	54	28	201	2	8	13	0	10	230	1	89	11	30	322	358	680
Total	3	0	7	234	70	781	11	74	46	0	48	1024	4	338	38	159	1491	1346	2837
Grand Total	4	0	7	392	110	1395	16	141	72	0	89	1618	4	631	60	273	2424	2388	4812
Apprch %	36.4	0	63.6		7.2	91.7	1.1		44.7	0	55.3		0.6	90.8	8.6				
Total %	0.2	0	0.3		4.6	58.4	0.7		3	0	3.7		0.2	26.4	2.5		50.4	49.6	
Cars	1	0	3		107	1319	2		64	0	70		2	548	56		0	0	4594
% Cars	25	0	42.9	100	97.3	94.6	12.5	100	88.9	0	78.7	99.9	50	86.8	93.3	100	0	0	95.5
Trucks	3	0	4		3	76	14		8	0	19		2	83	4		0	0	218
% Trucks	75	0	57.1	0	2.7	5.4	87.5	0	11.1	0	21.3	0.1	50	13.2	6.7	0	0	0	4.5

	Parking Lot Dr From North				Causeway St From East				Canal St From South				Causeway St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00																	
08:00	0	0	**3**	**3**	11	188	**4**	203	12	0	9	21	**2**	**93**	5	100	327
08:15	**1**	0	0	1	21	**202**	1	224	8	0	**15**	23	1	88	8	97	345
08:30	1	0	2	3	10	190	4	204	**13**	0	14	**27**	0	68	**14**	82	316
08:45	1	0	2	3	**28**	201	2	**231**	13	0	10	23	1	89	11	**101**	**358**
Total Volume	3	0	7	10	70	781	11	862	46	0	48	94	4	338	38	380	1346
% App. Total	30	0	70		8.1	90.6	1.3		48.9	0	51.1		1.1	88.9	10		
PHF	.750	.000	.583	.833	.625	.967	.688	.933	.885	.000	.800	.870	.500	.909	.679	.941	.940

File Name : 51680001
Site Code : 51680001
Start Date : 10/6/2005
Page No : 2



Accurate Counts
978-664-2565

N/S Street : Canal Street
E/W Street: Causeway Street
City/State : Boston, MA
Weather : Clear

File Name : 51680001
Site Code : 51680001
Start Date : 10/6/2005
Page No : 1

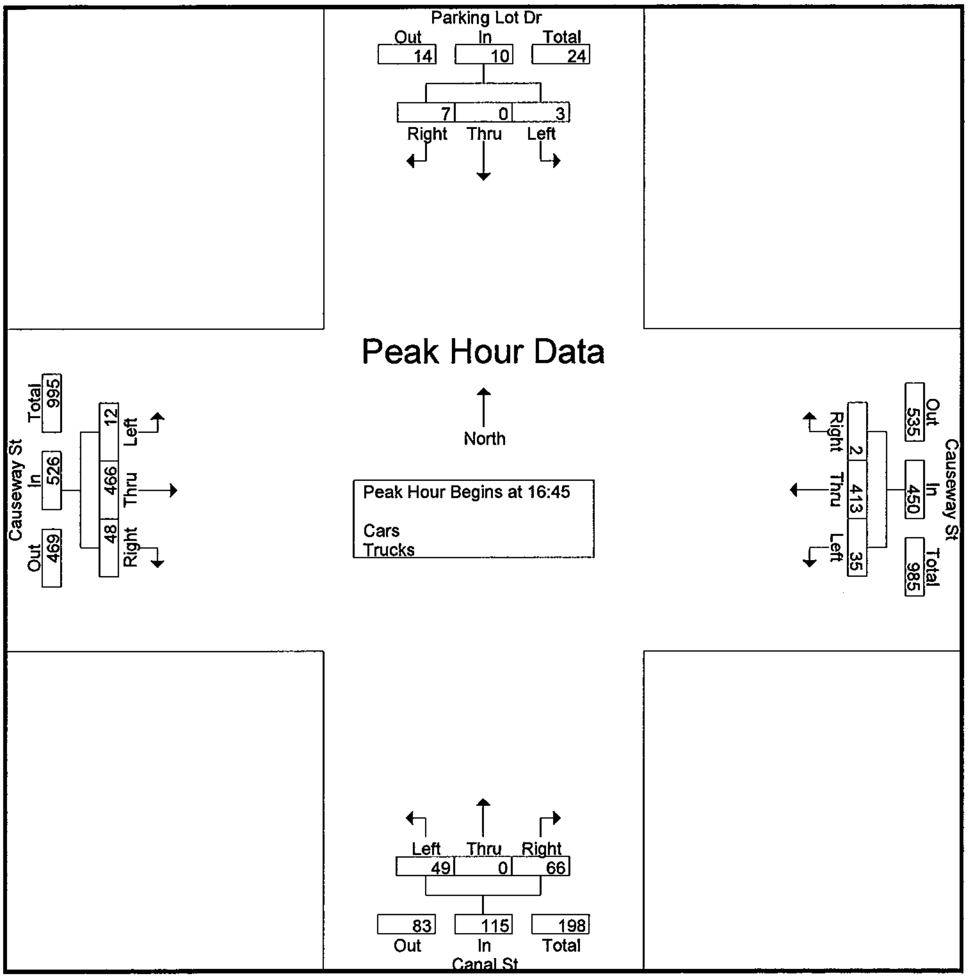
Groups Printed- Cars - Trucks

	Parking Lot Dr From North				Causeway St From East				Canal St From South				Causeway St From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
16:00	0	0	1	72	3	72	3	36	13	0	22	141	1	111	16	29	278	242	520
16:15	2	0	5	72	8	99	2	36	6	0	18	181	3	108	16	52	341	267	608
16:30	0	0	1	59	9	85	1	40	12	0	17	161	4	89	12	44	304	230	534
16:45	1	0	3	85	10	98	1	24	22	0	14	183	4	116	13	32	324	282	606
Total	3	0	10	288	30	354	7	136	53	0	71	666	12	424	57	157	1247	1021	2268
17:00	2	0	2	94	7	100	1	57	12	0	25	228	2	113	12	61	440	276	716
17:15	0	0	1	77	12	109	0	45	7	0	17	211	2	121	14	62	395	283	678
17:30	0	0	1	75	6	106	0	21	8	0	10	150	4	116	9	47	293	260	553
17:45	0	0	0	86	5	100	0	14	23	0	19	172	3	111	9	54	326	270	596
Total	2	0	4	332	30	415	1	137	50	0	71	761	11	461	44	224	1454	1089	2543
Grand Total	5	0	14	620	60	769	8	273	103	0	142	1427	23	885	101	381	2701	2110	4811
Apprch %	26.3	0	73.7		7.2	91.9	1		42	0	58		2.3	87.7	10				
Total %	0.2	0	0.7		2.8	36.4	0.4		4.9	0	6.7		1.1	41.9	4.8		56.1	43.9	
Cars	3	0	6		59	714	5		95	0	135		11	842	101		0	0	4672
% Cars	60	0	42.9	100	98.3	92.8	62.5	100	92.2	0	95.1	100	47.8	95.1	100	100	0	0	97.1
Trucks	2	0	8		1	55	3		8	0	7		12	43	0		0	0	139
% Trucks	40	0	57.1	0	1.7	7.2	37.5	0	7.8	0	4.9	0	52.2	4.9	0	0	0	0	2.9

	Parking Lot Dr From North				Causeway St From East				Canal St From South				Causeway St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 16:45																	
16:45	1	0	**3**	**4**	10	98	**1**	109	**22**	0	14	36	**4**	116	13	133	282
17:00	**2**	0	2	4	7	100	1	108	12	0	**25**	**37**	2	113	12	127	276
17:15	0	0	1	1	**12**	**109**	0	**121**	7	0	17	24	2	**121**	**14**	**137**	**283**
17:30	0	0	1	1	6	106	0	112	8	0	10	18	4	116	9	129	260
Total Volume	3	0	7	10	35	413	2	450	49	0	66	115	12	466	48	526	1101
% App. Total	30	0	70		7.8	91.8	0.4		42.6	0	57.4		2.3	88.6	9.1		
PHF	.375	.000	.583	.625	.729	.947	.500	.930	.557	.000	.660	.777	.750	.963	.857	.960	.973

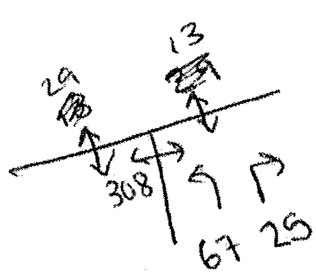
Accurate Counts
978-664-2565

File Name : 51680001
Site Code : 51680001
Start Date : 10/6/2005
Page No : 2



06040 Kaitlin 9/~~27~~28/06

	Out of Medford (Cars)		Crossing Causeway (Peds)				Peds Medford	
	Left (West)	Right (East)	EoM N	EoM S	WoM N	WoM S	E	W
7:00-7:15	11	4	0	0	4	3	20	12
7:15-7:30	15	6	0	3	3	2	21	11
7:30-7:45	11	1	0	2	2	1	40	18
7:45-8:00	16	7	1	3	0	5	40	27
8:00-8:15	13	7	0	0	3	4	44	40
8:15-8:30	24	4	0	4	5	2	38	40
8:30-8:45	20	7	1	3	3	4	40	24
8:45-9:00	10	7	1	4	4	4	47	35
8-9	67	25	2	11	15	14	169	139



HOWARD / STEIN - HUDSON ASSOCIATES

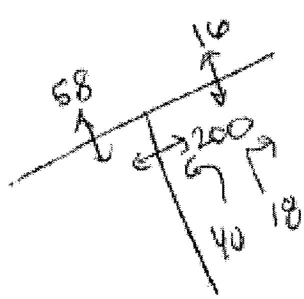
Project:
Project #: 06040

Date: 9/26/06 ~~9/27/06~~
By: Kaitlin
[redacted]

TRAFFIC COUNTS WORKSHEET

TIME	STREET: MEDFORD STREET			STREET: CAUSEWAY STREET (PEDS)	
	Left (West)	Right (East)	Peds (South)	West	East
4:00 PM	7	5	[illegible]	5	[illegible]
4:15 PM	16	2	[illegible]	7	5
4:30 PM	7	2	49	12	2
4:45 PM	11	5	53	20	4
5:00 PM	[illegible]	9	42	19	[illegible]
5:15 PM	14	2	56	[illegible]	[illegible]
5:30 PM	10	3	[illegible]	6	[illegible]
5:45 PM	13	4	[illegible]	9	[illegible]

4:30-5:30	40	18	200	58	16



Accurate Counts
978-664-2565

N/S Street : Canal Street
E/W Street: Valenti Way
City/State : Boston, MA
Weather : Clear

File Name : 51680002
Site Code : 51680002
Start Date : 10/6/2005
Page No : 1

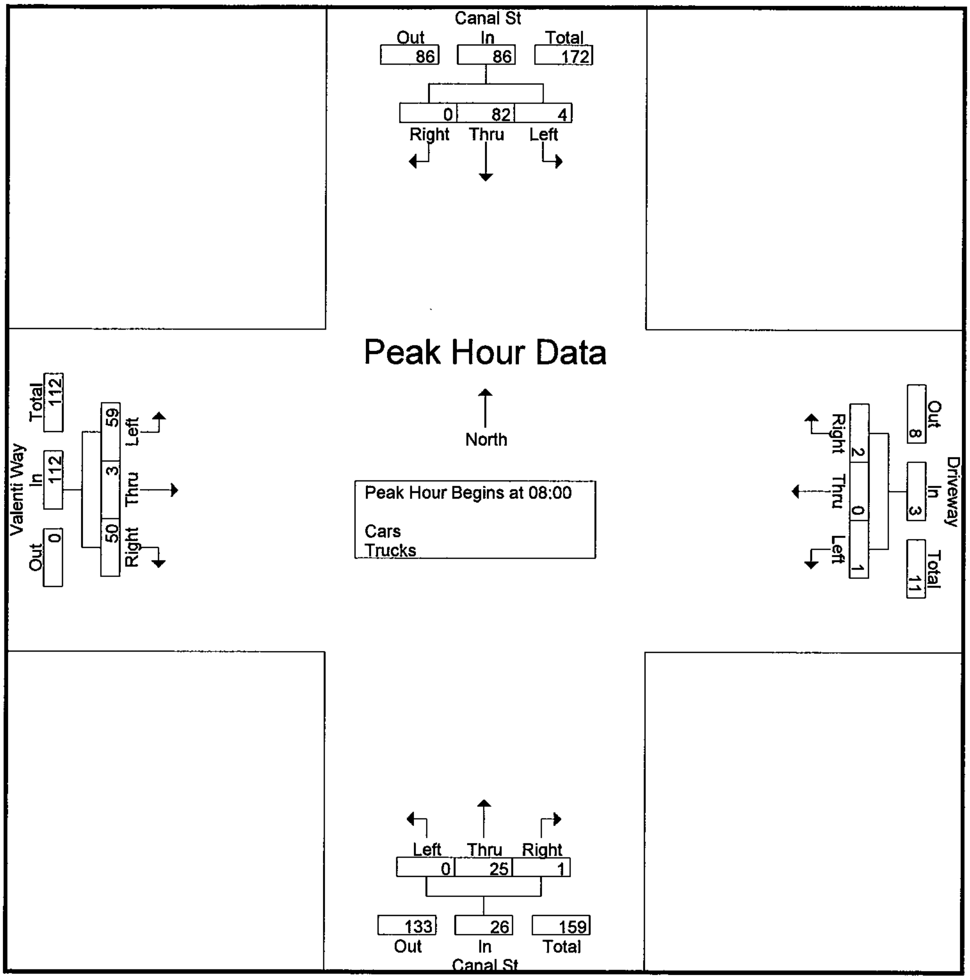
Groups Printed- Cars - Trucks

	Canal St From North				Driveway From East				Canal St From South				Valenti Way From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00	0	10	0	34	0	0	0	5	0	6	0	3	20	0	9	26	68	45	113
07:15	1	6	0	50	0	0	0	20	0	3	0	7	12	1	7	37	114	30	144
07:30	3	7	0	25	0	0	0	13	0	1	0	5	12	1	6	7	50	30	80
07:45	0	21	0	58	0	0	1	30	0	5	0	12	9	0	9	57	157	45	202
Total	4	44	0	167	0	0	1	68	0	15	0	27	53	2	31	127	389	150	539
08:00	1	14	0	129	0	0	0	29	0	5	0	14	15	2	13	110	282	50	332
08:15	2	19	0	164	0	0	1	26	0	5	0	26	8	1	8	78	294	44	338
08:30	0	20	0	135	1	0	0	36	0	7	0	31	19	0	12	55	257	59	316
08:45	1	29	0	96	0	0	1	34	0	8	1	20	17	0	17	77	227	74	301
Total	4	82	0	524	1	0	2	125	0	25	1	91	59	3	50	320	1060	227	1287
Grand Total	8	126	0	691	1	0	3	193	0	40	1	118	112	5	81	447	1449	377	1826
Apprch %	6	94	0		25	0	75		0	97.6	2.4		56.6	2.5	40.9				
Total %	2.1	33.4	0		0.3	0	0.8		0	10.6	0.3		29.7	1.3	21.5		79.4	20.6	
Cars	8	124	0		1	0	3		0	36	1		103	5	79		0	0	1809
% Cars	100	98.4	0	100	100	0	100	100	0	90	100	100	92	100	97.5	100	0	0	99.1
Trucks	0	2	0		0	0	0		0	4	0		9	0	2		0	0	17
% Trucks	0	1.6	0	0	0	0	0	0	0	10	0	0	8	0	2.5	0	0	0	0.9

	Canal St From North				Driveway From East				Canal St From South				Valenti Way From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00																	
08:00	1	14	0	15	0	0	0	0	0	5	0	5	15	**2**	13	30	50
08:15	**2**	19	0	21	0	0	**1**	**1**	0	5	0	5	8	1	8	17	44
08:30	0	20	0	20	**1**	0	0	1	0	7	0	7	**19**	0	12	31	59
08:45	1	**29**	0	**30**	0	0	1	1	0	**8**	**1**	**9**	17	0	**17**	**34**	**74**
Total Volume	4	82	0	86	1	0	2	3	0	25	1	26	59	3	50	112	227
% App. Total	4.7	95.3	0		33.3	0	66.7		0	96.2	3.8		52.7	2.7	44.6		
PHF	.500	.707	.000	.717	.250	.000	.500	.750	.000	.781	.250	.722	.776	.375	.735	.824	.767

Accurate Counts
978-664-2565

File Name : 51680002
Site Code : 51680002
Start Date : 10/6/2005
Page No : 2



Accurate Counts
978-664-2565

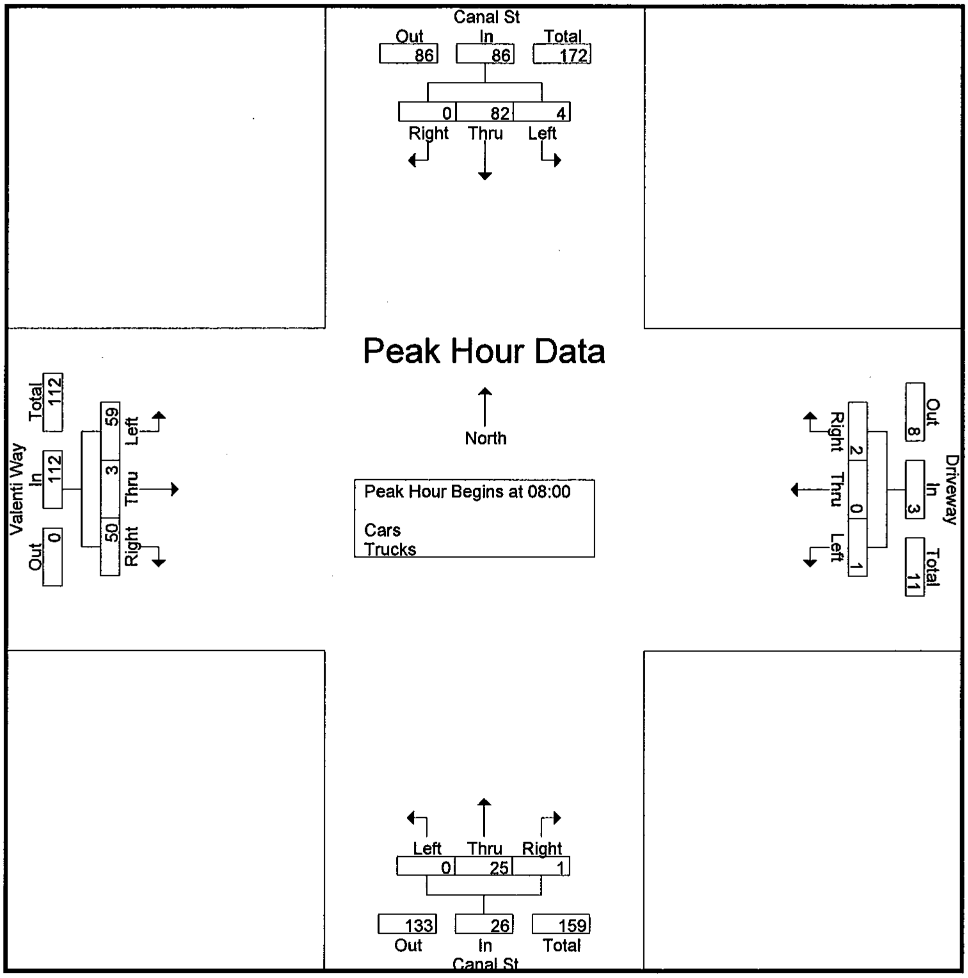
N/S Street : Canal Street
E/W Street: Valenti Way
City/State : Boston, MA
Weather : Clear

File Name : 51680002
Site Code : 51680002
Start Date : 10/6/2005
Page No : 1

Groups Printed- Cars - Trucks

	Canal St From North				Driveway From East				Canal St From South				Valenti Way From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00	0	10	0	34	0	0	0	5	0	6	0	3	20	0	9	26	68	45	113
07:15	1	6	0	50	0	0	0	20	0	3	0	7	12	1	7	37	114	30	144
07:30	3	7	0	25	0	0	0	13	0	1	0	5	12	1	6	7	50	30	80
07:45	0	21	0	58	0	0	1	30	0	5	0	12	9	0	9	57	157	45	202
Total	4	44	0	167	0	0	1	68	0	15	0	27	53	2	31	127	389	150	539
08:00	1	14	0	129	0	0	0	29	0	5	0	14	15	2	13	110	282	50	332
08:15	2	19	0	164	0	0	1	26	0	5	0	26	8	1	8	78	294	44	338
08:30	0	20	0	135	1	0	0	36	0	7	0	31	19	0	12	55	257	59	316
08:45	1	29	0	96	0	0	1	34	0	8	1	20	17	0	17	77	227	74	301
Total	4	82	0	524	1	0	2	125	0	25	1	91	59	3	50	320	1060	227	1287
Grand Total	8	126	0	691	1	0	3	193	0	40	1	118	112	5	81	447	1449	377	1826
Apprch %	6	94	0		25	0	75		0	97.6	2.4		56.6	2.5	40.9				
Total %	2.1	33.4	0		0.3	0	0.8		0	10.6	0.3		29.7	1.3	21.5		79.4	20.6	
Cars	8	124	0		1	0	3		0	36	1		103	5	79		0	0	1809
% Cars	100	98.4	0	100	100	0	100	100	0	90	100	100	92	100	97.5	100	0	0	99.1
Trucks	0	2	0		0	0	0		0	4	0		9	0	2		0	0	17
% Trucks	0	1.6	0	0	0	0	0	0	0	10	0	0	8	0	2.5	0	0	0	0.9

	Canal St From North				Driveway From East				Canal St From South				Valenti Way From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00																	
08:00	1	14	0	15	0	0	0	0	0	5	0	5	15	**2**	13	30	50
08:15	**2**	19	0	21	0	0	**1**	**1**	0	5	0	5	8	1	8	17	44
08:30	0	20	0	20	**1**	0	0	1	0	7	0	7	**19**	0	12	31	59
08:45	1	**29**	0	**30**	0	0	**1**	1	0	**8**	**1**	**9**	17	0	**17**	**34**	**74**
Total Volume	4	82	0	86	1	0	2	3	0	25	1	26	59	3	50	112	227
% App. Total	4.7	95.3	0		33.3	0	66.7		0	96.2	3.8		52.7	2.7	44.6		
PHF	.500	.707	.000	.717	.250	.000	.500	.750	.000	.781	.250	.722	.776	.375	.735	.824	.767


Canal St
Out 86
In 86
Total 172
0 82 4
Right Thru Left
Peak Hour Data
North
Peak Hour Begins at 08:00
Cars
Trucks
Valenti Way
Total 112
In 112
Out 0
59 Left
3 Thru
50 Right
Driveway
Out 8
In 3
Total 11
2 Right
0 Thru
1 Left
Left Thru Right
0 25 1
133 26 159
Out In Total
Canal St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	12	11	12	12	11	12	10	10	10
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	50	50
Trailing Detector (ft)	0	0	0	0	0	0		0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.95	0.95	1.00	0.95	0.95	1.00	1.00	0.95	0.95	1.00	0.91	0.91
Ped Bike Factor			0.69					0.97		0.94		
Frt			0.850			0.850		0.977			0.980	0.850
Flt Protected	0.950	0.989			0.980					0.950		
Satd. Flow (prot)	1493	1611	1468	0	3162	1509	0	2834	0	1560	2893	1306
Flt Permitted	0.950	0.989			0.980					0.166		
Satd. Flow (perm)	1493	1611	1014	0	3162	1509	0	2834	0	256	2893	1306
Right Turn on Red			Yes			Yes			Yes			No
Satd. Flow (RTOR)			145			80		12				
Headway Factor	1.04	1.04	1.00	1.00	1.04	1.00	1.00	1.04	1.00	1.09	1.09	1.09
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		309			183			111			268	
Travel Time (s)		7.0			4.2			2.5			6.1	
Volume (vph)	217	158	119	101	128	230	0	423	58	323	1007	592
Confl. Peds. (#/hr)			190						102	102		
Peak Hour Factor	0.81	0.85	0.82	0.84	0.76	0.78	0.54	0.96	0.73	0.90	0.94	0.83
Heavy Vehicles (%)	11%	6%	10%	7%	9%	7%	23%	16%	17%	8%	10%	5%
Adj. Flow (vph)	268	186	145	120	168	295	0	441	79	359	1071	713
Lane Group Flow (vph)	216	238	145	0	288	295	0	520	0	359	1234	550
Turn Type	Split		Perm	Split		pt+ov				D.P+P		custom
Protected Phases	2	2		5	5	5 6		1		6	1 6	6
Permitted Phases			2							1		1
Detector Phases	2	2	2	5	5	5 6		1		6	1 6	6
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0			8.0		8.0		8.0
Minimum Split (s)	31.0	31.0	31.0	25.0	25.0			25.0		25.0		25.0
Total Split (s)	31.0	31.0	31.0	25.0	25.0	87.0	0.0	32.0	0.0	62.0	94.0	62.0
Total Split (%)	20.7%	20.7%	20.7%	16.7%	16.7%	58.0%	0.0%	21.3%	0.0%	41.3%	62.7%	41.3%
Maximum Green (s)	27.0	27.0	27.0	21.0	21.0			28.0		58.0		58.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0			3.0		3.0		3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0			1.0		1.0		1.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead			Lead		Lag		Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0			2.0		2.0		2.0
Recall Mode	None	None	None	None	None			C-Max		None		None
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0		7.0		7.0
Flash Dont Walk (s)	20.0	20.0	20.0	14.0	14.0			14.0		14.0		14.0
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0		0
Act Effct Green (s)	24.5	24.5	24.5		17.5	71.3		42.3		92.1	96.1	96.1
Actuated g/C Ratio	0.16	0.16	0.16		0.12	0.48		0.28		0.61	0.64	0.64
v/c Ratio	0.89	0.90	0.51		0.78	0.39		0.64		0.61	0.67	0.66
Control Delay	95.3	96.9	14.3		79.3	17.9		53.3		27.3	20.1	22.8
Queue Delay	0.0	0.0	0.1		0.0	0.0		0.0		0.0	0.1	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	95.3	96.9	14.4		79.3	17.9		53.3		27.3	20.2	22.8
LOS	F	F	B		E	B		D		C	C	C
Approach Delay		76.3			48.2			53.3			22.1	
Approach LOS		E			D			D			C	
Queue Length 50th (ft)	215	238	0		146	120		250		208	415	367
Queue Length 95th (ft)	#286	#348	46		161	137		#385		320	532	476
Internal Link Dist (ft)		229			103			31			188	
Turn Bay Length (ft)												
Base Capacity (vph)	269	290	301		443	831		807		665	1847	834
Starvation Cap Reductn	0	0	0		0	0		0		0	0	0
Spillback Cap Reductn	0	0	4		0	0		0		0	58	0
Storage Cap Reductn	0	0	0		0	0		0		0	0	0
Reduced v/c Ratio	0.80	0.82	0.49		0.65	0.35		0.64		0.54	0.69	0.66

Intersection Summary
Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 0 (0%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 38.7 Intersection LOS: D
Intersection Capacity Utilization 77.9% 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: 29: Causeway Street & North Washington Street

ø1	ø2	ø5	ø6
32 s	31 s	25 s	62 s

Lane Group	NBL	NBT	NBR	SBL	SBR	SBR2
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	13	13	12	12	12
Storage Length (ft)	0		0	25	0	
Storage Lanes	1		0	1	2	
Total Lost Time (s)	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	9
Lane Util. Factor	1.00	1.00	1.00	1.00	0.88	1.00
Ped Bike Factor		0.97		0.94		
Frt		0.987			0.850	
Flt Protected	0.950			0.950		
Satd. Flow (prot)	1532	1709	0	1736	2613	0
Flt Permitted	0.950			0.320		
Satd. Flow (perm)	1532	1709	0	550	2613	0
Right Turn on Red			Yes			Yes
Satd. Flow (RTOR)		11			6	
Headway Factor	1.09	0.96	0.96	1.00	1.00	1.00
Link Speed (mph)		30				
Link Distance (ft)		347				
Travel Time (s)		7.9				
Volume (vph)	281	589	38	47	1143	20
Confl. Peds. (#/hr)			90	90		33
Peak Hour Factor	0.94	0.94	0.63	0.69	0.91	0.58
Heavy Vehicles (%)	10%	11%	3%	4%	9%	0%
Adj. Flow (vph)	299	627	60	68	1256	34
Lane Group Flow (vph)	299	687	0	68	1290	0
Turn Type	Prot			D.Pm	custom	
Protected Phases	5	1			1	
Permitted Phases				1		
Detector Phases	5	1		1	1	
Minimum Initial (s)	8.0	8.0		8.0	8.0	
Minimum Split (s)	26.0	25.0		25.0	25.0	
Total Split (s)	26.0	74.0	0.0	74.0	74.0	0.0
Total Split (%)	26.0%	74.0%	0.0%	74.0%	74.0%	0.0%
Maximum Green (s)	21.0	69.0		69.0	69.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0	2.0		2.0	2.0	
Recall Mode	None	C-Max		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	9.0	8.0		8.0	8.0	
Pedestrian Calls (#/hr)	0	0		0	0	
Act Effct Green (s)	21.3	70.7		70.7	70.7	
Actuated g/C Ratio	0.21	0.71		0.71	0.71	
v/c Ratio	0.91	0.57		0.17	0.70	

Lane Group	NBL	NBT	NBR	SBL	SBR	SBR2
Control Delay	75.7	12.2		6.4	11.2	
Queue Delay	0.0	0.5		0.0	165.1	
Total Delay	75.7	12.7		6.4	176.2	
LOS	E	B		A	F	
Approach Delay		31.8				
Approach LOS		C				
Queue Length 50th (ft)	200	340		13	240	
Queue Length 95th (ft)	#351	472		21	322	
Internal Link Dist (ft)		267				
Turn Bay Length (ft)				25		
Base Capacity (vph)	337	1211		389	1849	
Starvation Cap Reductn	0	199		0	149	
Spillback Cap Reductn	0	0		0	903	
Storage Cap Reductn	0	0		0	0	
Reduced v/c Ratio	0.89	0.68		0.17	1.36	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 45 (45%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 110.6 Intersection LOS: F
Intersection Capacity Utilization 62.9% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 332: Valenti Way & North Washington Street

ø1	ø5
74 s	26 s

Lane Group	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations			↑↑↑			↱↱↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)			50			50
Trailing Detector (ft)			0			0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.76
Frt						0.850
Flt Protected						
Satd. Flow (prot)	0	0	4759	0	0	3347
Flt Permitted						
Satd. Flow (perm)	0	0	4759	0	0	3347
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						103
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		397	273		177	
Travel Time (s)		9.0	6.2		4.0	
Volume (vph)	0	0	1143	0	0	334
Peak Hour Factor	0.92	0.92	0.91	0.92	0.92	0.94
Heavy Vehicles (%)	0%	0%	9%	0%	0%	10%
Adj. Flow (vph)	0	0	1256	0	0	355
Lane Group Flow (vph)	0	0	1256	0	0	355
Turn Type						custom
Protected Phases			5			1
Permitted Phases						
Detector Phases			5			1
Minimum Initial (s)			8.0			8.0
Minimum Split (s)			24.0			24.0
Total Split (s)	0.0	0.0	57.0	0.0	0.0	43.0
Total Split (%)	0.0%	0.0%	57.0%	0.0%	0.0%	43.0%
Maximum Green (s)			53.0			39.0
Yellow Time (s)			3.0			3.0
All-Red Time (s)			1.0			1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)			2.0			2.0
Recall Mode			Ped			C-Max
Walk Time (s)			7.0			7.0
Flash Dont Walk (s)			9.0			9.0
Pedestrian Calls (#/hr)			0			0
Act Effct Green (s)			30.6			61.4
Actuated g/C Ratio			0.31			0.61
v/c Ratio			0.86			0.17
Control Delay			38.3			3.2
Queue Delay			0.4			0.0
Total Delay			38.7			3.2
LOS			D			A
Approach Delay			38.7			

Lane Group	NBL	NBT	SBT	SBR	SEL	SER
Approach LOS			D			
Queue Length 50th (ft)			315			8
Queue Length 95th (ft)			367			m54
Internal Link Dist (ft)		317	193		97	
Turn Bay Length (ft)						
Base Capacity (vph)			2522			2095
Starvation Cap Reductn			665			0
Spillback Cap Reductn			90			264
Storage Cap Reductn			0			0
Reduced v/c Ratio			0.68			0.19

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 57 (57%), Referenced to phase 1:SER, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 30.9 Intersection LOS: C
Intersection Capacity Utilization 36.5% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4120: North Washington Street & Beverly Street

ø1	ø5
43 s	57 s

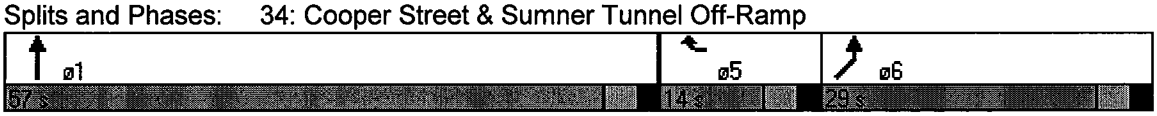
Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER
Lane Configurations		↱		↑↑					↰↰	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	14	12	12	12	12	12	12	12	12
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50		50					50	
Trailing Detector (ft)		0		0					0	
Turning Speed (mph)	15	9	15		9	15		9	15	9
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00
Frt		0.865								
Flt Protected									0.950	
Satd. Flow (prot)	0	1736	0	3505	0	0	0	0	3273	0
Flt Permitted									0.950	
Satd. Flow (perm)	0	1736	0	3505	0	0	0	0	3273	0
Right Turn on Red		Yes			No			No	No	
Satd. Flow (RTOR)		218								
Headway Factor	1.00	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30			30			30		30	
Link Distance (ft)	264			579			347		320	
Travel Time (s)	6.0			13.2			7.9		7.3	
Volume (vph)	0	74	0	669	0	0	0	0	165	0
Peak Hour Factor	0.92	0.84	0.92	0.92	0.92	0.92	0.92	0.92	0.66	0.92
Heavy Vehicles (%)	0%	1%	0%	3%	0%	0%	0%	0%	7%	0%
Adj. Flow (vph)	0	88	0	727	0	0	0	0	250	0
Lane Group Flow (vph)	0	88	0	727	0	0	0	0	250	0
Turn Type		custom							Prot	
Protected Phases		5		1					6	
Permitted Phases										
Detector Phases		5		1					6	
Minimum Initial (s)		8.0		8.0					8.0	
Minimum Split (s)		13.0		13.0					13.0	
Total Split (s)	0.0	14.0	0.0	57.0	0.0	0.0	0.0	0.0	29.0	0.0
Total Split (%)	0.0%	14.0%	0.0%	57.0%	0.0%	0.0%	0.0%	0.0%	29.0%	0.0%
Maximum Green (s)		9.0		52.0					24.0	
Yellow Time (s)		3.0		3.0					3.0	
All-Red Time (s)		2.0		2.0					2.0	
Lead/Lag		Lead							Lag	
Lead-Lag Optimize?		Yes							Yes	
Vehicle Extension (s)		2.0		2.0					2.0	
Recall Mode		None		C-Max					None	
Act Effct Green (s)		9.0		69.1					12.5	
Actuated g/C Ratio		0.09		0.69					0.12	
v/c Ratio		0.25		0.30					0.61	
Control Delay		1.7		4.2					47.6	
Queue Delay		0.0		0.0					0.1	
Total Delay		1.7		4.2					47.7	
LOS		A		A					D	
Approach Delay				4.2					47.7	
Approach LOS				A					D	
Queue Length 50th (ft)		0		42					78	

Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER
Queue Length 95th (ft)		0		57					81	
Internal Link Dist (ft)	184			499			267		240	
Turn Bay Length (ft)										
Base Capacity (vph)		370		2421					818	
Starvation Cap Reductn		0		0					0	
Spillback Cap Reductn		11		174					83	
Storage Cap Reductn		0		0					0	
Reduced v/c Ratio		0.25		0.32					0.34	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 46 (46%), Referenced to phase 1:NBT, Start of Green
Natural Cycle: 40
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.61
Intersection Signal Delay: 14.2 Intersection LOS: B
Intersection Capacity Utilization 31.8% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 34: Cooper Street & Sumner Tunnel Off-Ramp

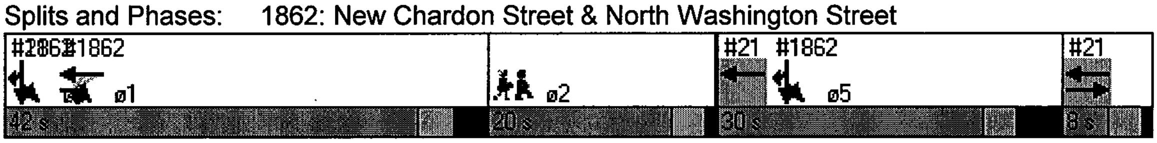


Lane Group	EBR	EBR2	WBL2	WBL	WBT	SBL	SBT	SBR	ø2	ø5	ø6
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900			
Lane Width (ft)	11	11	12	16	12	16	12	16			
Storage Length (ft)	0			25		0		0			
Storage Lanes	3			1		2		1			
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	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)	9	9	15	15		15		9			
Lane Util. Factor	0.88	1.00	0.95	1.00	0.95	0.97	0.95	0.95			
Frt	0.850	0.850					0.963	0.850			
Flt Protected				0.950		0.950					
Satd. Flow (prot)	2617	1382	0	1902	3539	3780	1479	1581			
Flt Permitted				0.950		0.950					
Satd. Flow (perm)	2617	1382	0	1902	3539	3780	1479	1581			
Right Turn on Red		Yes	No					No			
Satd. Flow (RTOR)		60									
Headway Factor	1.04	1.04	1.00	0.85	1.00	0.85	1.00	0.85			
Link Speed (mph)					30		30				
Link Distance (ft)					125		397				
Travel Time (s)					2.8		9.0				
Volume (vph)	365	46	54	26	404	786	248	443			
Peak Hour Factor	0.95	0.77	0.68	0.72	0.92	0.93	0.88	0.91			
Heavy Vehicles (%)	5%	13%	11%	0%	2%	5%	20%	10%			
Adj. Flow (vph)	384	60	79	36	439	845	282	487			
Lane Group Flow (vph)	384	60	0	115	439	845	375	394			
Turn Type	custom	custom	Perm	Perm		Split		Prot			
Protected Phases	1	1			1	5 6	5 6	5 6	2	5	6
Permitted Phases			1	1							
Detector Phases	1	1	1	1	1	5 6	5 6	5 6			
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0				8.0	8.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0				20.0	24.0	8.0
Total Split (s)	42.0	42.0	42.0	42.0	42.0	38.0	38.0	38.0	20.0	30.0	8.0
Total Split (%)	42.0%	42.0%	42.0%	42.0%	42.0%	38.0%	38.0%	38.0%	20%	30%	8%
Maximum Green (s)	36.0	36.0	36.0	36.0	36.0				16.0	23.0	4.0
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				1.0	4.0	1.0
Lead/Lag	Lead	Lead	Lead	Lead	Lead				Lag	Lead	Lag
Lead-Lag Optimize?										Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0				2.0	2.0	2.0
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max				None	Max	Max
Walk Time (s)									7.0		
Flash Dont Walk (s)									9.0		
Pedestrian Calls (#/hr)									50		
Act Effct Green (s)	42.0	42.0		42.0	42.0	34.0	34.0	34.0			
Actuated g/C Ratio	0.42	0.42		0.42	0.42	0.34	0.34	0.34			
v/c Ratio	0.35	0.10		0.14	0.30	0.66	0.75	0.73			
Control Delay	7.4	1.3		20.5	21.2	59.3	65.9	65.0			
Queue Delay	0.3	0.5		0.0	0.0	5.8	3.9	6.0			

Lane Group	EBR	EBR2	WBL2	WBL	WBT	SBL	SBT	SBR	ø2	ø5	ø6
Total Delay	7.7	1.9		20.5	21.2	65.1	69.8	71.0			
LOS	A	A		C	C	E	E	E			
Approach Delay					21.1		67.7				
Approach LOS					C		E				
Queue Length 50th (ft)	6	1		48	102	300	272	286			
Queue Length 95th (ft)	153	0		68	142	m351	m326	m344			
Internal Link Dist (ft)					45		317				
Turn Bay Length (ft)				25							
Base Capacity (vph)	1099	615		799	1487	1285	503	538			
Starvation Cap Reductn	279	359		0	0	377	68	97			
Spillback Cap Reductn	0	0		0	0	0	0	0			
Storage Cap Reductn	0	0		0	0	0	0	0			
Reduced v/c Ratio	0.47	0.23		0.14	0.30	0.93	0.86	0.89			

Intersection Summary	
Area Type: Other	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 13 (13%), Referenced to phase 1:EBWB, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 47.5	Intersection LOS: D
Intersection Capacity Utilization 51.9%	ICU Level of Service A
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 1862: New Chardon Street & North Washington Street



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	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
Lane Util. Factor	1.00	0.91	0.95	0.95	1.00	1.00
Frt					0.932	
Flt Protected	0.950				0.976	
Satd. Flow (prot)	1770	4759	3282	0	1694	0
Flt Permitted	0.222				0.976	
Satd. Flow (perm)	414	4759	3282	0	1694	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)					1	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		204	244		162	
Travel Time (s)		4.6	5.5		3.7	
Volume (vph)	1	474	835	1	1	1
Peak Hour Factor	0.92	0.83	0.77	0.92	0.92	0.92
Heavy Vehicles (%)	2%	9%	10%	2%	2%	2%
Adj. Flow (vph)	1	571	1084	1	1	1
Lane Group Flow (vph)	1	571	1085	0	2	0
Turn Type	Perm					
Protected Phases		1	1		5	
Permitted Phases	1					
Detector Phases	1	1	1		5	
Minimum Initial (s)	8.0	8.0	8.0		8.0	
Minimum Split (s)	28.0	28.0	28.0		25.0	
Total Split (s)	65.0	65.0	65.0	0.0	25.0	0.0
Total Split (%)	72.2%	72.2%	72.2%	0.0%	27.8%	0.0%
Maximum Green (s)	60.0	60.0	60.0		19.0	
Yellow Time (s)	3.0	3.0	3.0		3.0	
All-Red Time (s)	2.0	2.0	2.0		3.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0	2.0	2.0		2.0	
Recall Mode	C-Max	C-Max	C-Max		None	
Walk Time (s)	10.0	10.0	10.0		12.0	
Flash Dont Walk (s)	8.0	8.0	8.0		1.0	
Pedestrian Calls (#/hr)	0	0	0		0	
Act Effct Green (s)	86.4	86.4	86.4		10.0	
Actuated g/C Ratio	0.96	0.96	0.96		0.11	
v/c Ratio	0.00	0.12	0.34		0.01	
Control Delay	1.0	0.5	1.1		31.0	
Queue Delay	0.0	0.0	0.0		0.0	
Total Delay	1.0	0.5	1.1		31.0	
LOS	A	A	A		C	
Approach Delay		0.5	1.1		31.0	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		A	A		C	
Queue Length 50th (ft)	0	0	0		1	
Queue Length 95th (ft)	m0	16	72		7	
Internal Link Dist (ft)		124	164		82	
Turn Bay Length (ft)						
Base Capacity (vph)	397	4569	3151		396	
Starvation Cap Reductn	0	0	0		0	
Spillback Cap Reductn	0	0	0		0	
Storage Cap Reductn	0	0	0		0	
Reduced v/c Ratio	0.00	0.12	0.34		0.01	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.34
Intersection Signal Delay: 0.9 Intersection LOS: A
Intersection Capacity Utilization 36.4% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 506: Causeway Street & Legends Way

ø1	ø5
65 s	25 s

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	1	45	436	0	0	1227
Peak Hour Factor	0.25	0.75	0.85	0.92	0.92	0.92
Hourly flow rate (vph)	4	60	513	0	0	1334
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			495			111
pX, platoon unblocked	0.74					
vC, conflicting volume	1180	256			513	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	895	256			513	
tC, single (s)	6.8	7.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.5			2.2	
p0 queue free %	98	91			100	
cM capacity (veh/h)	211	702			1063	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	64	256	256	667	667
Volume Left	4	0	0	0	0
Volume Right	60	0	0	0	0
cSH	613	1700	1700	1700	1700
Volume to Capacity	0.10	0.15	0.15	0.39	0.39
Queue Length 95th (ft)	9	0	0	0	0
Control Delay (s)	11.6	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	11.6	0.0		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	43.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	153	436	1210	18	0	0
Peak Hour Factor	0.75	0.92	0.90	0.63	0.92	0.92
Hourly flow rate (vph)	204	474	1344	29	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)		109	497			
pX, platoon unblocked	0.77				0.77	0.77
vC, conflicting volume	1373				2004	687
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1181				2005	283
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	55				100	100
cM capacity (veh/h)	449				22	551

Direction, Lane #	NB 1	NB 2	SB 1	SB 2
Volume Total	362	316	896	477
Volume Left	204	0	0	0
Volume Right	0	0	0	29
cSH	449	1700	1700	1700
Volume to Capacity	0.45	0.19	0.53	0.28
Queue Length 95th (ft)	58	0	0	0
Control Delay (s)	15.2	0.0	0.0	0.0
Lane LOS	C			
Approach Delay (s)	8.1		0.0	
Approach LOS				

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	57.2%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	6	423	38	50	775	11	46	0	48	3	0	7
Peak Hour Factor	0.50	0.91	0.68	0.63	0.97	0.69	0.88	0.92	0.80	0.75	0.92	0.58
Hourly flow rate (vph)	12	465	56	79	799	16	52	0	60	4	0	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)		443			204							
pX, platoon unblocked	0.96			0.94			0.97	0.97	0.94	0.97	0.97	0.96
vC, conflicting volume	815			521			1087	1490	260	1282	1510	407
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	762			433			921	1339	157	1123	1360	336
tC, single (s)	5.1			4.2			7.7	6.5	7.3	7.6	6.5	7.0
tC, 2 stage (s)												
tF (s)	2.7			2.2			3.6	4.0	3.5	3.6	4.0	3.4
p0 queue free %	98			92			72	100	92	97	100	98
cM capacity (veh/h)	569			1054			189	135	764	127	131	620

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	244	288	479	415	112	16
Volume Left	12	0	79	0	52	4
Volume Right	0	56	0	16	60	12
cSH	569	1700	1054	1700	316	316
Volume to Capacity	0.02	0.17	0.08	0.24	0.36	0.05
Queue Length 95th (ft)	2	0	6	0	39	4
Control Delay (s)	0.8	0.0	2.2	0.0	22.6	17.0
Lane LOS	A		A		C	C
Approach Delay (s)	0.4		1.2		22.6	17.0
Approach LOS					C	C

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	55.4%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑		
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	469	0	0	720	149	25
Peak Hour Factor	0.83	0.92	0.92	0.78	0.70	0.89
Hourly flow rate (vph)	565	0	0	923	213	28
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	387			309		
pX, platoon unblocked						
vC, conflicting volume			565		1027	188
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			565		1027	188
tC, single (s)			4.1		6.8	7.1
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			100		8	97
cM capacity (veh/h)			1017		232	803

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1
Volume Total	188	188	188	462	462	241
Volume Left	0	0	0	0	0	213
Volume Right	0	0	0	0	0	28
cSH	1700	1700	1700	1700	1700	253
Volume to Capacity	0.11	0.11	0.11	0.27	0.27	0.95
Queue Length 95th (ft)	0	0	0	0	0	219
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	87.2
Lane LOS						F
Approach Delay (s)	0.0			0.0		87.2
Approach LOS						F

Intersection Summary			
Average Delay	12.2		
Intersection Capacity Utilization	36.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	59	42	0	25	87	0
Peak Hour Factor	0.78	0.74	0.92	0.78	0.71	0.92
Hourly flow rate (vph)	76	57	0	32	123	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				465		
pX, platoon unblocked						
vC, conflicting volume	155	123	123			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	155	123	123			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	91	94	100			
cM capacity (veh/h)	842	934	1477			

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	76	57	32	123
Volume Left	76	0	0	0
Volume Right	0	57	0	0
cSH	842	934	1700	1700
Volume to Capacity	0.09	0.06	0.02	0.07
Queue Length 95th (ft)	7	5	0	0
Control Delay (s)	9.7	9.1	0.0	0.0
Lane LOS	A	A		
Approach Delay (s)	9.4		0.0	0.0
Approach LOS	A			

Intersection Summary			
Average Delay	4.4		
Intersection Capacity Utilization	14.6%	ICU Level of Service	A
Analysis Period (min)	15		

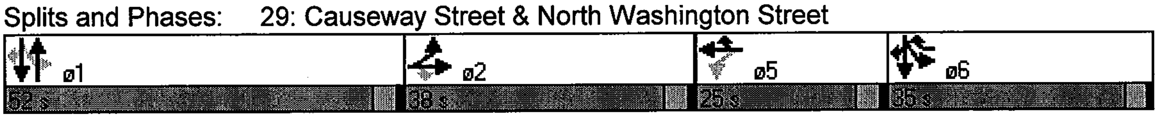
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↑	↱		↰↑↑	↱		↑↑↱		↰	↑↑↱	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	12	11	12	12	11	12	10	10	10
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50		50		50	50	50
Trailing Detector (ft)	0	0	0	0	0	0		0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.95	0.95	1.00	0.95	0.95	1.00	1.00	0.95	0.95	1.00	0.91	0.91
Ped Bike Factor			0.86					0.99				
Frt			0.850			0.850		0.979				0.850
Flt Protected	0.950	0.976			0.982					0.950		
Satd. Flow (prot)	1641	1686	1615	0	3427	1599	0	3318	0	1668	3196	1372
Flt Permitted	0.950	0.976			0.730					0.155		
Satd. Flow (perm)	1641	1686	1382	0	2547	1599	0	3318	0	272	3196	1372
Right Turn on Red			Yes			Yes			Yes			No
Satd. Flow (RTOR)			45			59		12				
Headway Factor	1.04	1.04	1.00	1.00	1.04	1.00	1.00	1.04	1.00	1.09	1.09	1.09
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		309			183			111			268	
Travel Time (s)		7.0			4.2			2.5			6.1	
Volume (vph)	350	141	17	84	149	579	0	623	75	239	977	302
Confl. Peds. (#/hr)			84						31	31		
Peak Hour Factor	0.77	0.87	0.38	0.89	0.90	0.70	0.84	0.91	0.69	0.90	0.79	0.69
Heavy Vehicles (%)	1%	1%	0%	0%	0%	1%	0%	2%	1%	1%	1%	0%
Adj. Flow (vph)	455	162	45	94	166	827	0	685	109	266	1237	438
Lane Group Flow (vph)	300	317	45	0	260	827	0	794	0	266	1237	438
Turn Type	Split		Perm	Perm		pt+ov				D.P+P		custom
Protected Phases	2	2			5	5 6		1		6	1 6	6
Permitted Phases			2	5						1		1
Detector Phases	2	2	2	5	5	5 6		1		6	1 6	6
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0			8.0		8.0		8.0
Minimum Split (s)	32.0	32.0	32.0	25.0	25.0			25.0		25.0		25.0
Total Split (s)	38.0	38.0	38.0	25.0	25.0	60.0	0.0	52.0	0.0	35.0	87.0	35.0
Total Split (%)	25.3%	25.3%	25.3%	16.7%	16.7%	40.0%	0.0%	34.7%	0.0%	23.3%	58.0%	23.3%
Maximum Green (s)	34.0	34.0	34.0	21.0	21.0			48.0		31.0		31.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0			3.0		3.0		3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0			1.0		1.0		1.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead			Lead		Lag		Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0		3.0		3.0
Recall Mode	Max	Max	Max	Max	Max			C-Max		Max		Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0		7.0		7.0
Flash Dont Walk (s)	21.0	21.0	21.0	14.0	14.0			14.0		14.0		14.0
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0		0
Act Effct Green (s)	34.0	34.0	34.0		21.0	56.0		48.0		79.0	83.0	83.0
Actuated g/C Ratio	0.23	0.23	0.23		0.14	0.37		0.32		0.53	0.55	0.55
v/c Ratio	0.81	0.83	0.13		0.73	1.30		0.74		0.62	0.70	0.58
Control Delay	72.3	74.1	12.8		74.5	184.0		49.8		30.5	27.1	25.8
Queue Delay	0.0	0.0	0.0		0.0	0.0		0.3		0.0	0.0	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	72.3	74.1	12.8		74.5	184.0		50.1		30.5	27.1	25.8
LOS	E	E	B		E	F		D		C	C	C
Approach Delay		69.1			157.8			50.1			27.3	
Approach LOS		E			F			D			C	
Queue Length 50th (ft)	295	313	0		130	~1001		360		140	469	300
Queue Length 95th (ft)	343	#446	0		183	#825		440		241	447	281
Internal Link Dist (ft)		229			103			31			188	
Turn Bay Length (ft)												
Base Capacity (vph)	372	382	348		357	634		1070		432	1768	759
Starvation Cap Reductn	0	0	0		0	0		39		0	0	0
Spillback Cap Reductn	0	0	0		0	0		0		0	0	0
Storage Cap Reductn	0	0	0		0	0		0		0	0	0
Reduced v/c Ratio	0.81	0.83	0.13		0.73	1.30		0.77		0.62	0.70	0.58

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 0 (0%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.30
Intersection Signal Delay: 69.1 Intersection LOS: E
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: 29: Causeway Street & North Washington Street

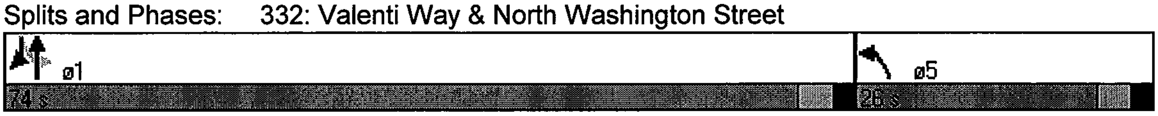


Lane Group	NBL	NBT	NBR	SBL	SBR	SBR2
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	13	13	12	12	12
Storage Length (ft)	0		0	25	0	
Storage Lanes	1		0	1	2	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50	
Trailing Detector (ft)	0	0		0	0	
Turning Speed (mph)	15		9	15	9	9
Lane Util. Factor	1.00	1.00	1.00	1.00	0.88	1.00
Ped Bike Factor		0.98				
Frt		0.993			0.850	
Flt Protected	0.950			0.950		
Satd. Flow (prot)	1532	1772	0	1805	2671	0
Flt Permitted	0.950			0.217		
Satd. Flow (perm)	1532	1772	0	412	2671	0
Right Turn on Red			Yes			Yes
Satd. Flow (RTOR)		6			4	
Headway Factor	1.09	0.96	0.96	1.00	1.00	1.00
Link Speed (mph)		30				
Link Distance (ft)		347				
Travel Time (s)		7.9				
Volume (vph)	286	766	32	52	1002	12
Confl. Peds. (#/hr)			139	139		61
Peak Hour Factor	0.85	0.91	0.80	0.88	0.91	0.58
Heavy Vehicles (%)	10%	8%	0%	0%	6%	29%
Adj. Flow (vph)	336	842	40	59	1101	21
Lane Group Flow (vph)	336	882	0	59	1122	0
Turn Type	Prot			D.Pm	custom	
Protected Phases	5	1			1	
Permitted Phases				1		
Detector Phases	5	1		1	1	
Minimum Initial (s)	8.0	8.0		8.0	8.0	
Minimum Split (s)	26.0	22.0		22.0	22.0	
Total Split (s)	26.0	74.0	0.0	74.0	74.0	0.0
Total Split (%)	26.0%	74.0%	0.0%	74.0%	74.0%	0.0%
Maximum Green (s)	21.0	69.0		69.0	69.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0	2.0		2.0	2.0	
Recall Mode	None	C-Max		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	9.0	8.0		8.0	8.0	
Pedestrian Calls (#/hr)	0	0		0	0	
Act Effct Green (s)	22.0	70.0		70.0	70.0	
Actuated g/C Ratio	0.22	0.70		0.70	0.70	
v/c Ratio	1.00	0.71		0.20	0.60	

Lane Group	NBL	NBT	NBR	SBL	SBR	SBR2
Control Delay	77.4	15.6		7.3	9.4	
Queue Delay	0.0	2.5		0.0	85.7	
Total Delay	77.4	18.1		7.3	95.1	
LOS	E	B		A	F	
Approach Delay		34.5				
Approach LOS		C				
Queue Length 50th (ft)	224	276		11	182	
Queue Length 95th (ft)	#360	355		28	242	
Internal Link Dist (ft)		267				
Turn Bay Length (ft)				25		
Base Capacity (vph)	337	1242		288	1871	
Starvation Cap Reductn	0	234		0	0	
Spillback Cap Reductn	0	15		0	923	
Storage Cap Reductn	0	0		0	0	
Reduced v/c Ratio	1.00	0.88		0.20	1.18	

Intersection Summary
Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 85 (85%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.00
Intersection Signal Delay: 62.1 Intersection LOS: E
Intersection Capacity Utilization 58.0% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 332: Valenti Way & North Washington Street



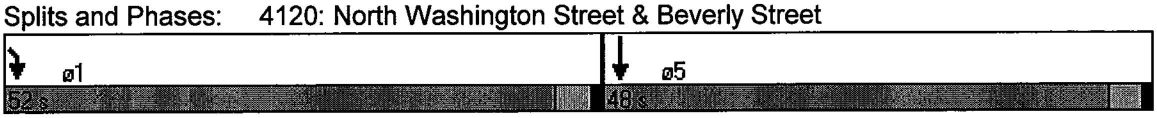
Lane Group	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations			↓↓↓			↘↘↘
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)			50			50
Trailing Detector (ft)			0			0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.76
Frt						0.850
Flt Protected						
Satd. Flow (prot)	0	0	4893	0	0	3409
Flt Permitted						
Satd. Flow (perm)	0	0	4893	0	0	3409
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						85
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		397	273		177	
Travel Time (s)		9.0	6.2		4.0	
Volume (vph)	0	0	1002	0	0	288
Peak Hour Factor	0.92	0.92	0.91	0.92	0.92	0.91
Heavy Vehicles (%)	0%	0%	6%	0%	0%	8%
Adj. Flow (vph)	0	0	1101	0	0	316
Lane Group Flow (vph)	0	0	1101	0	0	316
Turn Type						custom
Protected Phases			5			1
Permitted Phases						
Detector Phases			5			1
Minimum Initial (s)			8.0			8.0
Minimum Split (s)			20.0			20.0
Total Split (s)	0.0	0.0	48.0	0.0	0.0	52.0
Total Split (%)	0.0%	0.0%	48.0%	0.0%	0.0%	52.0%
Maximum Green (s)			44.0			48.0
Yellow Time (s)			3.0			3.0
All-Red Time (s)			1.0			1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)			2.0			2.0
Recall Mode			Ped			C-Max
Walk Time (s)			7.0			
Flash Dont Walk (s)			1.0			
Pedestrian Calls (#/hr)			0			
Act Effct Green (s)			27.0			65.0
Actuated g/C Ratio			0.27			0.65
v/c Ratio			0.83			0.14
Control Delay			53.4			13.0
Queue Delay			0.7			0.0
Total Delay			54.1			13.0
LOS			D			B
Approach Delay			54.1			

Lane Group	NBL	NBT	SBT	SBR	SEL	SER
Approach LOS			D			
Queue Length 50th (ft)			279			82
Queue Length 95th (ft)			326			m87
Internal Link Dist (ft)		317	193		97	
Turn Bay Length (ft)						
Base Capacity (vph)			2153			2247
Starvation Cap Reductn			647			0
Spillback Cap Reductn			289			618
Storage Cap Reductn			0			0
Reduced v/c Ratio			0.73			0.19

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 4 (4%), Referenced to phase 1:SER, Start of Green
Natural Cycle: 40
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 45.0 Intersection LOS: D
Intersection Capacity Utilization 32.7% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4120: North Washington Street & Beverly Street



Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER
Lane Configurations										
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	14	12	12	12	12	12	12	12	12
Total Lost Time (s)	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	
Trailing Detector (ft)		0		0					0	
Turning Speed (mph)	15	9	15		9	15		9	15	9
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00
Frt		0.865								
Flt Protected									0.950	
Satd. Flow (prot)	0	1753	0	3574	0	0	0	0	3400	0
Flt Permitted									0.950	
Satd. Flow (perm)	0	1753	0	3574	0	0	0	0	3400	0
Right Turn on Red		Yes			No			No	No	
Satd. Flow (RTOR)		202								
Headway Factor	1.00	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30			30			30		30	
Link Distance (ft)	264			579			347		320	
Travel Time (s)	6.0			13.2			7.9		7.3	
Volume (vph)	0	55	0	883	0	0	0	0	146	0
Peak Hour Factor	0.92	0.67	0.92	0.88	0.92	0.92	0.92	0.92	0.69	0.92
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	0%	3%	0%
Adj. Flow (vph)	0	82	0	1003	0	0	0	0	212	0
Lane Group Flow (vph)	0	82	0	1003	0	0	0	0	212	0
Turn Type		custom							Prot	
Protected Phases		5		1					6	
Permitted Phases										
Detector Phases		5		1					6	
Minimum Initial (s)		8.0		8.0					8.0	
Minimum Split (s)		13.0		13.0					13.0	
Total Split (s)	0.0	14.0	0.0	53.0	0.0	0.0	0.0	0.0	33.0	0.0
Total Split (%)	0.0%	14.0%	0.0%	53.0%	0.0%	0.0%	0.0%	0.0%	33.0%	0.0%
Maximum Green (s)		9.0		48.0					28.0	
Yellow Time (s)		3.0		3.0					3.0	
All-Red Time (s)		2.0		2.0					2.0	
Lead/Lag		Lead							Lag	
Lead-Lag Optimize?		Yes							Yes	
Vehicle Extension (s)		2.0		2.0					2.0	
Recall Mode		None		C-Max					None	
Act Effct Green (s)		9.0		70.4					11.2	
Actuated g/C Ratio		0.09		0.70					0.11	
v/c Ratio		0.24		0.40					0.55	
Control Delay		1.7		4.9					47.5	
Queue Delay		0.1		0.0					0.0	
Total Delay		1.7		4.9					47.5	
LOS		A		A					D	
Approach Delay				4.9					47.5	
Approach LOS				A					D	
Queue Length 50th (ft)		0		78					67	

Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER
Queue Length 95th (ft)		0		m99					75	
Internal Link Dist (ft)	184			499			267		240	
Turn Bay Length (ft)										
Base Capacity (vph)		357		2515					986	
Starvation Cap Reductn		0		0					0	
Spillback Cap Reductn		29		230					0	
Storage Cap Reductn		0		0					0	
Reduced v/c Ratio		0.25		0.44					0.22	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 43 (43%), Referenced to phase 1:NBT, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.55
Intersection Signal Delay: 11.7 Intersection LOS: B
Intersection Capacity Utilization 37.7% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 34: Cooper Street & Sumner Tunnel Off-Ramp

ø1	ø5	ø6
53 s	14 s	33 s

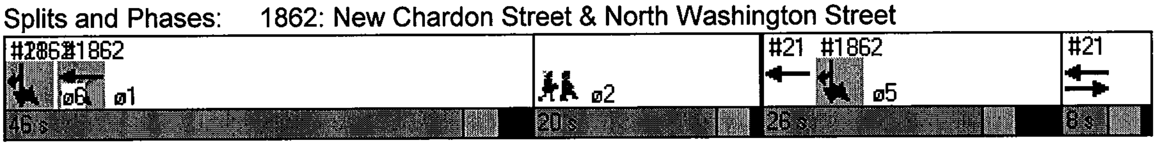
Lane Group	EBR	EBR2	WBL2	WBL	WBT	SBL	SBT	SBR	ø2	ø5	ø6
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900			
Lane Width (ft)	11	11	12	16	12	16	12	16			
Storage Length (ft)	0			25		0		0			
Storage Lanes	3			1		2		1			
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	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)	9	9	15	15		15		9			
Lane Util. Factor	0.88	1.00	0.95	1.00	0.95	0.97	0.95	0.95			
Frt	0.850	0.850					0.941	0.850			
Flt Protected				0.950		0.950					
Satd. Flow (prot)	1963	1546	0	2046	3610	3929	1405	1581			
Flt Permitted				0.950		0.950					
Satd. Flow (perm)	1963	1546	0	2046	3610	3929	1405	1581			
Right Turn on Red		Yes	No					No			
Satd. Flow (RTOR)		39									
Headway Factor	1.04	1.04	1.00	0.85	1.00	0.85	1.00	0.85			
Link Speed (mph)					30		30				
Link Distance (ft)					125		397				
Travel Time (s)					2.8		9.0				
Volume (vph)	1023	42	23	35	279	852	129	309			
Peak Hour Factor	0.75	0.95	0.68	0.34	0.83	0.88	0.92	0.88			
Heavy Vehicles (%)	40%	1%	0%	0%	0%	1%	28%	10%			
Adj. Flow (vph)	1364	44	34	103	336	968	140	351			
Lane Group Flow (vph)	1364	44	0	137	336	968	232	259			
Turn Type	custom	custom	Perm	Perm		Split		Prot			
Protected Phases	1	1			1	5 6	5 6	5 6	2	5	6
Permitted Phases			1	1							
Detector Phases	1	1	1	1	1	5 6	5 6	5 6			
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0				8.0	8.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0				20.0	24.0	8.0
Total Split (s)	46.0	46.0	46.0	46.0	46.0	34.0	34.0	34.0	20.0	26.0	8.0
Total Split (%)	46.0%	46.0%	46.0%	46.0%	46.0%	34.0%	34.0%	34.0%	20%	26%	8%
Maximum Green (s)	40.0	40.0	40.0	40.0	40.0				16.0	19.0	4.0
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				1.0	4.0	1.0
Lead/Lag	Lead	Lead	Lead	Lead	Lead				Lag	Lead	Lag
Lead-Lag Optimize?											Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0				2.0	2.0	3.0
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max				None	Max	Max
Walk Time (s)									7.0		
Flash Dont Walk (s)									9.0		
Pedestrian Calls (#/hr)									50		
Act Effct Green (s)	46.0	46.0		46.0	46.0	30.0	30.0	30.0			
Actuated g/C Ratio	0.46	0.46		0.46	0.46	0.30	0.30	0.30			
v/c Ratio	1.51	0.06		0.15	0.20	0.82	0.55	0.55			
Control Delay	248.7	0.5		17.9	17.8	50.4	45.4	44.9			
Queue Delay	0.0	0.6		0.0	0.0	30.9	0.0	0.0			

Lane Group	EBR	EBR2	WBL2	WBL	WBT	SBL	SBT	SBR	ø2	ø5	ø6
Total Delay	248.7	1.2		17.9	17.8	81.3	45.4	44.9			
LOS	F	A		B	B	F	D	D			
Approach Delay					17.8		69.1				
Approach LOS					B		E				
Queue Length 50th (ft)	~708	0		53	70	344	168	187			
Queue Length 95th (ft)	#657	m0		32	92	400	m213	m235			
Internal Link Dist (ft)					45		317				
Turn Bay Length (ft)				25							
Base Capacity (vph)	903	732		941	1660	1179	422	474			
Starvation Cap Reductn	0	524		0	0	261	0	0			
Spillback Cap Reductn	0	0		0	0	0	0	0			
Storage Cap Reductn	0	0		0	0	0	0	0			
Reduced v/c Ratio	1.51	0.21		0.15	0.20	1.05	0.55	0.55			

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 49 (49%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.51
Intersection Signal Delay: 134.3 | Intersection LOS: F
Intersection Capacity Utilization 76.8% | 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.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1862: New Chardon Street & North Washington Street



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	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
Lane Util. Factor	1.00	0.91	0.95	0.95	1.00	1.00
Frt					0.932	
Flt Protected	0.950				0.976	
Satd. Flow (prot)	1787	5136	3574	0	1711	0
Flt Permitted	0.361				0.976	
Satd. Flow (perm)	679	5136	3574	0	1711	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)					1	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		204	244		148	
Travel Time (s)		4.6	5.5		3.4	
Volume (vph)	1	471	542	1	1	1
Peak Hour Factor	0.92	0.78	0.76	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	1	604	713	1	1	1
Lane Group Flow (vph)	1	604	714	0	2	0
Turn Type	Perm					
Protected Phases		1	1		5	
Permitted Phases	1					
Detector Phases	1	1	1		5	
Minimum Initial (s)	8.0	8.0	8.0		8.0	
Minimum Split (s)	23.0	23.0	23.0		19.0	
Total Split (s)	75.0	75.0	75.0	0.0	25.0	0.0
Total Split (%)	75.0%	75.0%	75.0%	0.0%	25.0%	0.0%
Maximum Green (s)	70.0	70.0	70.0		19.0	
Yellow Time (s)	3.0	3.0	3.0		3.0	
All-Red Time (s)	2.0	2.0	2.0		3.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0	2.0	2.0		2.0	
Recall Mode	C-Max	C-Max	C-Max		None	
Walk Time (s)	10.0	10.0	10.0		12.0	
Flash Dont Walk (s)	8.0	8.0	8.0		1.0	
Pedestrian Calls (#/hr)	0	0	0		0	
Act Effct Green (s)	96.4	96.4	96.4		10.0	
Actuated g/C Ratio	0.96	0.96	0.96		0.10	
v/c Ratio	0.00	0.12	0.21		0.01	
Control Delay	1.0	0.3	0.7		35.0	
Queue Delay	0.0	0.0	0.0		0.0	
Total Delay	1.0	0.3	0.7		35.0	
LOS	A	A	A		C	
Approach Delay		0.3	0.7		35.0	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		A	A		C	
Queue Length 50th (ft)	0	0	0		1	
Queue Length 95th (ft)	m0	9	41		8	
Internal Link Dist (ft)		124	164		68	
Turn Bay Length (ft)						
Base Capacity (vph)	655	4951	3445		360	
Starvation Cap Reductn	0	0	0		0	
Spillback Cap Reductn	0	0	0		0	
Storage Cap Reductn	0	0	0		0	
Reduced v/c Ratio	0.00	0.12	0.21		0.01	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 93 (93%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.21
Intersection Signal Delay: 0.5 — Intersection LOS: A
Intersection Capacity Utilization 28.3% — ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 506: Causeway Street & Legends Way

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	5	9	689	0	0	1078
Peak Hour Factor	0.42	0.75	0.88	0.92	0.92	0.78
Hourly flow rate (vph)	12	12	783	0	0	1382
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			495			111
pX, platoon unblocked	0.72					
vC, conflicting volume	1474	391			783	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1268	391			783	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	90	98			100	
cM capacity (veh/h)	117	613			844	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	24	391	391	691	691
Volume Left	12	0	0	0	0
Volume Right	12	0	0	0	0
cSH	197	1700	1700	1700	1700
Volume to Capacity	0.12	0.23	0.23	0.41	0.41
Queue Length 95th (ft)	10	0	0	0	0
Control Delay (s)	25.7	0.0	0.0	0.0	0.0
Lane LOS	D				
Approach Delay (s)	25.7	0.0		0.0	
Approach LOS	D				

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	39.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	77	689	1066	17	0	0
Peak Hour Factor	0.80	0.91	0.94	0.53	0.92	0.92
Hourly flow rate (vph)	96	757	1134	32	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)		109	497			
pX, platoon unblocked	0.74				0.74	0.74
vC, conflicting volume	1166				1721	583
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	876				1624	90
tC, single (s)	4.2				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	83				100	100
cM capacity (veh/h)	559				58	709

Direction, Lane #	NB 1	NB 2	SB 1	SB 2
Volume Total	349	505	756	410
Volume Left	96	0	0	0
Volume Right	0	0	0	32
cSH	559	1700	1700	1700
Volume to Capacity	0.17	0.30	0.44	0.24
Queue Length 95th (ft)	15	0	0	0
Control Delay (s)	5.4	0.0	0.0	0.0
Lane LOS	A			
Approach Delay (s)	2.2		0.0	
Approach LOS				

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	58.0%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	17	403	42	29	512	2	49	0	66	3	0	10
Peak Hour Factor	0.75	0.96	0.86	0.73	0.95	0.50	0.56	0.92	0.66	0.38	0.92	0.58
Hourly flow rate (vph)	23	420	49	40	539	4	88	0	100	8	0	17
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)		443			204							
pX, platoon unblocked	0.99			0.98			0.98	0.98	0.98	0.98	0.98	0.99
vC, conflicting volume	543			469			856	1112	234	976	1134	271
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	530			430			805	1066	189	927	1089	256
tC, single (s)	5.1			4.1			7.7	6.5	6.9	7.5	6.5	8.0
tC, 2 stage (s)												
tF (s)	2.7			2.2			3.6	4.0	3.3	3.5	4.0	3.9
p0 queue free %	97			96			63	100	88	96	100	97
cM capacity (veh/h)	756			1112			238	205	800	184	199	595

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	233	259	309	273	188	25
Volume Left	23	0	40	0	88	8
Volume Right	0	49	0	4	100	17
cSH	756	1700	1112	1700	381	350
Volume to Capacity	0.03	0.15	0.04	0.16	0.49	0.07
Queue Length 95th (ft)	2	0	3	0	66	6
Control Delay (s)	1.3	0.0	1.4	0.0	23.3	16.1
Lane LOS	A		A		C	C
Approach Delay (s)	0.6		0.7		23.3	16.1
Approach LOS					C	C

Intersection Summary			
Average Delay	4.3		
Intersection Capacity Utilization	50.1%	ICU Level of Service	A
Analysis Period (min)	15		

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑	Y	
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	489	0	0	451	79	19
Peak Hour Factor	0.78	0.92	0.92	0.76	0.77	0.52
Hourly flow rate (vph)	627	0	0	593	103	37
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	387			309		
pX, platoon unblocked					0.98	
vC, conflicting volume			627		924	209
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			627		900	209
tC, single (s)			4.1		6.8	7.0
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			100		62	95
cM capacity (veh/h)			965		272	788

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1
Volume Total	209	209	209	297	297	139
Volume Left	0	0	0	0	0	103
Volume Right	0	0	0	0	0	37
cSH	1700	1700	1700	1700	1700	329
Volume to Capacity	0.12	0.12	0.12	0.17	0.17	0.42
Queue Length 95th (ft)	0	0	0	0	0	51
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	23.8
Lane LOS						C
Approach Delay (s)	0.0			0.0		23.8
Approach LOS						C

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	24.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱		↑	↑	
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	93	43	0	22	71	0
Peak Hour Factor	0.79	0.72	0.92	0.69	0.81	0.92
Hourly flow rate (vph)	118	60	0	32	88	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				465		
pX, platoon unblocked						
vC, conflicting volume	120	88	88			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	120	88	88			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	86	94	100			
cM capacity (veh/h)	869	962	1521			

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	118	60	32	88
Volume Left	118	0	0	0
Volume Right	0	60	0	0
cSH	869	962	1700	1700
Volume to Capacity	0.14	0.06	0.02	0.05
Queue Length 95th (ft)	12	5	0	0
Control Delay (s)	9.8	9.0	0.0	0.0
Lane LOS	A	A		
Approach Delay (s)	9.5		0.0	0.0
Approach LOS	A			

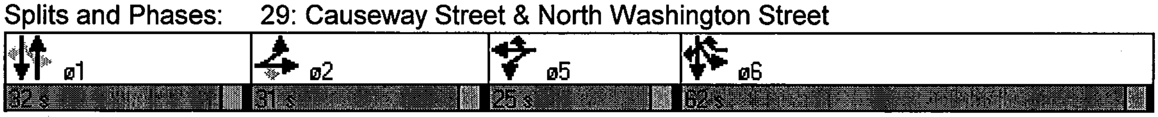
Intersection Summary			
Average Delay	5.7		
Intersection Capacity Utilization	15.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	12	11	12	12	11	12	10	10	10
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	50	50
Trailing Detector (ft)	0	0	0	0	0	0		0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.95	0.95	1.00	0.95	0.95	1.00	1.00	0.95	0.95	1.00	0.91	0.91
Ped Bike Factor			0.69					0.94				
Frt			0.850			0.850		0.965			0.978	0.850
Flt Protected	0.950	0.989			0.978					0.950		
Satd. Flow (prot)	1493	1611	1468	0	3157	1509	0	2738	0	1560	2889	1306
Flt Permitted	0.950	0.989			0.978					0.143		
Satd. Flow (perm)	1493	1611	1009	0	3157	1509	0	2738	0	235	2889	1306
Right Turn on Red			Yes			Yes			Yes			No
Satd. Flow (RTOR)			1			83		23				
Headway Factor	1.04	1.04	1.00	1.00	1.04	1.00	1.00	1.04	1.00	1.09	1.09	1.09
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		309			183			111			268	
Travel Time (s)		7.0			4.2			2.5			6.1	
Volume (vph)	212	155	1	111	127	233	0	430	99	342	1017	619
Confl. Peds. (#/hr)			200						107	107		
Peak Hour Factor	0.81	0.85	0.82	0.84	0.76	0.78	0.54	0.96	0.73	0.90	0.94	0.83
Heavy Vehicles (%)	11%	6%	10%	7%	9%	7%	23%	16%	17%	8%	10%	5%
Adj. Flow (vph)	262	182	1	132	167	299	0	448	136	380	1082	746
Lane Group Flow (vph)	211	233	1	0	299	299	0	584	0	380	1265	563
Turn Type	Split		Perm	Split		pt+ov				D.P+P		custom
Protected Phases	2	2		5	5	5 6		1		6	1 6	6
Permitted Phases			2							1		1
Detector Phases	2	2	2	5	5	5 6		1		6	1 6	6
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0			8.0		8.0		8.0
Minimum Split (s)	31.0	31.0	31.0	25.0	25.0			25.0		25.0		25.0
Total Split (s)	31.0	31.0	31.0	25.0	25.0	87.0	0.0	32.0	0.0	62.0	94.0	62.0
Total Split (%)	20.7%	20.7%	20.7%	16.7%	16.7%	58.0%	0.0%	21.3%	0.0%	41.3%	62.7%	41.3%
Maximum Green (s)	27.0	27.0	27.0	21.0	21.0			28.0		58.0		58.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0			3.0		3.0		3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0			1.0		1.0		1.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead			Lead		Lag		Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0			2.0		2.0		2.0
Recall Mode	None	None	None	None	None			C-Max		None		None
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0		7.0		7.0
Flash Dont Walk (s)	20.0	20.0	20.0	14.0	14.0			14.0		14.0		14.0
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0		0
Act Effct Green (s)	24.3	24.3	24.3		17.8	72.8		40.9		91.9	95.9	95.9
Actuated g/C Ratio	0.16	0.16	0.16		0.12	0.49		0.27		0.61	0.64	0.64
v/c Ratio	0.87	0.89	0.01		0.80	0.39		0.76		0.64	0.68	0.67
Control Delay	93.5	95.0	38.0		80.2	17.2		57.2		30.6	20.8	23.6
Queue Delay	0.0	0.0	0.0		0.0	0.0		0.0		0.0	0.1	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	93.5	95.0	38.0		80.2	17.2		57.2		30.6	20.9	23.6
LOS	F	F	D		F	B		E		C	C	C
Approach Delay		94.2			48.7			57.2			23.3	
Approach LOS		F			D			E			C	
Queue Length 50th (ft)	210	233	0		152	115		293		233	437	384
Queue Length 95th (ft)	276	#337	5		167	138		#457		352	557	495
Internal Link Dist (ft)		229			103			31			188	
Turn Bay Length (ft)												
Base Capacity (vph)	269	290	182		442	833		764		659	1848	835
Starvation Cap Reductn	0	0	0		0	0		0		0	0	0
Spillback Cap Reductn	0	0	2		0	0		0		0	59	0
Storage Cap Reductn	0	0	0		0	0		0		0	0	0
Reduced v/c Ratio	0.78	0.80	0.01		0.68	0.36		0.76		0.58	0.71	0.67

Intersection Summary
Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 0 (0%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 40.6 Intersection LOS: D
Intersection Capacity Utilization 79.0% 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: 29: Causeway Street & North Washington Street



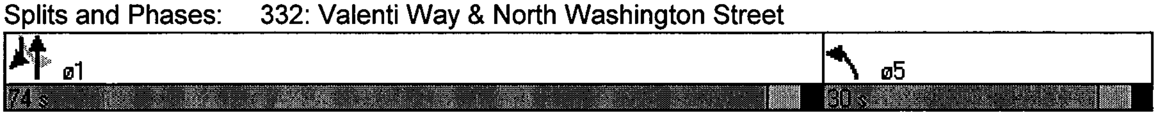
Lane Group	NBL	NBT	NBR	SBL	SBR	SBR2
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	13	13	12	12	12
Storage Length (ft)	0		0	25	0	
Storage Lanes	1		0	1	2	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50	
Trailing Detector (ft)	0	0		0	0	
Turning Speed (mph)	15		9	15	9	9
Lane Util. Factor	1.00	1.00	1.00	1.00	0.88	1.00
Ped Bike Factor		0.96		0.90		
Frt		0.984			0.850	
Flt Protected	0.950			0.950		
Satd. Flow (prot)	1532	1689	0	1736	2614	0
Flt Permitted	0.950			0.384		
Satd. Flow (perm)	1532	1689	0	634	2614	0
Right Turn on Red			Yes			Yes
Satd. Flow (RTOR)		13			6	
Headway Factor	1.09	0.96	0.96	1.00	1.00	1.00
Link Speed (mph)		30				
Link Distance (ft)		347				
Travel Time (s)		7.9				
Volume (vph)	544	464	38	47	1077	22
Confl. Peds. (#/hr)			95	95		35
Peak Hour Factor	0.94	0.94	0.63	0.69	0.91	0.58
Heavy Vehicles (%)	10%	11%	3%	4%	9%	0%
Adj. Flow (vph)	579	494	60	68	1184	38
Lane Group Flow (vph)	579	554	0	68	1222	0
Turn Type	Prot			D.Pm	custom	
Protected Phases	5	1			1	
Permitted Phases				1		
Detector Phases	5	1		1	1	
Minimum Initial (s)	8.0	8.0		8.0	8.0	
Minimum Split (s)	26.0	25.0		25.0	25.0	
Total Split (s)	30.0	74.0	0.0	74.0	74.0	0.0
Total Split (%)	28.8%	71.2%	0.0%	71.2%	71.2%	0.0%
Maximum Green (s)	25.0	69.0		69.0	69.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0	2.0		2.0	2.0	
Recall Mode	None	C-Max		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	9.0	8.0		8.0	8.0	
Pedestrian Calls (#/hr)	0	0		0	0	
Act Effct Green (s)	26.0	70.0		70.0	70.0	
Actuated g/C Ratio	0.25	0.67		0.67	0.67	
v/c Ratio	1.51	0.49		0.16	0.69	

Lane Group	NBL	NBT	NBR	SBL	SBR	SBR2
Control Delay	273.9	9.8		7.3	13.0	
Queue Delay	39.3	4.7		0.0	17.4	
Total Delay	313.2	14.5		7.3	30.4	
LOS	F	B		A	C	
Approach Delay		167.1				
Approach LOS		F				
Queue Length 50th (ft)	~538	156		15	252	
Queue Length 95th (ft)	#750	229		24	333	
Internal Link Dist (ft)		267				
Turn Bay Length (ft)				25		
Base Capacity (vph)	383	1141		427	1761	
Starvation Cap Reductn	21	503		0	153	
Spillback Cap Reductn	12	0		0	557	
Storage Cap Reductn	0	0		0	0	
Reduced v/c Ratio	1.60	0.87		0.16	1.01	

Intersection Summary

Area Type: Other
Cycle Length: 104
Actuated Cycle Length: 104
Offset: 45 (43%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.51
Intersection Signal Delay: 93.7 Intersection LOS: F
Intersection Capacity Utilization 75.3% 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: 332: Valenti Way & North Washington Street



Lane Group	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations			↓↓↓			↘↘↘
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)			50			50
Trailing Detector (ft)			0			0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.76
Frt						0.850
Flt Protected						
Satd. Flow (prot)	0	0	4759	0	0	3347
Flt Permitted						
Satd. Flow (perm)	0	0	4759	0	0	3347
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						127
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		397	273		170	
Travel Time (s)		9.0	6.2		3.9	
Volume (vph)	0	0	1072	0	0	487
Peak Hour Factor	0.92	0.92	0.91	0.92	0.92	0.94
Heavy Vehicles (%)	0%	0%	9%	0%	0%	10%
Adj. Flow (vph)	0	0	1178	0	0	518
Lane Group Flow (vph)	0	0	1178	0	0	518
Turn Type						custom
Protected Phases			5			1
Permitted Phases						
Detector Phases			5			1
Minimum Initial (s)			8.0			8.0
Minimum Split (s)			24.0			24.0
Total Split (s)	0.0	0.0	57.0	0.0	0.0	43.0
Total Split (%)	0.0%	0.0%	57.0%	0.0%	0.0%	43.0%
Maximum Green (s)			53.0			39.0
Yellow Time (s)			3.0			3.0
All-Red Time (s)			1.0			1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)			2.0			2.0
Recall Mode			Ped			C-Max
Walk Time (s)			7.0			7.0
Flash Dont Walk (s)			9.0			9.0
Pedestrian Calls (#/hr)			0			0
Act Effct Green (s)			27.6			64.4
Actuated g/C Ratio			0.28			0.64
v/c Ratio			0.90			0.24
Control Delay			44.3			7.2
Queue Delay			0.2			0.4
Total Delay			44.4			7.7
LOS			D			A
Approach Delay			44.4			

Lane Group	NBL	NBT	SBT	SBR	SEL	SER
Approach LOS			D			
Queue Length 50th (ft)			264			49
Queue Length 95th (ft)			291			67
Internal Link Dist (ft)		317	193		90	
Turn Bay Length (ft)						
Base Capacity (vph)			2522			2200
Starvation Cap Reductn			484			1147
Spillback Cap Reductn			93			401
Storage Cap Reductn			0			0
Reduced v/c Ratio			0.58			0.49

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 57 (57%), Referenced to phase 1:SER, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 33.2 Intersection LOS: C
Intersection Capacity Utilization 38.7% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 4120: North Washington Street & Beverly Street

ø1	ø5
43 s	57 s

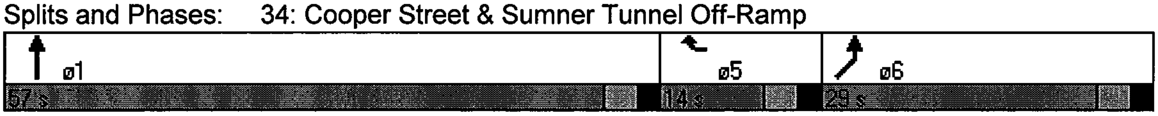
Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER
Lane Configurations		↱		↑↑					↰↰	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	14	12	12	12	12	12	12	12	12
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50		50					50	
Trailing Detector (ft)		0		0					0	
Turning Speed (mph)	15	9	15		9	15		9	15	9
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00
Frt		0.865								
Flt Protected									0.950	
Satd. Flow (prot)	0	1736	0	3505	0	0	0	0	3273	0
Flt Permitted									0.950	
Satd. Flow (perm)	0	1736	0	3505	0	0	0	0	3273	0
Right Turn on Red		Yes			No			No	No	
Satd. Flow (RTOR)		152								
Headway Factor	1.00	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30			30			30		30	
Link Distance (ft)	264			579			347		320	
Travel Time (s)	6.0			13.2			7.9		7.3	
Volume (vph)	0	74	0	700	0	0	0	0	272	0
Peak Hour Factor	0.92	0.84	0.92	0.92	0.92	0.92	0.92	0.92	0.66	0.92
Heavy Vehicles (%)	0%	1%	0%	3%	0%	0%	0%	0%	7%	0%
Adj. Flow (vph)	0	88	0	761	0	0	0	0	412	0
Lane Group Flow (vph)	0	88	0	761	0	0	0	0	412	0
Turn Type		custom							Prot	
Protected Phases		5		1					6	
Permitted Phases										
Detector Phases		5		1					6	
Minimum Initial (s)		8.0		8.0					8.0	
Minimum Split (s)		13.0		13.0					13.0	
Total Split (s)	0.0	14.0	0.0	57.0	0.0	0.0	0.0	0.0	29.0	0.0
Total Split (%)	0.0%	14.0%	0.0%	57.0%	0.0%	0.0%	0.0%	0.0%	29.0%	0.0%
Maximum Green (s)		9.0		52.0					24.0	
Yellow Time (s)		3.0		3.0					3.0	
All-Red Time (s)		2.0		2.0					2.0	
Lead/Lag		Lead							Lag	
Lead-Lag Optimize?		Yes							Yes	
Vehicle Extension (s)		2.0		2.0					2.0	
Recall Mode		None		C-Max					None	
Act Effct Green (s)		9.0		64.3					17.3	
Actuated g/C Ratio		0.09		0.64					0.17	
v/c Ratio		0.30		0.34					0.73	
Control Delay		3.3		5.0					46.6	
Queue Delay		0.4		0.1					0.4	
Total Delay		3.8		5.1					47.0	
LOS		A		A					D	
Approach Delay				5.1					47.0	
Approach LOS				A					D	
Queue Length 50th (ft)		0		43					129	

Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER
Queue Length 95th (ft)		0		57					119	
Internal Link Dist (ft)	184			499			267		240	
Turn Bay Length (ft)										
Base Capacity (vph)		310		2253					818	
Starvation Cap Reductn		0		0					0	
Spillback Cap Reductn		57		500					106	
Storage Cap Reductn		0		0					0	
Reduced v/c Ratio		0.35		0.43					0.58	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 46 (46%), Referenced to phase 1:NBT, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 18.7 Intersection LOS: B
Intersection Capacity Utilization 33.8% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 34: Cooper Street & Sumner Tunnel Off-Ramp

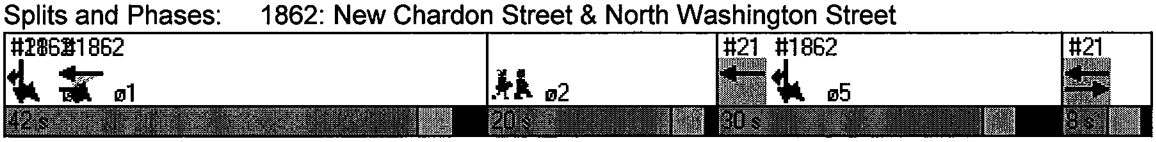


Lane Group	EBR	EBR2	WBL2	WBL	WBT	SBL	SBT	SBR	ø2	ø5	ø6
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900			
Lane Width (ft)	11	11	12	16	12	16	12	16			
Storage Length (ft)	0			25		0		0			
Storage Lanes	3			1		2		1			
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	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)	9	9	15	15		15		9			
Lane Util. Factor	0.88	1.00	0.95	1.00	0.95	0.97	0.95	0.95			
Frt	0.850	0.850					0.968	0.850			
Flt Protected				0.950		0.950					
Satd. Flow (prot)	2617	1382	0	1902	3539	3780	1482	1581			
Flt Permitted				0.950		0.950					
Satd. Flow (perm)	2617	1382	0	1902	3539	3780	1482	1581			
Right Turn on Red		Yes	No					No			
Satd. Flow (RTOR)		61									
Headway Factor	1.04	1.04	1.00	0.85	1.00	0.85	1.00	0.85			
Link Speed (mph)					30		30				
Link Distance (ft)					125		397				
Travel Time (s)					2.8		9.0				
Volume (vph)	376	47	54	26	416	843	268	446			
Peak Hour Factor	0.95	0.77	0.68	0.72	0.92	0.93	0.88	0.91			
Heavy Vehicles (%)	5%	13%	11%	0%	2%	5%	20%	10%			
Adj. Flow (vph)	396	61	79	36	452	906	305	490			
Lane Group Flow (vph)	396	61	0	115	452	906	387	408			
Turn Type	custom	custom	Perm	Perm		Split		Prot			
Protected Phases	1	1			1	5 6	5 6	5 6	2	5	6
Permitted Phases			1	1							
Detector Phases	1	1	1	1	1	5 6	5 6	5 6			
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0				7.0	8.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0				20.0	24.0	8.0
Total Split (s)	42.0	42.0	42.0	42.0	42.0	38.0	38.0	38.0	20.0	30.0	8.0
Total Split (%)	42.0%	42.0%	42.0%	42.0%	42.0%	38.0%	38.0%	38.0%	20%	30%	8%
Maximum Green (s)	36.0	36.0	36.0	36.0	36.0				16.0	23.0	4.0
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				1.0	4.0	1.0
Lead/Lag	Lead	Lead	Lead	Lead	Lead				Lag	Lead	Lag
Lead-Lag Optimize?										Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0				2.0	2.0	2.0
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max				Ped	None	Min
Walk Time (s)									7.0		
Flash Dont Walk (s)									9.0		
Pedestrian Calls (#/hr)									50		
Act Effct Green (s)	38.0	38.0		38.0	38.0	34.0	34.0	34.0			
Actuated g/C Ratio	0.38	0.38		0.38	0.38	0.34	0.34	0.34			
v/c Ratio	0.40	0.11		0.16	0.34	0.71	0.77	0.76			
Control Delay	7.6	1.4		21.2	22.9	56.7	63.4	62.5			
Queue Delay	0.5	1.0		0.0	0.0	10.7	5.1	7.6			

Lane Group	EBR	EBR2	WBL2	WBL	WBT	SBL	SBT	SBR	ø2	ø5	ø6
Total Delay	8.1	2.3		21.2	22.9	67.4	68.5	70.1			
LOS	A	A		C	C	E	E	E			
Approach Delay					22.6		68.3				
Approach LOS					C		E				
Queue Length 50th (ft)	3	0		48	105	314	275	290			
Queue Length 95th (ft)	159	0		68	146	m363	m329	m349			
Internal Link Dist (ft)					45		317				
Turn Bay Length (ft)				25							
Base Capacity (vph)	994	563		723	1345	1285	504	538			
Starvation Cap Reductn	264	357		0	0	358	69	94			
Spillback Cap Reductn	0	0		0	0	0	0	0			
Storage Cap Reductn	0	0		0	0	0	0	0			
Reduced v/c Ratio	0.54	0.30		0.16	0.34	0.98	0.89	0.92			

Intersection Summary
Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 13 (13%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 48.6 Intersection LOS: D
Intersection Capacity Utilization 53.9% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1862: New Chardon Street & North Washington Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
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	
Trailing Detector (ft)	0	0			0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.998			0.850			0.907	
Flt Protected	0.950						0.950				0.985	
Satd. Flow (prot)	1770	4759	0	0	3279	0	1805	1615	0	0	1664	0
Flt Permitted	0.263						0.749				0.959	
Satd. Flow (perm)	490	4759	0	0	3279	0	1423	1615	0	0	1620	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					4			272			9	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		204			132			531			162	
Travel Time (s)		4.6			3.0			12.1			3.7	
Volume (vph)	7	600	0	0	727	13	139	0	15	4	0	8
Peak Hour Factor	0.92	0.83	0.92	0.92	0.77	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	9%	0%	0%	10%	2%	0%	0%	0%	2%	0%	2%
Adj. Flow (vph)	8	723	0	0	944	14	151	0	16	4	0	9
Lane Group Flow (vph)	8	723	0	0	958	0	151	16	0	0	13	0
Turn Type	Perm						Perm			Perm		
Protected Phases		1			1			5			5	
Permitted Phases	1						5			5		
Detector Phases	1	1			1		5	5		5	5	
Minimum Initial (s)	8.0	8.0			8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	22.0	22.0			22.0		20.0	20.0		20.0	20.0	
Total Split (s)	65.0	65.0	0.0	0.0	65.0	0.0	25.0	25.0	0.0	25.0	25.0	0.0
Total Split (%)	72.2%	72.2%	0.0%	0.0%	72.2%	0.0%	27.8%	27.8%	0.0%	27.8%	27.8%	0.0%
Maximum Green (s)	61.0	61.0			61.0		21.0	21.0		21.0	21.0	
Yellow Time (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0		1.0	1.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0			2.0		2.0	2.0		2.0	2.0	
Recall Mode	C-Max	C-Max			C-Max		None	None		None	None	
Walk Time (s)	10.0	10.0			10.0		12.0	12.0		12.0	12.0	
Flash Dont Walk (s)	8.0	8.0			8.0		1.0	1.0		1.0	1.0	
Pedestrian Calls (#/hr)	0	0			0		0	0		0	0	
Act Effct Green (s)	68.4	68.4			68.4		13.6	13.6			13.6	
Actuated g/C Ratio	0.76	0.76			0.76		0.15	0.15			0.15	
v/c Ratio	0.02	0.20			0.38		0.70	0.03			0.05	
Control Delay	2.4	2.2			4.7		52.8	0.1			19.4	
Queue Delay	0.0	0.0			0.0		0.0	0.0			0.0	
Total Delay	2.4	2.2			4.7		52.8	0.1			19.4	
LOS	A	A			A		D	A			B	
Approach Delay		2.2			4.7			47.7			19.4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		A			A			D			B	
Queue Length 50th (ft)	1	19			75		83	0			2	
Queue Length 95th (ft)	m2	24			112		136	0			17	
Internal Link Dist (ft)		124			52			451			82	
Turn Bay Length (ft)												
Base Capacity (vph)	372	3616			2492		332	585			385	
Starvation Cap Reductn	0	0			0		0	0			0	
Spillback Cap Reductn	0	0			0		0	0			0	
Storage Cap Reductn	0	0			0		0	0			0	
Reduced v/c Ratio	0.02	0.20			0.38		0.45	0.03			0.03	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 1:EBWB, Start of Green

Natural Cycle: 45

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.70

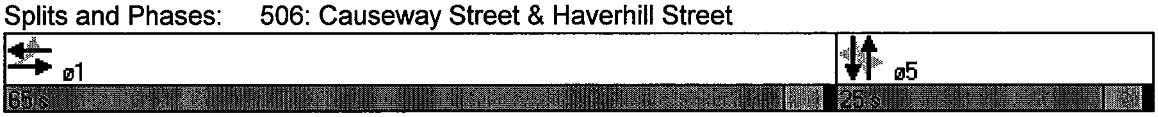
Intersection Signal Delay: 7.7 Intersection LOS: A

Intersection Capacity Utilization 41.5% ICU Level of Service A

Analysis Period (min) 15

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

Splits and Phases: 506: Causeway Street & Haverhill Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
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	
Trailing Detector (ft)				0	0						0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor											0.98	
Frt											0.944	
Flt Protected				0.950	0.984							
Satd. Flow (prot)	0	0	0	1643	3403	0	0	0	0	0	3326	0
Flt Permitted				0.950	0.984							
Satd. Flow (perm)	0	0	0	1643	3403	0	0	0	0	0	3326	0
Right Turn on Red			Yes	Yes		Yes			Yes			Yes
Satd. Flow (RTOR)				225	100						98	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		142			213			170			521	
Travel Time (s)		3.2			4.8			3.9			11.8	
Volume (vph)	0	0	0	334	265	0	0	0	0	0	153	90
Confl. Peds. (#/hr)												50
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	0	0	363	288	0	0	0	0	0	166	98
Lane Group Flow (vph)	0	0	0	225	426	0	0	0	0	0	264	0
Turn Type				Split								
Protected Phases				1	1						5	
Permitted Phases												
Detector Phases				1	1						5	
Minimum Initial (s)				8.0	8.0						5.0	
Minimum Split (s)				13.0	13.0						20.0	
Total Split (s)	0.0	0.0	0.0	52.0	52.0	0.0	0.0	0.0	0.0	0.0	32.0	0.0
Total Split (%)	0.0%	0.0%	0.0%	52.0%	52.0%	0.0%	0.0%	0.0%	0.0%	0.0%	32.0%	0.0%
Maximum Green (s)				47.0	47.0						27.0	
Yellow Time (s)				3.0	3.0						3.0	
All-Red Time (s)				2.0	2.0						2.0	
Lead/Lag				Lead	Lead							
Lead-Lag Optimize?												
Vehicle Extension (s)				2.0	2.0						2.0	
Recall Mode				C-Max	C-Max						Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)				48.0	48.0						28.0	
Actuated g/C Ratio				0.48	0.48						0.28	
v/c Ratio				0.25	0.25						0.26	
Control Delay				2.7	12.0						18.1	
Queue Delay				1.6	2.2						0.0	
Total Delay				4.3	14.2						18.1	
LOS				A	B						B	

Lane Group	ø2
Lane Configurations	
Ideal Flow (vphpl)	
Total Lost Time (s)	
Leading Detector (ft)	
Trailing Detector (ft)	
Turning Speed (mph)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Headway Factor	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Volume (vph)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Adj. Flow (vph)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	2
Permitted Phases	
Detector Phases	
Minimum Initial (s)	7.0
Minimum Split (s)	16.0
Total Split (s)	16.0
Total Split (%)	16%
Maximum Green (s)	14.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lead/Lag	Lag
Lead-Lag Optimize?	
Vehicle Extension (s)	2.0
Recall Mode	Ped
Walk Time (s)	7.0
Flash Dont Walk (s)	7.0
Pedestrian Calls (#/hr)	50
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay					10.8						18.1	
Approach LOS					B						B	
Queue Length 50th (ft)				0	63						42	
Queue Length 95th (ft)				41	95						74	
Internal Link Dist (ft)		62			133			90			441	
Turn Bay Length (ft)												
Base Capacity (vph)				906	1685						1002	
Starvation Cap Reductn				510	1094						0	
Spillback Cap Reductn				24	25						1	
Storage Cap Reductn				0	0						0	
Reduced v/c Ratio				0.57	0.72						0.26	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 36 (36%), Referenced to phase 1:WBTL, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.26
Intersection Signal Delay: 12.9 Intersection LOS: B
Intersection Capacity Utilization 31.4% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 65: Valenti Way & Beverly Street

Lane Group	ø2
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	1	45	470	0	0	1134
Peak Hour Factor	0.25	0.75	0.85	0.92	0.92	0.92
Hourly flow rate (vph)	4	60	553	0	0	1233
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			495			111
pX, platoon unblocked	0.73					
vC, conflicting volume	1169	276			553	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	861	276			553	
tC, single (s)	6.8	7.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.5			2.2	
p0 queue free %	98	91			100	
cM capacity (veh/h)	218	681			1027	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	64	276	276	616	616
Volume Left	4	0	0	0	0
Volume Right	60	0	0	0	0
cSH	601	1700	1700	1700	1700
Volume to Capacity	0.11	0.16	0.16	0.36	0.36
Queue Length 95th (ft)	9	0	0	0	0
Control Delay (s)	11.7	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	11.7	0.0		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	41.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations		↑↑	↑↑		Y	
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	464	1134	0	19	12
Peak Hour Factor	0.75	0.92	0.90	0.63	0.92	0.92
Hourly flow rate (vph)	0	504	1260	0	21	13
Pedestrians			4			
Lane Width (ft)			12.0			
Walking Speed (ft/s)			4.0			
Percent Blockage			0			
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)		109	497			
pX, platoon unblocked	0.75				0.75	0.75
vC, conflicting volume	1260				1516	630
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1019				1359	184
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				81	98
cM capacity (veh/h)	510				107	629

Direction, Lane #	NB 1	NB 2	SB 1	SB 2	SE 1
Volume Total	252	252	630	630	34
Volume Left	0	0	0	0	21
Volume Right	0	0	0	0	13
cSH	1700	1700	1700	1700	158
Volume to Capacity	0.15	0.15	0.37	0.37	0.21
Queue Length 95th (ft)	0	0	0	0	19
Control Delay (s)	0.0	0.0	0.0	0.0	33.9
Lane LOS					D
Approach Delay (s)	0.0		0.0		33.9
Approach LOS					D

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	41.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	572	43	50	824	6	47
Peak Hour Factor	0.91	0.68	0.63	0.97	0.88	0.80
Hourly flow rate (vph)	629	63	79	849	7	59
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	443			204		
pX, platoon unblocked			0.90		0.94	0.90
vC, conflicting volume			692		1244	346
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			550		944	166
tC, single (s)			4.2		7.0	7.3
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.5
p0 queue free %			91		97	92
cM capacity (veh/h)			910		213	720

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	419	273	363	566	66
Volume Left	0	0	79	0	7
Volume Right	0	63	0	0	59
cSH	1700	1700	910	1700	577
Volume to Capacity	0.25	0.16	0.09	0.33	0.11
Queue Length 95th (ft)	0	0	7	0	10
Control Delay (s)	0.0	0.0	2.8	0.0	12.0
Lane LOS			A		B
Approach Delay (s)	0.0		1.1		12.0
Approach LOS					B

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	54.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	409	12	16	733	0	0
Peak Hour Factor	0.83	0.92	0.92	0.78	0.70	0.89
Hourly flow rate (vph)	493	13	17	940	0	0
Pedestrians					324	
Lane Width (ft)					0.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	387			309		
pX, platoon unblocked						
vC, conflicting volume			830		1328	495
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			830		1328	495
tC, single (s)			4.1		6.8	7.1
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			98		100	100
cM capacity (veh/h)			811		146	505

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2
Volume Total	197	197	112	331	626
Volume Left	0	0	0	17	0
Volume Right	0	0	13	0	0
cSH	1700	1700	1700	811	1700
Volume to Capacity	0.12	0.12	0.07	0.02	0.37
Queue Length 95th (ft)	0	0	0	2	0
Control Delay (s)	0.0	0.0	0.0	0.7	0.0
Lane LOS				A	
Approach Delay (s)	0.0			0.3	
Approach LOS					

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	35.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	0	0	0	34	28	6	19	0	0	0	88
Peak Hour Factor	0.78	0.92	0.74	0.92	0.92	0.92	0.92	0.78	0.92	0.92	0.71	0.92
Hourly flow rate (vph)	0	0	0	0	37	30	7	24	0	0	0	96

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total (vph)	25	43	7	24	96
Volume Left (vph)	0	0	7	0	0
Volume Right (vph)	0	30	0	0	96
Hadj (s)	0.00	-0.50	0.50	0.14	-0.60
Departure Headway (s)	4.8	4.3	5.2	4.9	4.1
Degree Utilization, x	0.03	0.05	0.01	0.03	0.11
Capacity (veh/h)	732	809	670	720	863
Control Delay (s)	6.7	6.3	7.1	6.8	7.6
Approach Delay (s)	6.5		6.9		7.6
Approach LOS	A		A		A

Intersection Summary			
Delay	7.1		
HCM Level of Service	A		
Intersection Capacity Utilization	40.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↱		↰	↑↑		
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	410	218	16	739	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	446	237	17	803	0	0
Pedestrians					330	
Lane Width (ft)					0.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	132			564		
pX, platoon unblocked			0.97		0.97	0.97
vC, conflicting volume			1013		1331	597
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			950		1278	521
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		100	100
cM capacity (veh/h)			709		152	490

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3
Volume Total	178	178	326	17	402	402
Volume Left	0	0	0	17	0	0
Volume Right	0	0	237	0	0	0
cSH	1700	1700	1700	709	1700	1700
Volume to Capacity	0.10	0.10	0.19	0.02	0.24	0.24
Queue Length 95th (ft)	0	0	0	2	0	0
Control Delay (s)	0.0	0.0	0.0	10.2	0.0	0.0
Lane LOS				B		
Approach Delay (s)	0.0			0.2		
Approach LOS						

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	23.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↑			
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	0	202	153	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	220	166	0	0
Pedestrians					310	
Lane Width (ft)					0.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)			142			
pX, platoon unblocked	0.95				0.95	0.95
vC, conflicting volume	696				613	503
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	633				546	431
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	915				451	552

Direction, Lane #	WB 1	WB 2
Volume Total	146	239
Volume Left	0	0
Volume Right	0	166
cSH	1700	1700
Volume to Capacity	0.09	0.14
Queue Length 95th (ft)	0	0
Control Delay (s)	0.0	0.0
Lane LOS		
Approach Delay (s)	0.0	
Approach LOS		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	17.6%	ICU Level of Service	A
Analysis Period (min)	15		

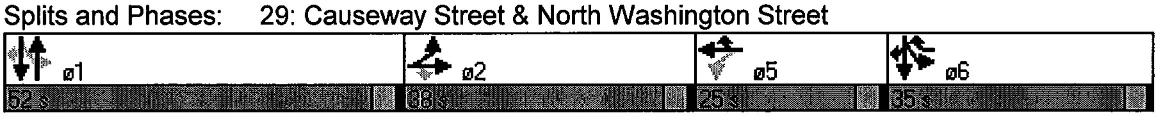
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↑	↱	↰	↑	↱		↑↑↱		↰	↑↑↱	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	12	11	12	12	11	12	10	10	10
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50		50		50	50	50
Trailing Detector (ft)	0	0	0	0	0	0		0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.91	0.91
Ped Bike Factor			0.85					0.98				
Frt			0.850			0.850		0.971				0.850
Flt Protected	0.950	0.978		0.950						0.950		
Satd. Flow (prot)	1641	1690	1615	1805	1837	1599	0	3277	0	1668	3196	1372
Flt Permitted	0.950	0.978		0.570						0.107		
Satd. Flow (perm)	1641	1690	1372	1083	1837	1599	0	3277	0	188	3196	1372
Right Turn on Red			Yes			Yes			Yes			No
Satd. Flow (RTOR)			16			63		20				
Headway Factor	1.04	1.04	1.00	1.00	1.04	1.00	1.00	1.04	1.00	1.09	1.09	1.09
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		309			183			111			268	
Travel Time (s)		7.0			4.2			2.5			6.1	
Volume (vph)	320	141	6	155	168	627	0	655	117	257	958	333
Confl. Peds. (#/hr)			88						33	33		
Peak Hour Factor	0.77	0.87	0.38	0.89	0.90	0.70	0.84	0.91	0.69	0.90	0.79	0.69
Heavy Vehicles (%)	1%	1%	0%	0%	0%	1%	0%	2%	1%	1%	1%	0%
Adj. Flow (vph)	416	162	16	174	187	896	0	720	170	286	1213	483
Lane Group Flow (vph)	281	297	16	174	187	896	0	890	0	286	1213	483
Turn Type	Split		Perm	Perm		pt+ov				D.P+P		custom
Protected Phases	2	2			5	5 6		1		6	1 6	6
Permitted Phases			2	5						1		1
Detector Phases	2	2	2	5	5	5 6		1		6	1 6	6
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0			8.0		8.0		8.0
Minimum Split (s)	32.0	32.0	32.0	25.0	25.0			25.0		25.0		25.0
Total Split (s)	38.0	38.0	38.0	25.0	25.0	60.0	0.0	52.0	0.0	35.0	87.0	35.0
Total Split (%)	25.3%	25.3%	25.3%	16.7%	16.7%	40.0%	0.0%	34.7%	0.0%	23.3%	58.0%	23.3%
Maximum Green (s)	34.0	34.0	34.0	21.0	21.0			48.0		31.0		31.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0			3.0		3.0		3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0			1.0		1.0		1.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead			Lead		Lag		Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0		3.0		3.0
Recall Mode	Max	Max	Max	Max	Max			C-Max		Max		Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0		7.0		7.0
Flash Dont Walk (s)	21.0	21.0	21.0	14.0	14.0			14.0		14.0		14.0
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0		0
Act Effct Green (s)	34.0	34.0	34.0	21.0	21.0	56.0		48.0		79.0	83.0	83.0
Actuated g/C Ratio	0.23	0.23	0.23	0.14	0.14	0.37		0.32		0.53	0.55	0.55
v/c Ratio	0.76	0.78	0.05	1.14	0.73	1.41		0.84		0.71	0.69	0.64
Control Delay	68.2	69.3	18.2	172.2	78.7	226.9		54.6		44.1	26.7	27.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.6		0.0	0.1	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	68.2	69.3	18.2	172.2	78.7	226.9		55.2		44.1	26.7	27.9
LOS	E	E	B	F	E	F		E		D	C	C
Approach Delay		67.4			197.3			55.2			29.5	
Approach LOS		E			F			E			C	
Queue Length 50th (ft)	272	289	0	~199	178	~1138		418		195	454	347
Queue Length 95th (ft)	320	392	2	#351	#281	#932		506		305	435	317
Internal Link Dist (ft)		229			103			31			188	
Turn Bay Length (ft)												
Base Capacity (vph)	372	383	323	152	257	636		1062		405	1768	759
Starvation Cap Reductn	0	0	0	0	0	0		29		0	0	0
Spillback Cap Reductn	0	0	2	0	0	0		0		0	48	0
Storage Cap Reductn	0	0	0	0	0	0		0		0	0	0
Reduced v/c Ratio	0.76	0.78	0.05	1.14	0.73	1.41		0.86		0.71	0.71	0.64

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 0 (0%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.41
Intersection Signal Delay: 83.8 Intersection LOS: F
Intersection Capacity Utilization 94.4% ICU Level of Service F
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: 29: Causeway Street & North Washington Street



Lane Group	NBL	NBT	NBR	SBL	SBR	SBR2
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	13	13	12	12	12
Storage Length (ft)	0		0	25	0	
Storage Lanes	1		0	1	2	
Total Lost Time (s)	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	9
Lane Util. Factor	1.00	1.00	1.00	1.00	0.88	1.00
Ped Bike Factor		0.97				
Frt		0.992			0.850	
Flt Protected	0.950			0.950		
Satd. Flow (prot)	1532	1761	0	1805	2671	0
Flt Permitted	0.950			0.226		
Satd. Flow (perm)	1532	1761	0	429	2671	0
Right Turn on Red			Yes			Yes
Satd. Flow (RTOR)		7			4	
Headway Factor	1.09	0.96	0.96	1.00	1.00	1.00
Link Speed (mph)		30				
Link Distance (ft)		347				
Travel Time (s)		7.9				
Volume (vph)	460	745	36	52	1052	12
Confl. Peds. (#/hr)			164	164		64
Peak Hour Factor	0.85	0.91	0.80	0.88	0.91	0.58
Heavy Vehicles (%)	10%	8%	0%	0%	6%	29%
Adj. Flow (vph)	541	819	45	59	1156	21
Lane Group Flow (vph)	541	864	0	59	1177	0
Turn Type	Prot			D.Pm	custom	
Protected Phases	5	1			1	
Permitted Phases				1		
Detector Phases	5	1		1	1	
Minimum Initial (s)	8.0	8.0		8.0	8.0	
Minimum Split (s)	26.0	25.0		25.0	25.0	
Total Split (s)	26.0	74.0	0.0	74.0	74.0	0.0
Total Split (%)	26.0%	74.0%	0.0%	74.0%	74.0%	0.0%
Maximum Green (s)	21.0	69.0		69.0	69.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0	2.0		2.0	2.0	
Recall Mode	None	C-Max		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	9.0	8.0		8.0	8.0	
Pedestrian Calls (#/hr)	0	0		0	0	
Act Effct Green (s)	22.0	70.0		70.0	70.0	
Actuated g/C Ratio	0.22	0.70		0.70	0.70	
v/c Ratio	1.61	0.70		0.20	0.63	

Lane Group	NBL	NBT	NBR	SBL	SBR	SBR2
Control Delay	311.1	13.7		7.1	9.9	
Queue Delay	4.3	2.1		0.0	147.7	
Total Delay	315.4	15.8		7.1	157.6	
LOS	F	B		A	F	
Approach Delay		131.2				
Approach LOS		F				
Queue Length 50th (ft)	~512	205		11	198	
Queue Length 95th (ft)	#670	356		27	263	
Internal Link Dist (ft)		267				
Turn Bay Length (ft)				25		
Base Capacity (vph)	337	1235		300	1871	
Starvation Cap Reductn	0	229		0	188	
Spillback Cap Reductn	2	38		0	982	
Storage Cap Reductn	0	0		0	0	
Reduced v/c Ratio	1.61	0.86		0.20	1.32	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 85 (85%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.61
Intersection Signal Delay: 140.2 Intersection LOS: F
Intersection Capacity Utilization 69.4% ICU Level of Service C
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: 332: Valenti Way & North Washington Street

ø1	ø5
74 s	26 s

Lane Group	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations			↑↑↑			↱↱↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)			50			50
Trailing Detector (ft)			0			0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.76
Frt						0.850
Flt Protected						
Satd. Flow (prot)	0	0	4893	0	0	3409
Flt Permitted						
Satd. Flow (perm)	0	0	4893	0	0	3409
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						71
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		397	273		170	
Travel Time (s)		9.0	6.2		3.9	
Volume (vph)	0	0	1052	0	0	485
Peak Hour Factor	0.92	0.92	0.91	0.92	0.92	0.91
Heavy Vehicles (%)	0%	0%	6%	0%	0%	8%
Adj. Flow (vph)	0	0	1156	0	0	533
Lane Group Flow (vph)	0	0	1156	0	0	533
Turn Type						custom
Protected Phases			5			1
Permitted Phases						
Detector Phases			5			1
Minimum Initial (s)			8.0			8.0
Minimum Split (s)			20.0			20.0
Total Split (s)	0.0	0.0	48.0	0.0	0.0	52.0
Total Split (%)	0.0%	0.0%	48.0%	0.0%	0.0%	52.0%
Maximum Green (s)			44.0			48.0
Yellow Time (s)			3.0			3.0
All-Red Time (s)			1.0			1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)			2.0			2.0
Recall Mode			Ped			C-Max
Walk Time (s)			7.0			
Flash Dont Walk (s)			1.0			
Pedestrian Calls (#/hr)			0			
Act Effct Green (s)			28.1			63.9
Actuated g/C Ratio			0.28			0.64
v/c Ratio			0.84			0.24
Control Delay			53.6			2.8
Queue Delay			1.1			0.4
Total Delay			54.7			3.2
LOS			D			A
Approach Delay			54.7			

Lane Group	NBL	NBT	SBT	SBR	SEL	SER
Approach LOS			D			
Queue Length 50th (ft)			294			18
Queue Length 95th (ft)			341			22
Internal Link Dist (ft)		317	193		90	
Turn Bay Length (ft)						
Base Capacity (vph)			2153			2205
Starvation Cap Reductn			702			1153
Spillback Cap Reductn			294			617
Storage Cap Reductn			0			0
Reduced v/c Ratio			0.80			0.51

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 4 (4%), Referenced to phase 1:SER, Start of Green
Natural Cycle: 40
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 38.4 Intersection LOS: D
Intersection Capacity Utilization 38.3% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 4120: North Washington Street & Beverly Street

ø1	ø5
52 s	48 s

Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER
Lane Configurations		↱		↑↑					↰↰	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	14	12	12	12	12	12	12	12	12
Total Lost Time (s)	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	
Trailing Detector (ft)		0		0					0	
Turning Speed (mph)	15	9	15		9	15		9	15	9
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00
Frt		0.865								
Flt Protected									0.950	
Satd. Flow (prot)	0	1753	0	3574	0	0	0	0	3400	0
Flt Permitted									0.950	
Satd. Flow (perm)	0	1753	0	3574	0	0	0	0	3400	0
Right Turn on Red		Yes			No			No	No	
Satd. Flow (RTOR)		126								
Headway Factor	1.00	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30			30			30		30	
Link Distance (ft)	264			579			347		320	
Travel Time (s)	6.0			13.2			7.9		7.3	
Volume (vph)	0	55	0	945	0	0	0	0	231	0
Peak Hour Factor	0.92	0.67	0.92	0.88	0.92	0.92	0.92	0.92	0.69	0.92
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	0%	3%	0%
Adj. Flow (vph)	0	82	0	1074	0	0	0	0	335	0
Lane Group Flow (vph)	0	82	0	1074	0	0	0	0	335	0
Turn Type		custom							Prot	
Protected Phases		5		1					6	
Permitted Phases										
Detector Phases		5		1					6	
Minimum Initial (s)		8.0		8.0					8.0	
Minimum Split (s)		13.0		13.0					13.0	
Total Split (s)	0.0	14.0	0.0	53.0	0.0	0.0	0.0	0.0	33.0	0.0
Total Split (%)	0.0%	14.0%	0.0%	53.0%	0.0%	0.0%	0.0%	0.0%	33.0%	0.0%
Maximum Green (s)		9.0		48.0					28.0	
Yellow Time (s)		3.0		3.0					3.0	
All-Red Time (s)		2.0		2.0					2.0	
Lead/Lag		Lead							Lag	
Lead-Lag Optimize?		Yes							Yes	
Vehicle Extension (s)		2.0		2.0					2.0	
Recall Mode		None		C-Max					None	
Act Effct Green (s)		9.0		67.1					14.5	
Actuated g/C Ratio		0.09		0.67					0.14	
v/c Ratio		0.30		0.45					0.68	
Control Delay		5.5		8.6					47.6	
Queue Delay		0.1		0.3					0.0	
Total Delay		5.6		8.8					47.6	
LOS		A		A					D	
Approach Delay				8.8					47.6	
Approach LOS				A					D	
Queue Length 50th (ft)		0		202					106	

Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER
Queue Length 95th (ft)		0		m188					107	
Internal Link Dist (ft)	184			499			267		240	
Turn Bay Length (ft)										
Base Capacity (vph)		289		2400					986	
Starvation Cap Reductn		0		631					0	
Spillback Cap Reductn		21		615					0	
Storage Cap Reductn		0		0					0	
Reduced v/c Ratio		0.31		0.61					0.34	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 43 (43%), Referenced to phase 1:NBT, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.68
Intersection Signal Delay: 17.4 Intersection LOS: B
Intersection Capacity Utilization 39.5% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 34: Cooper Street & Sumner Tunnel Off-Ramp

ø1	ø5	ø6
53 s	14 s	33 s

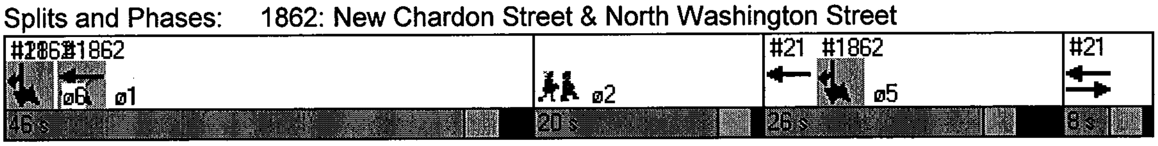
Lane Group	EBR	EBR2	WBL2	WBL	WBT	SBL	SBT	SBR	ø2	ø5	ø6
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900			
Lane Width (ft)	11	11	12	16	12	16	12	16			
Storage Length (ft)	0			25		0		0			
Storage Lanes	3			1		2		1			
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	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)	9	9	15	15		15		9			
Lane Util. Factor	0.88	1.00	0.95	1.00	0.95	0.97	0.95	0.95			
Frt	0.850	0.850					0.968	0.850			
Flt Protected				0.950		0.950					
Satd. Flow (prot)	1963	1546	0	2046	3610	3929	1407	1581			
Flt Permitted				0.950		0.950					
Satd. Flow (perm)	1963	1546	0	2046	3610	3929	1407	1581			
Right Turn on Red		Yes	No					No			
Satd. Flow (RTOR)		34									
Headway Factor	1.04	1.04	1.00	0.85	1.00	0.85	1.00	0.85			
Link Speed (mph)					30		30				
Link Distance (ft)					125		397				
Travel Time (s)					2.8		9.0				
Volume (vph)	1157	42	23	3	293	1001	204	332			
Peak Hour Factor	0.75	0.95	0.68	0.34	0.83	0.88	0.92	0.88			
Heavy Vehicles (%)	40%	1%	0%	0%	0%	1%	28%	10%			
Adj. Flow (vph)	1543	44	34	9	353	1138	222	377			
Lane Group Flow (vph)	1543	44	0	43	353	1138	282	317			
Turn Type	custom	custom	Perm	Perm		Split		Prot			
Protected Phases	1	1			1	5 6	5 6	5 6	2	5	6
Permitted Phases			1	1							
Detector Phases	1	1	1	1	1	5 6	5 6	5 6			
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0				7.0	8.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0				20.0	24.0	8.0
Total Split (s)	46.0	46.0	46.0	46.0	46.0	34.0	34.0	34.0	20.0	26.0	8.0
Total Split (%)	46.0%	46.0%	46.0%	46.0%	46.0%	34.0%	34.0%	34.0%	20%	26%	8%
Maximum Green (s)	40.0	40.0	40.0	40.0	40.0				16.0	19.0	4.0
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				1.0	4.0	1.0
Lead/Lag	Lead	Lead	Lead	Lead	Lead				Lag	Lead	Lag
Lead-Lag Optimize?											Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0				2.0	2.0	3.0
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max				Ped	None	Min
Walk Time (s)									7.0		
Flash Dont Walk (s)									9.0		
Pedestrian Calls (#/hr)									50		
Act Effct Green (s)	42.0	42.0		42.0	42.0	30.0	30.0	30.0			
Actuated g/C Ratio	0.42	0.42		0.42	0.42	0.30	0.30	0.30			
v/c Ratio	1.87	0.07		0.05	0.23	0.97	0.67	0.67			
Control Delay	410.6	0.6		17.5	19.2	57.2	43.1	42.5			
Queue Delay	0.0	1.5		0.0	0.0	81.3	2.1	0.8			

Lane Group	EBR	EBR2	WBL2	WBL	WBT	SBL	SBT	SBR	ø2	ø5	ø6
Total Delay	410.6	2.1		17.5	19.2	138.5	45.2	43.3			
LOS	F	A		B	B	F	D	D			
Approach Delay					19.0		106.0				
Approach LOS					B		F				
Queue Length 50th (ft)	~846	0		16	74	375	183	206			
Queue Length 95th (ft)	m#736	m0		14	96	#485	m228	m252			
Internal Link Dist (ft)					45		317				
Turn Bay Length (ft)				25							
Base Capacity (vph)	824	669		859	1516	1179	422	474			
Starvation Cap Reductn	0	521		0	0	224	0	34			
Spillback Cap Reductn	0	1		0	0	0	54	0			
Storage Cap Reductn	0	0		0	0	0	0	0			
Reduced v/c Ratio	1.87	0.30		0.05	0.23	1.19	0.77	0.72			

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 49 (49%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.87
Intersection Signal Delay: 221.8 Intersection LOS: F
Intersection Capacity Utilization 85.7% 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.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1862: New Chardon Street & North Washington Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
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	
Trailing Detector (ft)	0	0			0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.999			0.850			0.897	
Flt Protected	0.950						0.950				0.988	
Satd. Flow (prot)	1787	5136	0	0	3571	0	1805	1615	0	0	1667	0
Flt Permitted	0.383						0.746				0.964	
Satd. Flow (perm)	720	5136	0	0	3571	0	1417	1615	0	0	1627	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					1			206			13	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		204			132			531			148	
Travel Time (s)		4.6			3.0			12.1			3.4	
Volume (vph)	14	705	0	0	502	3	79	0	12	4	0	12
Peak Hour Factor	0.92	0.78	0.92	0.92	0.76	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	0%	0%	1%	1%	0%	0%	0%	1%	0%	1%
Adj. Flow (vph)	15	904	0	0	661	3	86	0	13	4	0	13
Lane Group Flow (vph)	15	904	0	0	664	0	86	13	0	0	17	0
Turn Type	Perm						Perm			Perm		
Protected Phases		1			1			5			5	
Permitted Phases	1						5			5		
Detector Phases	1	1			1		5	5		5	5	
Minimum Initial (s)	8.0	8.0			8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	23.0	23.0			23.0		18.0	18.0		18.0	18.0	
Total Split (s)	75.0	75.0	0.0	0.0	75.0	0.0	25.0	25.0	0.0	25.0	25.0	0.0
Total Split (%)	75.0%	75.0%	0.0%	0.0%	75.0%	0.0%	25.0%	25.0%	0.0%	25.0%	25.0%	0.0%
Maximum Green (s)	70.0	70.0			70.0		20.0	20.0		20.0	20.0	
Yellow Time (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0			2.0		2.0	2.0		2.0	2.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0			2.0		2.0	2.0		2.0	2.0	
Recall Mode	C-Max	C-Max			C-Max		None	None		None	None	
Walk Time (s)	10.0	10.0			10.0		12.0	12.0		12.0	12.0	
Flash Dont Walk (s)	8.0	8.0			8.0		1.0	1.0		1.0	1.0	
Pedestrian Calls (#/hr)	0	0			0		0	0		0	0	
Act Effct Green (s)	83.9	83.9			83.9		11.5	11.5			11.5	
Actuated g/C Ratio	0.84	0.84			0.84		0.12	0.12			0.12	
v/c Ratio	0.02	0.21			0.22		0.52	0.04			0.09	
Control Delay	1.5	1.3			2.5		56.3	0.2			22.1	
Queue Delay	0.0	0.0			0.0		0.0	0.0			0.0	
Total Delay	1.5	1.3			2.5		56.3	0.2			22.1	
LOS	A	A			A		E	A			C	
Approach Delay		1.3			2.5			48.9			22.1	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		A			A			D			C	
Queue Length 50th (ft)	1	20			38		0	0			2	
Queue Length 95th (ft)	m3	25			56		102	1			22	
Internal Link Dist (ft)		124			52			451			68	
Turn Bay Length (ft)												
Base Capacity (vph)	604	4307			2995		298	502			352	
Starvation Cap Reductn	0	0			0		0	0			0	
Spillback Cap Reductn	0	0			0		0	0			0	
Storage Cap Reductn	0	0			0		0	0			0	
Reduced v/c Ratio	0.02	0.21			0.22		0.29	0.03			0.05	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 93 (93%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.52
Intersection Signal Delay: 4.7 Intersection LOS: A
Intersection Capacity Utilization 31.7% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 506: Causeway Street & Haverhill Street

ø1	ø5
75 s	25 s

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
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	
Trailing Detector (ft)				0	0						0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt											0.959	
Flt Protected				0.950	0.977							
Satd. Flow (prot)	0	0	0	1643	3378	0	0	0	0	0	3462	0
Flt Permitted				0.950	0.977							
Satd. Flow (perm)	0	0	0	1643	3378	0	0	0	0	0	3462	0
Right Turn on Red			Yes	Yes		Yes			Yes			Yes
Satd. Flow (RTOR)				169	157						58	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		142			213			170			521	
Travel Time (s)		3.2			4.8			3.9			11.8	
Volume (vph)	0	0	0	300	161	0	0	0	0	0	184	70
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	0	0	326	175	0	0	0	0	0	200	76
Lane Group Flow (vph)	0	0	0	169	332	0	0	0	0	0	276	0
Turn Type				Split								
Protected Phases				1	1						5	
Permitted Phases												
Detector Phases				1	1						5	
Minimum Initial (s)				8.0	8.0						5.0	
Minimum Split (s)				13.0	13.0						20.0	
Total Split (s)	0.0	0.0	0.0	48.0	48.0	0.0	0.0	0.0	0.0	0.0	36.0	0.0
Total Split (%)	0.0%	0.0%	0.0%	48.0%	48.0%	0.0%	0.0%	0.0%	0.0%	0.0%	36.0%	0.0%
Maximum Green (s)				43.0	43.0						31.0	
Yellow Time (s)				3.0	3.0						3.0	
All-Red Time (s)				2.0	2.0						2.0	
Lead/Lag				Lead	Lead							
Lead-Lag Optimize?												
Vehicle Extension (s)				2.0	2.0						2.0	
Recall Mode				C-Max	C-Max						Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)				44.0	44.0						32.0	
Actuated g/C Ratio				0.44	0.44						0.32	
v/c Ratio				0.21	0.21						0.24	
Control Delay				26.3	35.2						29.2	
Queue Delay				5.5	4.0						0.0	
Total Delay				31.8	39.1						29.2	
LOS				C	D						C	
Approach Delay					36.6						29.2	
Approach LOS					D						C	

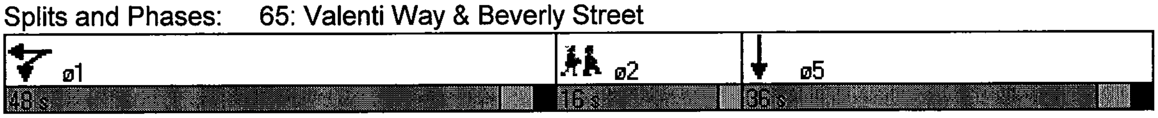
Lane Group	ø2
Lane Configurations	
Ideal Flow (vphpl)	
Total Lost Time (s)	
Leading Detector (ft)	
Trailing Detector (ft)	
Turning Speed (mph)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Headway Factor	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Volume (vph)	
Peak Hour Factor	
Adj. Flow (vph)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	2
Permitted Phases	
Detector Phases	
Minimum Initial (s)	7.0
Minimum Split (s)	16.0
Total Split (s)	16.0
Total Split (%)	16%
Maximum Green (s)	14.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lead/Lag	Lag
Lead-Lag Optimize?	
Vehicle Extension (s)	2.0
Recall Mode	Ped
Walk Time (s)	7.0
Flash Dont Walk (s)	7.0
Pedestrian Calls (#/hr)	50
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)				86	97						60	
Queue Length 95th (ft)				m41	m54						92	
Internal Link Dist (ft)		62			133			90			441	
Turn Bay Length (ft)												
Base Capacity (vph)				818	1574						1147	
Starvation Cap Reductn				583	1143						0	
Spillback Cap Reductn				0	0						0	
Storage Cap Reductn				0	0						0	
Reduced v/c Ratio				0.72	0.77						0.24	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 22 (22%), Referenced to phase 1:WBTL, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.24
Intersection Signal Delay: 34.0 Intersection LOS: C
Intersection Capacity Utilization 22.8% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 65: Valenti Way & Beverly Street



Lane Group	ø2
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	5	9	764	0	0	1109
Peak Hour Factor	0.42	0.75	0.88	0.92	0.92	0.78
Hourly flow rate (vph)	12	12	868	0	0	1422
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			495			111
pX, platoon unblocked	0.73					
vC, conflicting volume	1579	434			868	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1421	434			868	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	87	98			100	
cM capacity (veh/h)	94	575			784	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	24	434	434	711	711
Volume Left	12	0	0	0	0
Volume Right	12	0	0	0	0
cSH	162	1700	1700	1700	1700
Volume to Capacity	0.15	0.26	0.26	0.42	0.42
Queue Length 95th (ft)	13	0	0	0	0
Control Delay (s)	31.0	0.0	0.0	0.0	0.0
Lane LOS	D				
Approach Delay (s)	31.0	0.0		0.0	
Approach LOS	D				

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	42.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations		↑↑	↑↑		Y	
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	745	1114	0	19	2
Peak Hour Factor	0.80	0.91	0.94	0.53	0.92	0.92
Hourly flow rate (vph)	0	819	1185	0	21	2
Pedestrians		4	5			
Lane Width (ft)		12.0	12.0			
Walking Speed (ft/s)		4.0	4.0			
Percent Blockage		0	0			
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)		109	497			
pX, platoon unblocked	0.75				0.75	0.75
vC, conflicting volume	1185				1599	597
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	918				1468	136
tC, single (s)	4.2				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				77	100
cM capacity (veh/h)	547				90	671

Direction, Lane #	NB 1	NB 2	SB 1	SB 2	SE 1
Volume Total	409	409	593	593	23
Volume Left	0	0	0	0	21
Volume Right	0	0	0	0	2
cSH	1700	1700	1700	1700	99
Volume to Capacity	0.24	0.24	0.35	0.35	0.23
Queue Length 95th (ft)	0	0	0	0	21
Control Delay (s)	0.0	0.0	0.0	0.0	52.2
Lane LOS					F
Approach Delay (s)	0.0		0.0		52.2
Approach LOS					F

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	42.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↱			↰↑	Y	
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	546	80	27	556	4	145
Peak Hour Factor	0.96	0.86	0.73	0.95	0.56	0.66
Hourly flow rate (vph)	569	93	37	585	7	220
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	443			204		
pX, platoon unblocked			0.96		0.97	0.96
vC, conflicting volume			662		982	331
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			601		874	255
tC, single (s)			4.1		7.0	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			96		97	69
cM capacity (veh/h)			943		258	712

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	379	283	232	390	227
Volume Left	0	0	37	0	7
Volume Right	0	93	0	0	220
cSH	1700	1700	943	1700	675
Volume to Capacity	0.22	0.17	0.04	0.23	0.34
Queue Length 95th (ft)	0	0	3	0	37
Control Delay (s)	0.0	0.0	1.8	0.0	13.0
Lane LOS			A		B
Approach Delay (s)	0.0		0.7		13.0
Approach LOS					B

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	51.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑↱			↰↑		
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	467	2	16	486	0	0
Peak Hour Factor	0.78	0.92	0.92	0.76	0.77	0.52
Hourly flow rate (vph)	599	2	17	639	0	0
Pedestrians					212	
Lane Width (ft)					0.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	387			309		
pX, platoon unblocked						
vC, conflicting volume			813		1166	413
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			813		1166	413
tC, single (s)			4.1		6.8	7.0
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			98		100	100
cM capacity (veh/h)			823		183	580

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2
Volume Total	239	239	122	231	426
Volume Left	0	0	0	17	0
Volume Right	0	0	2	0	0
cSH	1700	1700	1700	823	1700
Volume to Capacity	0.14	0.14	0.07	0.02	0.25
Queue Length 95th (ft)	0	0	0	2	0
Control Delay (s)	0.0	0.0	0.0	0.9	0.0
Lane LOS				A	
Approach Delay (s)	0.0			0.3	
Approach LOS					

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	28.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	0	0	0	98	132	25	17	0	0	0	70
Peak Hour Factor	0.79	0.92	0.72	0.92	0.92	0.92	0.92	0.69	0.92	0.92	0.81	0.92
Hourly flow rate (vph)	0	0	0	0	107	143	27	25	0	0	0	76

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total (vph)	71	179	27	25	76
Volume Left (vph)	0	0	27	0	0
Volume Right (vph)	0	143	0	0	76
Hadj (s)	0.00	-0.56	0.50	0.00	-0.60
Departure Headway (s)	4.8	4.3	5.6	5.1	4.5
Degree Utilization, x	0.09	0.21	0.04	0.04	0.10
Capacity (veh/h)	730	820	608	664	750
Control Delay (s)	7.1	7.2	7.7	7.1	8.0
Approach Delay (s)	7.2		7.4		8.0
Approach LOS	A		A		A

Intersection Summary			
Delay	7.4		
HCM Level of Service	A		
Intersection Capacity Utilization	39.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑↱		↰	↑↑		
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	498	222	15	505	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	541	241	16	549	0	0
Pedestrians					210	
Lane Width (ft)					0.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	132			564		
pX, platoon unblocked			0.97		0.97	0.97
vC, conflicting volume			993		1179	511
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			937		1128	442
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		100	100
cM capacity (veh/h)			719		191	553

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3
Volume Total	217	217	350	16	274	274
Volume Left	0	0	0	16	0	0
Volume Right	0	0	241	0	0	0
cSH	1700	1700	1700	719	1700	1700
Volume to Capacity	0.13	0.13	0.21	0.02	0.16	0.16
Queue Length 95th (ft)	0	0	0	2	0	0
Control Delay (s)	0.0	0.0	0.0	10.1	0.0	0.0
Lane LOS				B		
Approach Delay (s)	0.0			0.3		
Approach LOS						

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	20.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↱			
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	0	115	99	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	125	108	0	0
Pedestrians					250	
Lane Width (ft)					0.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)			142			
pX, platoon unblocked						
vC, conflicting volume	483				429	366
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	483				429	366
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1091				560	636

Direction, Lane #	WB 1	WB 2
Volume Total	83	149
Volume Left	0	0
Volume Right	0	108
cSH	1700	1700
Volume to Capacity	0.05	0.09
Queue Length 95th (ft)	0	0
Control Delay (s)	0.0	0.0
Lane LOS		
Approach Delay (s)	0.0	
Approach LOS		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	16.7%	ICU Level of Service	A
Analysis Period (min)	15		

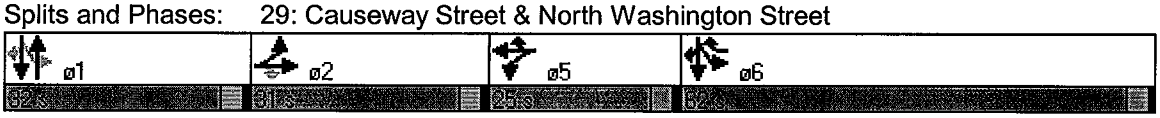
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↑	↱		↰↑↑	↱		↑↱		↰	↑↱	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	12	11	12	12	11	12	10	10	10
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50		50		50	50	50
Trailing Detector (ft)	0	0	0	0	0	0		0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.95	0.95	1.00	0.95	0.95	1.00	1.00	0.95	0.95	1.00	0.91	0.91
Ped Bike Factor			0.69					0.94				
Frt			0.850			0.850		0.965			0.978	0.850
Flt Protected	0.950	0.989			0.978					0.950		
Satd. Flow (prot)	1493	1611	1468	0	3157	1509	0	2738	0	1560	2889	1306
Flt Permitted	0.950	0.989			0.978					0.143		
Satd. Flow (perm)	1493	1611	1009	0	3157	1509	0	2738	0	235	2889	1306
Right Turn on Red			Yes			Yes			Yes			No
Satd. Flow (RTOR)			1			83		23				
Headway Factor	1.04	1.04	1.00	1.00	1.04	1.00	1.00	1.04	1.00	1.09	1.09	1.09
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		309			183			111			268	
Travel Time (s)		7.0			4.2			2.5			6.1	
Volume (vph)	212	155	1	111	127	233	0	430	99	342	1017	619
Confl. Peds. (#/hr)			200						107	107		
Peak Hour Factor	0.81	0.85	0.82	0.84	0.76	0.78	0.54	0.96	0.73	0.90	0.94	0.83
Heavy Vehicles (%)	11%	6%	10%	7%	9%	7%	23%	16%	17%	8%	10%	5%
Adj. Flow (vph)	262	182	1	132	167	299	0	448	136	380	1082	746
Lane Group Flow (vph)	211	233	1	0	299	299	0	584	0	380	1265	563
Turn Type	Split		Perm	Split		pt+ov				D.P+P		custom
Protected Phases	2	2		5	5	5 6		1		6	1 6	6
Permitted Phases			2							1		1
Detector Phases	2	2	2	5	5	5 6		1		6	1 6	6
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0			8.0		8.0		8.0
Minimum Split (s)	31.0	31.0	31.0	25.0	25.0			25.0		25.0		25.0
Total Split (s)	31.0	31.0	31.0	25.0	25.0	87.0	0.0	32.0	0.0	62.0	94.0	62.0
Total Split (%)	20.7%	20.7%	20.7%	16.7%	16.7%	58.0%	0.0%	21.3%	0.0%	41.3%	62.7%	41.3%
Maximum Green (s)	27.0	27.0	27.0	21.0	21.0			28.0		58.0		58.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0			3.0		3.0		3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0			1.0		1.0		1.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead			Lead		Lag		Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0			2.0		2.0		2.0
Recall Mode	None	None	None	None	None			C-Max		None		None
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0		7.0		7.0
Flash Dont Walk (s)	20.0	20.0	20.0	14.0	14.0			14.0		14.0		14.0
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0		0
Act Effct Green (s)	24.3	24.3	24.3		17.8	72.8		40.9		91.9	95.9	95.9
Actuated g/C Ratio	0.16	0.16	0.16		0.12	0.49		0.27		0.61	0.64	0.64
v/c Ratio	0.87	0.89	0.01		0.80	0.39		0.76		0.64	0.68	0.67
Control Delay	93.5	95.0	38.0		80.2	17.2		57.2		30.6	20.8	23.6
Queue Delay	0.0	0.0	0.0		0.0	0.0		0.0		0.0	0.1	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	93.5	95.0	38.0		80.2	17.2		57.2		30.6	20.9	23.6
LOS	F	F	D		F	B		E		C	C	C
Approach Delay		94.2			48.7			57.2			23.3	
Approach LOS		F			D			E			C	
Queue Length 50th (ft)	210	233	0		152	115		293		233	437	384
Queue Length 95th (ft)	276	#337	5		167	138		#457		352	557	495
Internal Link Dist (ft)		229			103			31			188	
Turn Bay Length (ft)												
Base Capacity (vph)	269	290	182		442	833		764		659	1848	835
Starvation Cap Reductn	0	0	0		0	0		0		0	0	0
Spillback Cap Reductn	0	0	2		0	0		0		0	59	0
Storage Cap Reductn	0	0	0		0	0		0		0	0	0
Reduced v/c Ratio	0.78	0.80	0.01		0.68	0.36		0.76		0.58	0.71	0.67

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 0 (0%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 40.6 Intersection LOS: D
Intersection Capacity Utilization 79.0% 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: 29: Causeway Street & North Washington Street



Lane Group	NBL	NBT	NBR	SBL	SBR	SBR2
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	13	13	12	12	12
Storage Length (ft)	0		0	25	0	
Storage Lanes	1		0	1	2	
Total Lost Time (s)	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	9
Lane Util. Factor	1.00	1.00	1.00	1.00	0.88	1.00
Ped Bike Factor		0.96		0.90		
Frt		0.984			0.850	
Flt Protected	0.950			0.950		
Satd. Flow (prot)	1532	1689	0	1736	2614	0
Flt Permitted	0.950			0.384		
Satd. Flow (perm)	1532	1689	0	634	2614	0
Right Turn on Red			Yes			Yes
Satd. Flow (RTOR)		13			6	
Headway Factor	1.09	0.96	0.96	1.00	1.00	1.00
Link Speed (mph)		30				
Link Distance (ft)		347				
Travel Time (s)		7.9				
Volume (vph)	627	464	38	47	1077	22
Confl. Peds. (#/hr)			95	95		35
Peak Hour Factor	0.94	0.94	0.63	0.69	0.91	0.58
Heavy Vehicles (%)	10%	11%	3%	4%	9%	0%
Adj. Flow (vph)	667	494	60	68	1184	38
Lane Group Flow (vph)	667	554	0	68	1222	0
Turn Type	Prot			D.Pm	custom	
Protected Phases	5	1			1	
Permitted Phases				1		
Detector Phases	5	1		1	1	
Minimum Initial (s)	8.0	8.0		8.0	8.0	
Minimum Split (s)	26.0	25.0		25.0	25.0	
Total Split (s)	30.0	74.0	0.0	74.0	74.0	0.0
Total Split (%)	28.8%	71.2%	0.0%	71.2%	71.2%	0.0%
Maximum Green (s)	25.0	69.0		69.0	69.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0	2.0		2.0	2.0	
Recall Mode	None	C-Max		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	9.0	8.0		8.0	8.0	
Pedestrian Calls (#/hr)	0	0		0	0	
Act Effct Green (s)	26.0	70.0		70.0	70.0	
Actuated g/C Ratio	0.25	0.67		0.67	0.67	
v/c Ratio	1.74	0.49		0.16	0.69	

Lane Group	NBL	NBT	NBR	SBL	SBR	SBR2
Control Delay	371.9	9.8		7.3	13.0	
Queue Delay	40.9	4.7		0.0	17.4	
Total Delay	412.8	14.5		7.3	30.4	
LOS	F	B		A	C	
Approach Delay		232.0				
Approach LOS		F				
Queue Length 50th (ft)	~661	156		15	252	
Queue Length 95th (ft)	#880	229		24	333	
Internal Link Dist (ft)		267				
Turn Bay Length (ft)				25		
Base Capacity (vph)	383	1141		427	1761	
Starvation Cap Reductn	19	503		0	153	
Spillback Cap Reductn	15	0		0	557	
Storage Cap Reductn	0	0		0	0	
Reduced v/c Ratio	1.83	0.87		0.16	1.01	

Intersection Summary

Area Type: Other

Cycle Length: 104

Actuated Cycle Length: 104

Offset: 45 (43%), Referenced to phase 1:NBSB, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.74

Intersection Signal Delay: 127.8 Intersection LOS: F

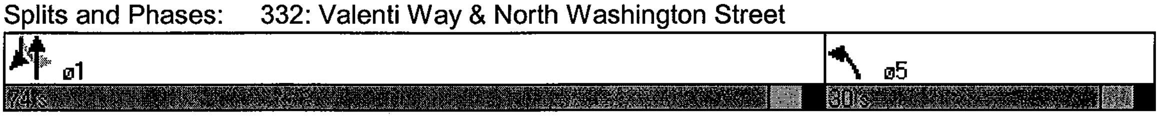
Intersection Capacity Utilization 79.8% ICU Level of Service D

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: 332: Valenti Way & North Washington Street

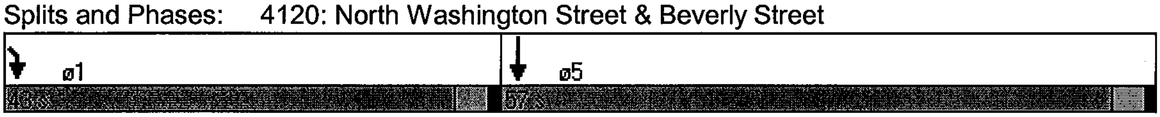


Lane Group	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)			50			50
Trailing Detector (ft)			0			0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.76
Frt						0.850
Flt Protected						
Satd. Flow (prot)	0	0	4759	0	0	3347
Flt Permitted						
Satd. Flow (perm)	0	0	4759	0	0	3347
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						127
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		397	273		170	
Travel Time (s)		9.0	6.2		3.9	
Volume (vph)	0	0	1072	0	0	509
Peak Hour Factor	0.92	0.92	0.91	0.92	0.92	0.94
Heavy Vehicles (%)	0%	0%	9%	0%	0%	10%
Adj. Flow (vph)	0	0	1178	0	0	541
Lane Group Flow (vph)	0	0	1178	0	0	541
Turn Type						custom
Protected Phases			5			1
Permitted Phases						
Detector Phases			5			1
Minimum Initial (s)			8.0			8.0
Minimum Split (s)			24.0			24.0
Total Split (s)	0.0	0.0	57.0	0.0	0.0	43.0
Total Split (%)	0.0%	0.0%	57.0%	0.0%	0.0%	43.0%
Maximum Green (s)			53.0			39.0
Yellow Time (s)			3.0			3.0
All-Red Time (s)			1.0			1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)			2.0			2.0
Recall Mode			Ped			C-Max
Walk Time (s)			7.0			7.0
Flash Dont Walk (s)			9.0			9.0
Pedestrian Calls (#/hr)			0			0
Act Effct Green (s)			27.6			64.4
Actuated g/C Ratio			0.28			0.64
v/c Ratio			0.90			0.25
Control Delay			44.3			7.6
Queue Delay			0.2			0.4
Total Delay			44.4			8.1
LOS			D			A
Approach Delay			44.4			

Lane Group	NBL	NBT	SBT	SBR	SEL	SER
Approach LOS			D			
Queue Length 50th (ft)			264			53
Queue Length 95th (ft)			291			72
Internal Link Dist (ft)		317	193		90	
Turn Bay Length (ft)						
Base Capacity (vph)			2522			2200
Starvation Cap Reductn			484			1138
Spillback Cap Reductn			95			475
Storage Cap Reductn			0			0
Reduced v/c Ratio			0.58			0.51

Intersection Summary	
Area Type: Other	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 57 (57%), Referenced to phase 1:SER, Start of Green	
Natural Cycle: 50	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay: 33.0	Intersection LOS: C
Intersection Capacity Utilization 39.3%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 4120: North Washington Street & Beverly Street



Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER
Lane Configurations										
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	14	12	12	12	12	12	12	12	12
Total Lost Time (s)	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	
Trailing Detector (ft)		0		0					0	
Turning Speed (mph)	15	9	15		9	15		9	15	9
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00
Frt		0.865								
Flt Protected									0.950	
Satd. Flow (prot)	0	1736	0	3505	0	0	0	0	3273	0
Flt Permitted									0.950	
Satd. Flow (perm)	0	1736	0	3505	0	0	0	0	3273	0
Right Turn on Red		Yes			No			No	No	
Satd. Flow (RTOR)		130								
Headway Factor	1.00	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30			30			30		30	
Link Distance (ft)	264			579			347		320	
Travel Time (s)	6.0			13.2			7.9		7.3	
Volume (vph)	0	74	0	718	0	0	0	0	337	0
Peak Hour Factor	0.92	0.84	0.92	0.92	0.92	0.92	0.92	0.92	0.66	0.92
Heavy Vehicles (%)	0%	1%	0%	3%	0%	0%	0%	0%	7%	0%
Adj. Flow (vph)	0	88	0	780	0	0	0	0	511	0
Lane Group Flow (vph)	0	88	0	780	0	0	0	0	511	0
Turn Type		custom							Prot	
Protected Phases		5		1					6	
Permitted Phases										
Detector Phases		5		1					6	
Minimum Initial (s)		8.0		8.0					8.0	
Minimum Split (s)		13.0		13.0					13.0	
Total Split (s)	0.0	14.0	0.0	57.0	0.0	0.0	0.0	0.0	29.0	0.0
Total Split (%)	0.0%	14.0%	0.0%	57.0%	0.0%	0.0%	0.0%	0.0%	29.0%	0.0%
Maximum Green (s)		9.0		52.0					24.0	
Yellow Time (s)		3.0		3.0					3.0	
All-Red Time (s)		2.0		2.0					2.0	
Lead/Lag		Lead							Lag	
Lead-Lag Optimize?		Yes							Yes	
Vehicle Extension (s)		2.0		2.0					2.0	
Recall Mode		None		C-Max					None	
Act Effct Green (s)		9.0		61.4					20.2	
Actuated g/C Ratio		0.09		0.61					0.20	
v/c Ratio		0.32		0.36					0.77	
Control Delay		5.9		5.7					45.8	
Queue Delay		0.6		0.2					1.0	
Total Delay		6.6		5.9					46.8	
LOS		A		A					D	
Approach Delay				5.9					46.8	
Approach LOS				A					D	
Queue Length 50th (ft)		0		43					159	

Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER
Queue Length 95th (ft)		13		65					140	
Internal Link Dist (ft)	184			499			267		240	
Turn Bay Length (ft)										
Base Capacity (vph)		291		2151					818	
Starvation Cap Reductn		0		0					0	
Spillback Cap Reductn		60		553					118	
Storage Cap Reductn		0		0					0	
Reduced v/c Ratio		0.38		0.49					0.73	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 46 (46%), Referenced to phase 1:NBT, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 21.1 Intersection LOS: C
Intersection Capacity Utilization 36.1% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 34: Cooper Street & Sumner Tunnel Off-Ramp

ø1	ø5	ø6
57 s	14 s	29 s

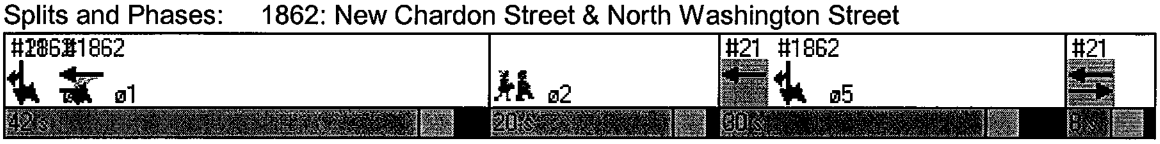
Lane Group	EBR	EBR2	WBL2	WBL	WBT	SBL	SBT	SBR	ø2	ø5	ø6
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900			
Lane Width (ft)	11	11	12	16	12	16	12	16			
Storage Length (ft)	0			25		0		0			
Storage Lanes	3			1		2		1			
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	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)	9	9	15	15		15		9			
Lane Util. Factor	0.88	1.00	0.95	1.00	0.95	0.97	0.95	0.95			
Frt	0.850	0.850					0.970	0.850			
Flt Protected				0.950		0.950					
Satd. Flow (prot)	2617	1382	0	1902	3539	3780	1484	1581			
Flt Permitted				0.950		0.950					
Satd. Flow (perm)	2617	1382	0	1902	3539	3780	1484	1581			
Right Turn on Red		Yes	No					No			
Satd. Flow (RTOR)		61									
Headway Factor	1.04	1.04	1.00	0.85	1.00	0.85	1.00	0.85			
Link Speed (mph)					30		30				
Link Distance (ft)					125		397				
Travel Time (s)					2.8		9.0				
Volume (vph)	376	47	54	26	416	858	275	446			
Peak Hour Factor	0.95	0.77	0.68	0.72	0.92	0.93	0.88	0.91			
Heavy Vehicles (%)	5%	13%	11%	0%	2%	5%	20%	10%			
Adj. Flow (vph)	396	61	79	36	452	923	312	490			
Lane Group Flow (vph)	396	61	0	115	452	923	391	411			
Turn Type	custom	custom	Perm	Perm		Split		Prot			
Protected Phases	1	1			1	5 6	5 6	5 6	2	5	6
Permitted Phases			1	1							
Detector Phases	1	1	1	1	1	5 6	5 6	5 6			
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0				7.0	8.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0				20.0	24.0	8.0
Total Split (s)	42.0	42.0	42.0	42.0	42.0	38.0	38.0	38.0	20.0	30.0	8.0
Total Split (%)	42.0%	42.0%	42.0%	42.0%	42.0%	38.0%	38.0%	38.0%	20%	30%	8%
Maximum Green (s)	36.0	36.0	36.0	36.0	36.0				16.0	23.0	4.0
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				1.0	4.0	1.0
Lead/Lag	Lead	Lead	Lead	Lead	Lead				Lag	Lead	Lag
Lead-Lag Optimize?										Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0				2.0	2.0	2.0
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max				Ped	None	Min
Walk Time (s)									7.0		
Flash Dont Walk (s)									9.0		
Pedestrian Calls (#/hr)									50		
Act Effct Green (s)	38.0	38.0		38.0	38.0	34.0	34.0	34.0			
Actuated g/C Ratio	0.38	0.38		0.38	0.38	0.34	0.34	0.34			
v/c Ratio	0.40	0.11		0.16	0.34	0.72	0.77	0.76			
Control Delay	7.6	1.4		21.2	22.9	56.8	63.4	62.4			
Queue Delay	0.5	1.0		0.0	0.0	13.4	5.3	8.2			

Lane Group	EBR	EBR2	WBL2	WBL	WBT	SBL	SBT	SBR	ø2	ø5	ø6
Total Delay	8.1	2.3		21.2	22.9	70.2	68.7	70.6			
LOS	A	A		C	C	E	E	E			
Approach Delay					22.6		70.0				
Approach LOS					C		E				
Queue Length 50th (ft)	3	0		48	105	320	278	292			
Queue Length 95th (ft)	159	0		68	146	m371	m334	m352			
Internal Link Dist (ft)					45		317				
Turn Bay Length (ft)				25							
Base Capacity (vph)	994	563		723	1345	1285	505	538			
Starvation Cap Reductn	264	357		0	0	355	68	94			
Spillback Cap Reductn	0	0		0	0	0	0	0			
Storage Cap Reductn	0	0		0	0	0	0	0			
Reduced v/c Ratio	0.54	0.30		0.16	0.34	0.99	0.89	0.93			

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 13 (13%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 49.8 Intersection LOS: D
Intersection Capacity Utilization 54.3% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1862: New Chardon Street & North Washington Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
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	
Trailing Detector (ft)	0	0			0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.998			0.850			0.907	
Flt Protected	0.950						0.950				0.985	
Satd. Flow (prot)	1770	4759	0	0	3279	0	1805	1615	0	0	1664	0
Flt Permitted	0.263						0.749				0.957	
Satd. Flow (perm)	490	4759	0	0	3279	0	1423	1615	0	0	1617	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					4			233			9	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		204			132			531			162	
Travel Time (s)		4.6			3.0			12.1			3.7	
Volume (vph)	7	665	0	0	727	13	155	0	29	4	0	8
Peak Hour Factor	0.92	0.83	0.92	0.92	0.77	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	9%	0%	0%	10%	2%	0%	0%	0%	2%	0%	2%
Adj. Flow (vph)	8	801	0	0	944	14	168	0	32	4	0	9
Lane Group Flow (vph)	8	801	0	0	958	0	168	32	0	0	13	0
Turn Type	Perm						Perm			Perm		
Protected Phases		1			1			5			5	
Permitted Phases	1						5			5		
Detector Phases	1	1			1		5	5		5	5	
Minimum Initial (s)	8.0	8.0			8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	22.0	22.0			22.0		20.0	20.0		20.0	20.0	
Total Split (s)	65.0	65.0	0.0	0.0	65.0	0.0	25.0	25.0	0.0	25.0	25.0	0.0
Total Split (%)	72.2%	72.2%	0.0%	0.0%	72.2%	0.0%	27.8%	27.8%	0.0%	27.8%	27.8%	0.0%
Maximum Green (s)	61.0	61.0			61.0		21.0	21.0		21.0	21.0	
Yellow Time (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0		1.0	1.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0			2.0		2.0	2.0		2.0	2.0	
Recall Mode	C-Max	C-Max			C-Max		None	None		None	None	
Walk Time (s)	10.0	10.0			10.0		12.0	12.0		12.0	12.0	
Flash Dont Walk (s)	8.0	8.0			8.0		1.0	1.0		1.0	1.0	
Pedestrian Calls (#/hr)	0	0			0		0	0		0	0	
Act Effct Green (s)	67.5	67.5			67.5		14.5	14.5			14.5	
Actuated g/C Ratio	0.75	0.75			0.75		0.16	0.16			0.16	
v/c Ratio	0.02	0.22			0.39		0.73	0.07			0.05	
Control Delay	2.6	2.3			5.1		53.3	0.3			18.8	
Queue Delay	0.0	0.0			0.0		0.0	0.0			0.0	
Total Delay	2.6	2.3			5.1		53.3	0.3			18.8	
LOS	A	A			A		D	A			B	
Approach Delay		2.3			5.1			44.9			18.8	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		A			A			D			B	
Queue Length 50th (ft)	0	21			81		92	0			2	
Queue Length 95th (ft)	m2	26			117		148	0			17	
Internal Link Dist (ft)		124			52			451			82	
Turn Bay Length (ft)												
Base Capacity (vph)	367	3567			2459		332	555			384	
Starvation Cap Reductn	0	0			0		0	0			0	
Spillback Cap Reductn	0	0			0		0	0			0	
Storage Cap Reductn	0	0			0		0	0			0	
Reduced v/c Ratio	0.02	0.22			0.39		0.51	0.06			0.03	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 1:EBWB, Start of Green

Natural Cycle: 45

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.73

Intersection Signal Delay: 8.0 Intersection LOS: A

Intersection Capacity Utilization 42.4% ICU Level of Service A

Analysis Period (min) 15

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

Splits and Phases: 506: Causeway Street & Haverhill Street

ø1	ø5
65 s	25 s

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
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	
Trailing Detector (ft)				0	0						0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor											0.98	
Frt											0.943	
Flt Protected				0.950	0.985							
Satd. Flow (prot)	0	0	0	1643	3406	0	0	0	0	0	3320	0
Flt Permitted				0.950	0.985							
Satd. Flow (perm)	0	0	0	1643	3406	0	0	0	0	0	3320	0
Right Turn on Red			Yes	Yes		Yes			Yes			Yes
Satd. Flow (RTOR)				233	88						115	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		142			135			170			251	
Travel Time (s)		3.2			3.1			3.9			5.7	
Volume (vph)	0	0	0	338	279	0	0	0	0	0	171	106
Confl. Peds. (#/hr)												50
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	0	0	367	303	0	0	0	0	0	186	115
Lane Group Flow (vph)	0	0	0	233	437	0	0	0	0	0	301	0
Turn Type				Split								
Protected Phases				1	1						5	
Permitted Phases												
Detector Phases				1	1						5	
Minimum Initial (s)				8.0	8.0						5.0	
Minimum Split (s)				13.0	13.0						20.0	
Total Split (s)	0.0	0.0	0.0	52.0	52.0	0.0	0.0	0.0	0.0	0.0	32.0	0.0
Total Split (%)	0.0%	0.0%	0.0%	52.0%	52.0%	0.0%	0.0%	0.0%	0.0%	0.0%	32.0%	0.0%
Maximum Green (s)				47.0	47.0						27.0	
Yellow Time (s)				3.0	3.0						3.0	
All-Red Time (s)				2.0	2.0						2.0	
Lead/Lag				Lead	Lead							
Lead-Lag Optimize?												
Vehicle Extension (s)				2.0	2.0						2.0	
Recall Mode				C-Max	C-Max						Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)				48.0	48.0						28.0	
Actuated g/C Ratio				0.48	0.48						0.28	
v/c Ratio				0.26	0.26						0.30	
Control Delay				2.7	12.6						18.0	
Queue Delay				1.6	2.4						0.0	
Total Delay				4.4	15.0						18.0	
LOS				A	B						B	

Lane Group	ø2
Lane Configurations	
Ideal Flow (vphpl)	
Total Lost Time (s)	
Leading Detector (ft)	
Trailing Detector (ft)	
Turning Speed (mph)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Headway Factor	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Volume (vph)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Adj. Flow (vph)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	2
Permitted Phases	
Detector Phases	
Minimum Initial (s)	7.0
Minimum Split (s)	16.0
Total Split (s)	16.0
Total Split (%)	16%
Maximum Green (s)	14.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lead/Lag	Lag
Lead-Lag Optimize?	
Vehicle Extension (s)	2.0
Recall Mode	Ped
Walk Time (s)	7.0
Flash Dont Walk (s)	7.0
Pedestrian Calls (#/hr)	50
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay					11.3						18.0	
Approach LOS					B						B	
Queue Length 50th (ft)				0	68						47	
Queue Length 95th (ft)				42	101						83	
Internal Link Dist (ft)		62			55			90			171	
Turn Bay Length (ft)												
Base Capacity (vph)				910	1681						1012	
Starvation Cap Reductn				507	1091						0	
Spillback Cap Reductn				28	29						2	
Storage Cap Reductn				0	0						0	
Reduced v/c Ratio				0.58	0.74						0.30	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 36 (36%), Referenced to phase 1:WBTL, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.30
Intersection Signal Delay: 13.4 — Intersection LOS: B
Intersection Capacity Utilization 31.7% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 65: Valenti Way & Beverly Street

ø1	ø2	ø5
52 s	16 s	32 s

Lane Group	ø2
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	1	45	470	0	0	1134
Peak Hour Factor	0.25	0.75	0.85	0.92	0.92	0.92
Hourly flow rate (vph)	4	60	553	0	0	1233
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			495			111
pX, platoon unblocked	0.73					
vC, conflicting volume	1169	276			553	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	861	276			553	
tC, single (s)	6.8	7.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.5			2.2	
p0 queue free %	98	91			100	
cM capacity (veh/h)	218	681			1027	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	64	276	276	616	616
Volume Left	4	0	0	0	0
Volume Right	60	0	0	0	0
cSH	601	1700	1700	1700	1700
Volume to Capacity	0.11	0.16	0.16	0.36	0.36
Queue Length 95th (ft)	9	0	0	0	0
Control Delay (s)	11.7	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	11.7	0.0		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	41.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations		↑↑	↑↑		Y	
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	464	1134	0	19	12
Peak Hour Factor	0.75	0.92	0.90	0.63	0.92	0.92
Hourly flow rate (vph)	0	504	1260	0	21	13
Pedestrians			4			
Lane Width (ft)			12.0			
Walking Speed (ft/s)			4.0			
Percent Blockage			0			
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)		109	497			
pX, platoon unblocked	0.75				0.75	0.75
vC, conflicting volume	1260				1516	630
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1019				1359	184
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				81	98
cM capacity (veh/h)	510				107	629

Direction, Lane #	NB 1	NB 2	SB 1	SB 2	SE 1
Volume Total	252	252	630	630	34
Volume Left	0	0	0	0	21
Volume Right	0	0	0	0	13
cSH	1700	1700	1700	1700	158
Volume to Capacity	0.15	0.15	0.37	0.37	0.21
Queue Length 95th (ft)	0	0	0	0	19
Control Delay (s)	0.0	0.0	0.0	0.0	33.9
Lane LOS					D
Approach Delay (s)	0.0		0.0		33.9
Approach LOS					D

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	41.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	637	43	50	840	6	47
Peak Hour Factor	0.91	0.68	0.63	0.97	0.88	0.80
Hourly flow rate (vph)	700	63	79	866	7	59
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	443			204		
pX, platoon unblocked			0.88		0.92	0.88
vC, conflicting volume			763		1323	382
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			594		992	160
tC, single (s)			4.2		7.0	7.3
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.5
p0 queue free %			91		96	92
cM capacity (veh/h)			854		193	709

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	467	297	368	577	66
Volume Left	0	0	79	0	7
Volume Right	0	63	0	0	59
cSH	1700	1700	854	1700	555
Volume to Capacity	0.27	0.17	0.09	0.34	0.12
Queue Length 95th (ft)	0	0	8	0	10
Control Delay (s)	0.0	0.0	2.9	0.0	12.4
Lane LOS			A		B
Approach Delay (s)	0.0		1.1		12.4
Approach LOS					B

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	57.0%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	409	12	16	733	0	0
Peak Hour Factor	0.83	0.92	0.92	0.78	0.70	0.89
Hourly flow rate (vph)	493	13	17	940	0	0
Pedestrians					324	
Lane Width (ft)					0.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	387			309		
pX, platoon unblocked						
vC, conflicting volume			830		1328	495
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			830		1328	495
tC, single (s)			4.1		6.8	7.1
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			98		100	100
cM capacity (veh/h)			811		146	505

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2
Volume Total	197	197	112	331	626
Volume Left	0	0	0	17	0
Volume Right	0	0	13	0	0
cSH	1700	1700	1700	811	1700
Volume to Capacity	0.12	0.12	0.07	0.02	0.37
Queue Length 95th (ft)	0	0	0	2	0
Control Delay (s)	0.0	0.0	0.0	0.7	0.0
Lane LOS				A	
Approach Delay (s)	0.0			0.3	
Approach LOS					

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	35.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	0	0	0	34	28	6	19	0	0	0	88
Peak Hour Factor	0.78	0.92	0.74	0.92	0.92	0.92	0.92	0.78	0.92	0.92	0.71	0.92
Hourly flow rate (vph)	0	0	0	0	37	30	7	24	0	0	0	96

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total (vph)	25	43	7	24	96
Volume Left (vph)	0	0	7	0	0
Volume Right (vph)	0	30	0	0	96
Hadj (s)	0.00	-0.50	0.50	0.14	-0.60
Departure Headway (s)	4.8	4.3	5.2	4.9	4.1
Degree Utilization, x	0.03	0.05	0.01	0.03	0.11
Capacity (veh/h)	732	809	670	720	863
Control Delay (s)	6.7	6.3	7.1	6.8	7.6
Approach Delay (s)	6.5		6.9		7.6
Approach LOS	A		A		A

Intersection Summary			
Delay	7.1		
HCM Level of Service	A		
Intersection Capacity Utilization	40.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↱		↰	↑↑		
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	410	297	16	739	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	446	323	17	803	0	0
Pedestrians					330	
Lane Width (ft)					0.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	132			564		
pX, platoon unblocked			0.96		0.96	0.96
vC, conflicting volume			1098		1373	640
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1022		1308	545
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		100	100
cM capacity (veh/h)			661		144	469

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3
Volume Total	178	178	412	17	402	402
Volume Left	0	0	0	17	0	0
Volume Right	0	0	323	0	0	0
cSH	1700	1700	1700	661	1700	1700
Volume to Capacity	0.10	0.10	0.24	0.03	0.24	0.24
Queue Length 95th (ft)	0	0	0	2	0	0
Control Delay (s)	0.0	0.0	0.0	10.6	0.0	0.0
Lane LOS				B		
Approach Delay (s)	0.0			0.2		
Approach LOS						

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	23.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↱			
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	0	202	183	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	220	199	0	0
Pedestrians					310	
Lane Width (ft)					0.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)			142			
pX, platoon unblocked	0.95				0.95	0.95
vC, conflicting volume	728				629	519
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	660				555	440
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	890				442	542

Direction, Lane #	WB 1	WB 2
Volume Total	146	272
Volume Left	0	0
Volume Right	0	199
cSH	1700	1700
Volume to Capacity	0.09	0.16
Queue Length 95th (ft)	0	0
Control Delay (s)	0.0	0.0
Lane LOS		
Approach Delay (s)	0.0	
Approach LOS		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	18.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	34	0	0	0	79	234
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	37	0	0	0	86	254
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			251			
pX, platoon unblocked						
vC, conflicting volume	299	0			0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	299	0			0	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	100			95	
cM capacity (veh/h)	639	1091			1636	

Direction, Lane #	WB 1	SB 1	SB 2
Volume Total	37	171	170
Volume Left	37	86	0
Volume Right	0	0	0
cSH	639	1636	1700
Volume to Capacity	0.06	0.05	0.10
Queue Length 95th (ft)	5	4	0
Control Delay (s)	11.0	3.9	0.0
Lane LOS	B	A	
Approach Delay (s)	11.0	1.9	
Approach LOS	B		

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	18.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	0	580	69	0	4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	630	75	0	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)		135	78			
pX, platoon unblocked						
vC, conflicting volume	705				668	248
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	705				668	248
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	99
cM capacity (veh/h)	902				396	759

Direction, Lane #	WB 1	WB 2	WB 3	SB 1
Volume Total	252	252	201	4
Volume Left	0	0	0	0
Volume Right	0	0	75	4
cSH	1700	1700	1700	759
Volume to Capacity	0.15	0.15	0.12	0.01
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	9.8
Lane LOS				A
Approach Delay (s)	0.0			9.8
Approach LOS				A

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	22.7%	ICU Level of Service	A
Analysis Period (min)	15		

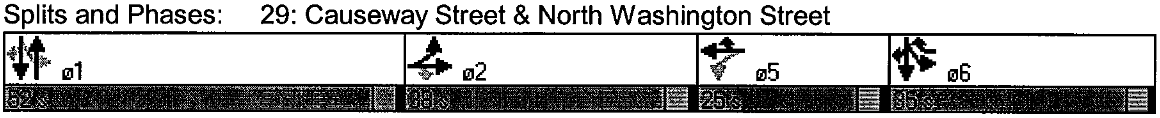
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↑	↱	↰	↑	↱		↑↑↱		↰	↑↑↱	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	12	11	12	12	11	12	10	10	10
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50		50		50	50	50
Trailing Detector (ft)	0	0	0	0	0	0		0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.91	0.91
Ped Bike Factor			0.85					0.98				
Frt			0.850			0.850		0.971				0.850
Flt Protected	0.950	0.978		0.950						0.950		
Satd. Flow (prot)	1641	1690	1615	1805	1837	1599	0	3277	0	1668	3196	1372
Flt Permitted	0.950	0.978		0.570						0.107		
Satd. Flow (perm)	1641	1690	1372	1083	1837	1599	0	3277	0	188	3196	1372
Right Turn on Red			Yes			Yes			Yes			No
Satd. Flow (RTOR)			16			63		20				
Headway Factor	1.04	1.04	1.00	1.00	1.04	1.00	1.00	1.04	1.00	1.09	1.09	1.09
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		309			183			111			268	
Travel Time (s)		7.0			4.2			2.5			6.1	
Volume (vph)	320	141	6	155	168	627	0	655	117	257	958	333
Confl. Peds. (#/hr)			88						33	33		
Peak Hour Factor	0.77	0.87	0.38	0.89	0.90	0.70	0.84	0.91	0.69	0.90	0.79	0.69
Heavy Vehicles (%)	1%	1%	0%	0%	0%	1%	0%	2%	1%	1%	1%	0%
Adj. Flow (vph)	416	162	16	174	187	896	0	720	170	286	1213	483
Lane Group Flow (vph)	281	297	16	174	187	896	0	890	0	286	1213	483
Turn Type	Split		Perm	Perm		pt+ov				D.P+P		custom
Protected Phases	2	2			5	5 6		1		6	1 6	6
Permitted Phases			2	5						1		1
Detector Phases	2	2	2	5	5	5 6		1		6	1 6	6
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0			8.0		8.0		8.0
Minimum Split (s)	32.0	32.0	32.0	25.0	25.0			25.0		25.0		25.0
Total Split (s)	38.0	38.0	38.0	25.0	25.0	60.0	0.0	52.0	0.0	35.0	87.0	35.0
Total Split (%)	25.3%	25.3%	25.3%	16.7%	16.7%	40.0%	0.0%	34.7%	0.0%	23.3%	58.0%	23.3%
Maximum Green (s)	34.0	34.0	34.0	21.0	21.0			48.0		31.0		31.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0			3.0		3.0		3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0			1.0		1.0		1.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead			Lead		Lag		Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0		3.0		3.0
Recall Mode	Max	Max	Max	Max	Max			C-Max		Max		Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0		7.0		7.0
Flash Dont Walk (s)	21.0	21.0	21.0	14.0	14.0			14.0		14.0		14.0
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0		0
Act Effct Green (s)	34.0	34.0	34.0	21.0	21.0	56.0		48.0		79.0	83.0	83.0
Actuated g/C Ratio	0.23	0.23	0.23	0.14	0.14	0.37		0.32		0.53	0.55	0.55
v/c Ratio	0.76	0.78	0.05	1.14	0.73	1.41		0.84		0.71	0.69	0.64
Control Delay	68.2	69.3	18.2	172.2	78.7	226.9		54.6		44.1	26.7	27.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.6		0.0	0.1	0.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	68.2	69.3	18.2	172.2	78.7	226.9		55.2		44.1	26.7	27.9
LOS	E	E	B	F	E	F		E		D	C	C
Approach Delay		67.4			197.3			55.2			29.5	
Approach LOS		E			F			E			C	
Queue Length 50th (ft)	272	289	0	~199	178	~1138		418		195	454	347
Queue Length 95th (ft)	320	392	2	#351	#281	#932		506		305	435	317
Internal Link Dist (ft)		229			103			31			188	
Turn Bay Length (ft)												
Base Capacity (vph)	372	383	323	152	257	636		1062		405	1768	759
Starvation Cap Reductn	0	0	0	0	0	0		29		0	0	0
Spillback Cap Reductn	0	0	2	0	0	0		0		0	48	0
Storage Cap Reductn	0	0	0	0	0	0		0		0	0	0
Reduced v/c Ratio	0.76	0.78	0.05	1.14	0.73	1.41		0.86		0.71	0.71	0.64

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 0 (0%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.41
Intersection Signal Delay: 83.8 Intersection LOS: F
Intersection Capacity Utilization 94.4% ICU Level of Service F
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: 29: Causeway Street & North Washington Street



Lane Group	NBL	NBT	NBR	SBL	SBR	SBR2
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	13	13	12	12	12
Storage Length (ft)	0		0	25	0	
Storage Lanes	1		0	1	2	
Total Lost Time (s)	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	9
Lane Util. Factor	1.00	1.00	1.00	1.00	0.88	1.00
Ped Bike Factor		0.97				
Frt		0.992			0.850	
Flt Protected	0.950			0.950		
Satd. Flow (prot)	1532	1761	0	1805	2671	0
Flt Permitted	0.950			0.226		
Satd. Flow (perm)	1532	1761	0	429	2671	0
Right Turn on Red			Yes			Yes
Satd. Flow (RTOR)		7			4	
Headway Factor	1.09	0.96	0.96	1.00	1.00	1.00
Link Speed (mph)		30				
Link Distance (ft)		347				
Travel Time (s)		7.9				
Volume (vph)	502	745	36	52	1052	12
Confl. Peds. (#/hr)			164	164		64
Peak Hour Factor	0.85	0.91	0.80	0.88	0.91	0.58
Heavy Vehicles (%)	10%	8%	0%	0%	6%	29%
Adj. Flow (vph)	591	819	45	59	1156	21
Lane Group Flow (vph)	591	864	0	59	1177	0
Turn Type	Prot			D.Pm	custom	
Protected Phases	5	1			1	
Permitted Phases				1		
Detector Phases	5	1		1	1	
Minimum Initial (s)	8.0	8.0		8.0	8.0	
Minimum Split (s)	26.0	25.0		25.0	25.0	
Total Split (s)	26.0	74.0	0.0	74.0	74.0	0.0
Total Split (%)	26.0%	74.0%	0.0%	74.0%	74.0%	0.0%
Maximum Green (s)	21.0	69.0		69.0	69.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0	2.0		2.0	2.0	
Recall Mode	None	C-Max		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	9.0	8.0		8.0	8.0	
Pedestrian Calls (#/hr)	0	0		0	0	
Act Effct Green (s)	22.0	70.0		70.0	70.0	
Actuated g/C Ratio	0.22	0.70		0.70	0.70	
v/c Ratio	1.75	0.70		0.20	0.63	

Lane Group	NBL	NBT	NBR	SBL	SBR	SBR2
Control Delay	374.8	13.5		7.1	9.9	
Queue Delay	9.5	2.1		0.0	147.7	
Total Delay	384.2	15.6		7.1	157.6	
LOS	F	B		A	F	
Approach Delay		165.3				
Approach LOS		F				
Queue Length 50th (ft)	~580	210		11	198	
Queue Length 95th (ft)	#739	362		27	263	
Internal Link Dist (ft)		267				
Turn Bay Length (ft)				25		
Base Capacity (vph)	337	1235		300	1871	
Starvation Cap Reductn	0	229		0	188	
Spillback Cap Reductn	4	39		0	982	
Storage Cap Reductn	0	0		0	0	
Reduced v/c Ratio	1.77	0.86		0.20	1.32	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 85 (85%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.75
Intersection Signal Delay: 158.5 Intersection LOS: F
Intersection Capacity Utilization 71.7% ICU Level of Service C
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: 332: Valenti Way & North Washington Street

ø1 74 s
ø5 26 s

Lane Group	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations			↑↑↑			↱↱↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)			50			50
Trailing Detector (ft)			0			0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.76
Frt						0.850
Flt Protected						
Satd. Flow (prot)	0	0	4893	0	0	3409
Flt Permitted						
Satd. Flow (perm)	0	0	4893	0	0	3409
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						71
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30	30		30	
Link Distance (ft)		397	273		170	
Travel Time (s)		9.0	6.2		3.9	
Volume (vph)	0	0	1052	0	0	568
Peak Hour Factor	0.92	0.92	0.91	0.92	0.92	0.91
Heavy Vehicles (%)	0%	0%	6%	0%	0%	8%
Adj. Flow (vph)	0	0	1156	0	0	624
Lane Group Flow (vph)	0	0	1156	0	0	624
Turn Type						custom
Protected Phases			5			1
Permitted Phases						
Detector Phases			5			1
Minimum Initial (s)			8.0			8.0
Minimum Split (s)			20.0			20.0
Total Split (s)	0.0	0.0	48.0	0.0	0.0	52.0
Total Split (%)	0.0%	0.0%	48.0%	0.0%	0.0%	52.0%
Maximum Green (s)			44.0			48.0
Yellow Time (s)			3.0			3.0
All-Red Time (s)			1.0			1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)			2.0			2.0
Recall Mode			Ped			C-Max
Walk Time (s)			7.0			
Flash Dont Walk (s)			1.0			
Pedestrian Calls (#/hr)			0			
Act Effct Green (s)			28.1			63.9
Actuated g/C Ratio			0.28			0.64
v/c Ratio			0.84			0.28
Control Delay			53.6			3.0
Queue Delay			1.1			0.4
Total Delay			54.7			3.4
LOS			D			A
Approach Delay			54.7			

Lane Group	NBL	NBT	SBT	SBR	SEL	SER
Approach LOS			D			
Queue Length 50th (ft)			294			23
Queue Length 95th (ft)			341			29
Internal Link Dist (ft)		317	193		90	
Turn Bay Length (ft)						
Base Capacity (vph)			2153			2205
Starvation Cap Reductn			702			1037
Spillback Cap Reductn			300			620
Storage Cap Reductn			0			0
Reduced v/c Ratio			0.80			0.53

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 4 (4%), Referenced to phase 1:SER, Start of Green
Natural Cycle: 40
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 36.7 Intersection LOS: D
Intersection Capacity Utilization 40.2% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 4120: North Washington Street & Beverly Street

ø1	ø5
52 s	48 s

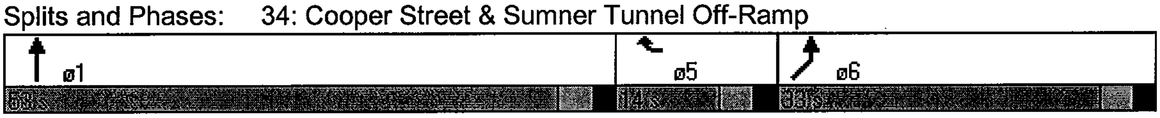
Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER
Lane Configurations		↱		↑↑					↰↰	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	14	12	12	12	12	12	12	12	12
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50		50					50	
Trailing Detector (ft)		0		0					0	
Turning Speed (mph)	15	9	15		9	15		9	15	9
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00
Frt		0.865								
Flt Protected									0.950	
Satd. Flow (prot)	0	1753	0	3574	0	0	0	0	3400	0
Flt Permitted									0.950	
Satd. Flow (perm)	0	1753	0	3574	0	0	0	0	3400	0
Right Turn on Red		Yes			No			No	No	
Satd. Flow (RTOR)		107								
Headway Factor	1.00	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30			30			30		30	
Link Distance (ft)	264			579			347		320	
Travel Time (s)	6.0			13.2			7.9		7.3	
Volume (vph)	0	55	0	954	0	0	0	0	264	0
Peak Hour Factor	0.92	0.67	0.92	0.88	0.92	0.92	0.92	0.92	0.69	0.92
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	0%	3%	0%
Adj. Flow (vph)	0	82	0	1084	0	0	0	0	383	0
Lane Group Flow (vph)	0	82	0	1084	0	0	0	0	383	0
Turn Type		custom							Prot	
Protected Phases		5		1					6	
Permitted Phases										
Detector Phases		5		1					6	
Minimum Initial (s)		8.0		8.0					8.0	
Minimum Split (s)		13.0		13.0					13.0	
Total Split (s)	0.0	14.0	0.0	53.0	0.0	0.0	0.0	0.0	33.0	0.0
Total Split (%)	0.0%	14.0%	0.0%	53.0%	0.0%	0.0%	0.0%	0.0%	33.0%	0.0%
Maximum Green (s)		9.0		48.0					28.0	
Yellow Time (s)		3.0		3.0					3.0	
All-Red Time (s)		2.0		2.0					2.0	
Lead/Lag		Lead							Lag	
Lead-Lag Optimize?		Yes							Yes	
Vehicle Extension (s)		2.0		2.0					2.0	
Recall Mode		None		C-Max					None	
Act Effct Green (s)		9.0		65.8					15.8	
Actuated g/C Ratio		0.09		0.66					0.16	
v/c Ratio		0.32		0.46					0.71	
Control Delay		8.4		9.6					47.3	
Queue Delay		0.2		0.3					0.0	
Total Delay		8.5		10.0					47.3	
LOS		A		A					D	
Approach Delay				10.0					47.3	
Approach LOS				A					D	
Queue Length 50th (ft)		0		234					120	

Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER
Queue Length 95th (ft)		5		m218					118	
Internal Link Dist (ft)	184			499			267		240	
Turn Bay Length (ft)										
Base Capacity (vph)		272		2350					986	
Starvation Cap Reductn		0		590					0	
Spillback Cap Reductn		19		636					0	
Storage Cap Reductn		0		0					0	
Reduced v/c Ratio		0.32		0.63					0.39	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 43 (43%), Referenced to phase 1:NBT, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.71
Intersection Signal Delay: 19.1 Intersection LOS: B
Intersection Capacity Utilization 40.6% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 34: Cooper Street & Sumner Tunnel Off-Ramp



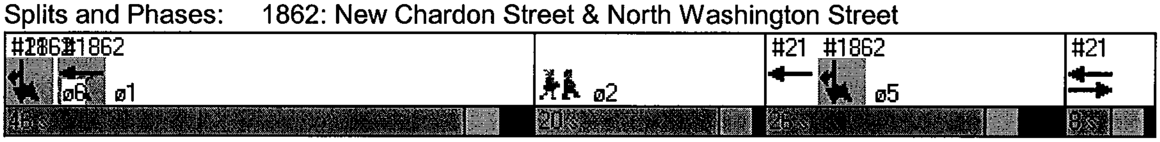
Lane Group	EBR	EBR2	WBL2	WBL	WBT	SBL	SBT	SBR	ø2	ø5	ø6
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900			
Lane Width (ft)	11	11	12	16	12	16	12	16			
Storage Length (ft)	0			25		0		0			
Storage Lanes	3			1		2		1			
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	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)	9	9	15	15		15		9			
Lane Util. Factor	0.88	1.00	0.95	1.00	0.95	0.97	0.95	0.95			
Frt	0.850	0.850					0.977	0.850			
Flt Protected				0.950		0.950					
Satd. Flow (prot)	1963	1546	0	2046	3610	3929	1408	1581			
Flt Permitted				0.950		0.950					
Satd. Flow (perm)	1963	1546	0	2046	3610	3929	1408	1581			
Right Turn on Red		Yes	No					No			
Satd. Flow (RTOR)		34									
Headway Factor	1.04	1.04	1.00	0.85	1.00	0.85	1.00	0.85			
Link Speed (mph)					30		30				
Link Distance (ft)					125		397				
Travel Time (s)					2.8		9.0				
Volume (vph)	1157	42	23	3	293	1057	231	332			
Peak Hour Factor	0.75	0.95	0.68	0.34	0.83	0.88	0.92	0.88			
Heavy Vehicles (%)	40%	1%	0%	0%	0%	1%	28%	10%			
Adj. Flow (vph)	1543	44	34	9	353	1201	251	377			
Lane Group Flow (vph)	1543	44	0	43	353	1201	296	332			
Turn Type	custom	custom	Perm	Perm		Split		Prot			
Protected Phases	1	1			1	5 6	5 6	5 6	2	5	6
Permitted Phases			1	1							
Detector Phases	1	1	1	1	1	5 6	5 6	5 6			
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0				7.0	8.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0				20.0	24.0	8.0
Total Split (s)	46.0	46.0	46.0	46.0	46.0	34.0	34.0	34.0	20.0	26.0	8.0
Total Split (%)	46.0%	46.0%	46.0%	46.0%	46.0%	34.0%	34.0%	34.0%	20%	26%	8%
Maximum Green (s)	40.0	40.0	40.0	40.0	40.0				16.0	19.0	4.0
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				1.0	4.0	1.0
Lead/Lag	Lead	Lead	Lead	Lead	Lead				Lag	Lead	Lag
Lead-Lag Optimize?											Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0				2.0	2.0	3.0
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max				Ped	None	Min
Walk Time (s)									7.0		
Flash Dont Walk (s)									9.0		
Pedestrian Calls (#/hr)									50		
Act Effct Green (s)	42.0	42.0		42.0	42.0	30.0	30.0	30.0			
Actuated g/C Ratio	0.42	0.42		0.42	0.42	0.30	0.30	0.30			
v/c Ratio	1.87	0.07		0.05	0.23	1.02	0.70	0.70			
Control Delay	410.6	0.6		17.5	19.2	68.1	43.7	42.8			
Queue Delay	0.0	1.5		0.0	0.0	90.7	8.0	1.0			

Lane Group	EBR	EBR2	WBL2	WBL	WBT	SBL	SBT	SBR	ø2	ø5	ø6
Total Delay	410.6	2.1		17.5	19.2	158.8	51.7	43.7			
LOS	F	A		B	B	F	D	D			
Approach Delay					19.0		120.6				
Approach LOS					B		F				
Queue Length 50th (ft)	~846	0		16	74	~435	191	214			
Queue Length 95th (ft)	m#736	m0		14	96	#528	m240	m265			
Internal Link Dist (ft)					45		317				
Turn Bay Length (ft)				25							
Base Capacity (vph)	824	669		859	1516	1179	422	474			
Starvation Cap Reductn	0	521		0	0	209	0	32			
Spillback Cap Reductn	0	2		0	0	0	90	0			
Storage Cap Reductn	0	0		0	0	0	0	0			
Reduced v/c Ratio	1.87	0.30		0.05	0.23	1.24	0.89	0.75			

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 49 (49%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.87
Intersection Signal Delay: 226.1 Intersection LOS: F
Intersection Capacity Utilization 87.3% 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.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1862: New Chardon Street & North Washington Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
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	
Trailing Detector (ft)	0	0			0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.999			0.850			0.897	
Flt Protected	0.950						0.950				0.988	
Satd. Flow (prot)	1787	5136	0	0	3571	0	1805	1615	0	0	1667	0
Flt Permitted	0.383						0.746				0.963	
Satd. Flow (perm)	720	5136	0	0	3571	0	1417	1615	0	0	1625	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					1			191			13	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		204			132			531			148	
Travel Time (s)		4.6			3.0			12.1			3.4	
Volume (vph)	14	738	0	0	502	3	138	0	22	4	0	12
Peak Hour Factor	0.92	0.78	0.92	0.92	0.76	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	0%	0%	1%	1%	0%	0%	0%	1%	0%	1%
Adj. Flow (vph)	15	946	0	0	661	3	150	0	24	4	0	13
Lane Group Flow (vph)	15	946	0	0	664	0	150	24	0	0	17	0
Turn Type	Perm						Perm			Perm		
Protected Phases		1			1			5			5	
Permitted Phases	1						5			5		
Detector Phases	1	1			1		5	5		5	5	
Minimum Initial (s)	8.0	8.0			8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	23.0	23.0			23.0		18.0	18.0		18.0	18.0	
Total Split (s)	75.0	75.0	0.0	0.0	75.0	0.0	25.0	25.0	0.0	25.0	25.0	0.0
Total Split (%)	75.0%	75.0%	0.0%	0.0%	75.0%	0.0%	25.0%	25.0%	0.0%	25.0%	25.0%	0.0%
Maximum Green (s)	70.0	70.0			70.0		20.0	20.0		20.0	20.0	
Yellow Time (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0			2.0		2.0	2.0		2.0	2.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0			2.0		2.0	2.0		2.0	2.0	
Recall Mode	C-Max	C-Max			C-Max		None	None		None	None	
Walk Time (s)	10.0	10.0			10.0		12.0	12.0		12.0	12.0	
Flash Dont Walk (s)	8.0	8.0			8.0		1.0	1.0		1.0	1.0	
Pedestrian Calls (#/hr)	0	0			0		0	0		0	0	
Act Effct Green (s)	76.7	76.7			76.7		15.3	15.3			15.3	
Actuated g/C Ratio	0.77	0.77			0.77		0.15	0.15			0.15	
v/c Ratio	0.03	0.24			0.24		0.69	0.06			0.07	
Control Delay	2.2	2.1			4.0		62.4	0.5			19.1	
Queue Delay	0.0	0.0			0.0		0.0	0.0			0.0	
Total Delay	2.2	2.1			4.0		62.4	0.5			19.1	
LOS	A	A			A		E	A			B	
Approach Delay		2.1			4.0			53.9			19.1	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		A			A			D			B	
Queue Length 50th (ft)	1	27			51		97	0			2	
Queue Length 95th (ft)	m4	34			73		156	2			20	
Internal Link Dist (ft)		124			52			451			68	
Turn Bay Length (ft)												
Base Capacity (vph)	552	3939			2739		298	490			352	
Starvation Cap Reductn	0	0			0		0	0			0	
Spillback Cap Reductn	0	0			0		0	0			0	
Storage Cap Reductn	0	0			0		0	0			0	
Reduced v/c Ratio	0.03	0.24			0.24		0.50	0.05			0.05	

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 93 (93%), Referenced to phase 1:EBWB, Start of Green

Natural Cycle: 45

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.69

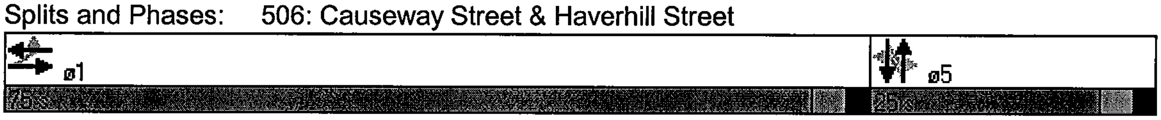
Intersection Signal Delay: 7.9 Intersection LOS: A

Intersection Capacity Utilization 35.2% ICU Level of Service A

Analysis Period (min) 15

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

Splits and Phases: 506: Causeway Street & Haverhill Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
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	
Trailing Detector (ft)				0	0						0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt											0.948	
Flt Protected				0.950	0.977							
Satd. Flow (prot)	0	0	0	1643	3378	0	0	0	0	0	3422	0
Flt Permitted				0.950	0.977							
Satd. Flow (perm)	0	0	0	1643	3378	0	0	0	0	0	3422	0
Right Turn on Red			Yes	Yes		Yes			Yes			Yes
Satd. Flow (RTOR)				181	169						100	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		142			141			170			265	
Travel Time (s)		3.2			3.2			3.9			6.0	
Volume (vph)	0	0	0	322	171	0	0	0	0	0	245	129
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	0	0	350	186	0	0	0	0	0	266	140
Lane Group Flow (vph)	0	0	0	181	355	0	0	0	0	0	406	0
Turn Type				Split								
Protected Phases				1	1						5	
Permitted Phases												
Detector Phases				1	1						5	
Minimum Initial (s)				8.0	8.0						5.0	
Minimum Split (s)				13.0	13.0						20.0	
Total Split (s)	0.0	0.0	0.0	48.0	48.0	0.0	0.0	0.0	0.0	0.0	36.0	0.0
Total Split (%)	0.0%	0.0%	0.0%	48.0%	48.0%	0.0%	0.0%	0.0%	0.0%	0.0%	36.0%	0.0%
Maximum Green (s)				43.0	43.0						31.0	
Yellow Time (s)				3.0	3.0						3.0	
All-Red Time (s)				2.0	2.0						2.0	
Lead/Lag				Lead	Lead							
Lead-Lag Optimize?												
Vehicle Extension (s)				2.0	2.0						2.0	
Recall Mode				C-Max	C-Max						Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)				44.0	44.0						32.0	
Actuated g/C Ratio				0.44	0.44						0.32	
v/c Ratio				0.22	0.22						0.35	
Control Delay				25.2	34.2						26.6	
Queue Delay				6.1	4.6						0.0	
Total Delay				31.3	38.8						26.6	
LOS				C	D						C	
Approach Delay					36.3						26.6	
Approach LOS					D						C	

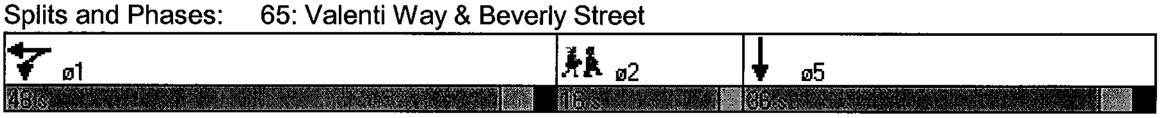
Lane Group	ø2
Lane Configurations	
Ideal Flow (vphpl)	
Total Lost Time (s)	
Leading Detector (ft)	
Trailing Detector (ft)	
Turning Speed (mph)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Headway Factor	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Volume (vph)	
Peak Hour Factor	
Adj. Flow (vph)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	2
Permitted Phases	
Detector Phases	
Minimum Initial (s)	7.0
Minimum Split (s)	16.0
Total Split (s)	16.0
Total Split (%)	16%
Maximum Green (s)	14.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lead/Lag	Lag
Lead-Lag Optimize?	
Vehicle Extension (s)	2.0
Recall Mode	Ped
Walk Time (s)	7.0
Flash Dont Walk (s)	7.0
Pedestrian Calls (#/hr)	50
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)				89	101						83	
Queue Length 95th (ft)				m40	m53						120	
Internal Link Dist (ft)		62			61			90			185	
Turn Bay Length (ft)												
Base Capacity (vph)				824	1581						1163	
Starvation Cap Reductn				582	1138						0	
Spillback Cap Reductn				2	1						35	
Storage Cap Reductn				0	0						0	
Reduced v/c Ratio				0.75	0.80						0.36	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 22 (22%), Referenced to phase 1:WBTL, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.35
Intersection Signal Delay: 32.1 Intersection LOS: C
Intersection Capacity Utilization 27.0% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 65: Valenti Way & Beverly Street



Lane Group	ø2
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↑↑			↑↑
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	5	9	764	0	0	1109
Peak Hour Factor	0.42	0.75	0.88	0.92	0.92	0.78
Hourly flow rate (vph)	12	12	868	0	0	1422
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			495			111
pX, platoon unblocked	0.73					
vC, conflicting volume	1579	434			868	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1421	434			868	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	87	98			100	
cM capacity (veh/h)	94	575			784	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	24	434	434	711	711
Volume Left	12	0	0	0	0
Volume Right	12	0	0	0	0
cSH	162	1700	1700	1700	1700
Volume to Capacity	0.15	0.26	0.26	0.42	0.42
Queue Length 95th (ft)	13	0	0	0	0
Control Delay (s)	31.0	0.0	0.0	0.0	0.0
Lane LOS	D				
Approach Delay (s)	31.0	0.0		0.0	
Approach LOS	D				

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	42.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations		↑↑	↑↑		Y	
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	745	1114	0	19	2
Peak Hour Factor	0.80	0.91	0.94	0.53	0.92	0.92
Hourly flow rate (vph)	0	819	1185	0	21	2
Pedestrians		4	5			
Lane Width (ft)		12.0	12.0			
Walking Speed (ft/s)		4.0	4.0			
Percent Blockage		0	0			
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)		109	497			
pX, platoon unblocked	0.75				0.75	0.75
vC, conflicting volume	1185				1599	597
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	918				1468	136
tC, single (s)	4.2				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				77	100
cM capacity (veh/h)	547				90	671

Direction, Lane #	NB 1	NB 2	SB 1	SB 2	SE 1
Volume Total	409	409	593	593	23
Volume Left	0	0	0	0	21
Volume Right	0	0	0	0	2
cSH	1700	1700	1700	1700	99
Volume to Capacity	0.24	0.24	0.35	0.35	0.23
Queue Length 95th (ft)	0	0	0	0	21
Control Delay (s)	0.0	0.0	0.0	0.0	52.2
Lane LOS					F
Approach Delay (s)	0.0		0.0		52.2
Approach LOS					F

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	42.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↱			↰↑	Y	
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	579	80	27	615	4	145
Peak Hour Factor	0.96	0.86	0.73	0.95	0.56	0.66
Hourly flow rate (vph)	603	93	37	647	7	220
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	443			204		
pX, platoon unblocked			0.95		0.97	0.95
vC, conflicting volume			696		1047	348
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			622		892	254
tC, single (s)			4.1		7.0	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			96		97	69
cM capacity (veh/h)			917		250	705

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	402	294	253	432	227
Volume Left	0	0	37	0	7
Volume Right	0	93	0	0	220
cSH	1700	1700	917	1700	667
Volume to Capacity	0.24	0.17	0.04	0.25	0.34
Queue Length 95th (ft)	0	0	3	0	38
Control Delay (s)	0.0	0.0	1.7	0.0	13.2
Lane LOS			A		B
Approach Delay (s)	0.0		0.6		13.2
Approach LOS					B

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	52.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↰↑		
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	467	2	16	486	0	0
Peak Hour Factor	0.78	0.92	0.92	0.76	0.77	0.52
Hourly flow rate (vph)	599	2	17	639	0	0
Pedestrians					212	
Lane Width (ft)					0.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	387			309		
pX, platoon unblocked						
vC, conflicting volume			813		1166	413
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			813		1166	413
tC, single (s)			4.1		6.8	7.0
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		100	100
cM capacity (veh/h)			823		183	580

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2
Volume Total	239	239	122	231	426
Volume Left	0	0	0	17	0
Volume Right	0	0	2	0	0
cSH	1700	1700	1700	823	1700
Volume to Capacity	0.14	0.14	0.07	0.02	0.25
Queue Length 95th (ft)	0	0	0	2	0
Control Delay (s)	0.0	0.0	0.0	0.9	0.0
Lane LOS				A	
Approach Delay (s)	0.0			0.3	
Approach LOS					

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	28.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↑↱		↰	↑				↱
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	0	0	0	98	132	25	17	0	0	0	70
Peak Hour Factor	0.79	0.92	0.72	0.92	0.92	0.92	0.92	0.69	0.92	0.92	0.81	0.92
Hourly flow rate (vph)	0	0	0	0	107	143	27	25	0	0	0	76

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total (vph)	71	179	27	25	76
Volume Left (vph)	0	0	27	0	0
Volume Right (vph)	0	143	0	0	76
Hadj (s)	0.00	-0.56	0.50	0.00	-0.60
Departure Headway (s)	4.8	4.3	5.6	5.1	4.5
Degree Utilization, x	0.09	0.21	0.04	0.04	0.10
Capacity (veh/h)	730	820	608	664	750
Control Delay (s)	7.1	7.2	7.7	7.1	8.0
Approach Delay (s)	7.2		7.4		8.0
Approach LOS	A		A		A

Intersection Summary			
Delay	7.4		
HCM Level of Service	A		
Intersection Capacity Utilization	39.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↱		↰	↑↑		
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	498	265	15	505	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	541	288	16	549	0	0
Pedestrians					210	
Lane Width (ft)					0.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	132			564		
pX, platoon unblocked			0.96		0.96	0.96
vC, conflicting volume			1039		1202	534
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			952		1123	425
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		100	100
cM capacity (veh/h)			699		190	558

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3
Volume Total	217	217	396	16	274	274
Volume Left	0	0	0	16	0	0
Volume Right	0	0	288	0	0	0
cSH	1700	1700	1700	699	1700	1700
Volume to Capacity	0.13	0.13	0.23	0.02	0.16	0.16
Queue Length 95th (ft)	0	0	0	2	0	0
Control Delay (s)	0.0	0.0	0.0	10.3	0.0	0.0
Lane LOS				B		
Approach Delay (s)	0.0			0.3		
Approach LOS						

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	21.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↱			
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	0	115	168	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	125	183	0	0
Pedestrians					250	
Lane Width (ft)					0.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)			142			
pX, platoon unblocked						
vC, conflicting volume	558				466	404
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	558				466	404
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1023				530	602

Direction, Lane #	WB 1	WB 2
Volume Total	83	224
Volume Left	0	0
Volume Right	0	183
cSH	1700	1700
Volume to Capacity	0.05	0.13
Queue Length 95th (ft)	0	0
Control Delay (s)	0.0	0.0
Lane LOS		
Approach Delay (s)	0.0	
Approach LOS		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	16.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰					↰↑
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	120	0	0	0	43	237
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	130	0	0	0	47	258
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			265			
pX, platoon unblocked						
vC, conflicting volume	222	0			0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	222	0			0	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	82	100			97	
cM capacity (veh/h)	730	1091			1636	

Direction, Lane #	WB 1	SB 1	SB 2
Volume Total	130	133	172
Volume Left	130	47	0
Volume Right	0	0	0
cSH	730	1636	1700
Volume to Capacity	0.18	0.03	0.10
Queue Length 95th (ft)	16	2	0
Control Delay (s)	11.0	2.7	0.0
Lane LOS	B	A	
Approach Delay (s)	11.0	1.2	
Approach LOS	B		

Intersection Summary			
Average Delay	4.1		
Intersection Capacity Utilization	21.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↑↑↱			↱
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	0	482	32	0	22
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	524	35	0	24
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)		141	72			
pX, platoon unblocked						
vC, conflicting volume	559				541	192
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	559				541	192
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	97
cM capacity (veh/h)	1022				476	823

Direction, Lane #	WB 1	WB 2	WB 3	SB 1
Volume Total	210	210	140	24
Volume Left	0	0	0	0
Volume Right	0	0	35	24
cSH	1700	1700	1700	823
Volume to Capacity	0.12	0.12	0.08	0.03
Queue Length 95th (ft)	0	0	0	2
Control Delay (s)	0.0	0.0	0.0	9.5
Lane LOS				A
Approach Delay (s)	0.0			9.5
Approach LOS				A

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	20.0%	ICU Level of Service	A
Analysis Period (min)	15		

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/10/2008
Project #	2005014

Site Information

Intersection	North Washington Street/Causeway Street
Condition	EXISTING
Period	AM PEAK HOUR

Inputs

Cycle length, C (sec.) 150

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Commercial Street	94	56	V_e	102	0.03	4
Causeway Street	94	56	V_w	2	0.00	0
N Washington Street	56	94	V_n	124	0.03	5
N Washington Street	56	94	V_s	190	0.05	8

Geometric Inputs

Crosswalk East Width, W_e (ft.)	12
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	12
Crosswalk South Width, W_s (ft.)	12
Crosswalk East Length, L_e (ft.)	89
Crosswalk West Length, L_w (ft.)	79
Crosswalk North Length, L_n (ft.)	84
Crosswalk South Length, L_s (ft.)	90

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	10.5	10.5	29.5	29.5
Pedestrian Delay LOS	**B**	**B**	**C**	**C**
Number of peds arriving during Don't Walk, N_{ped} (p)	0.793333333	0.015555556	1.618888889	2.480555556
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	25.6285	22.9535	24.56425	26.258125
Total time-space, TS (ft^2-s)	88510.5	79750.5	45864	48330
Total crosswalk occupancy time, T (p-s)	109	2	127	208
Number of conflicting right-turning vehicles, N_{tv} (veh)	11	4	23	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	5260	1720	11040	0
Effective time-space, TS_E (ft^2-s)	83250.5	78030.5	34824	48330
Circulation area per pedestrian, M (ft^2/p)	764.3	40794.0	274.4	232.5
Pedestrian Circulation Area LOS	**A**	**A**	**A**	**A**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/10/2008
Project #	2005014

Site Information

Intersection	N. Wahington & Thacher & Valenti
Condition	EXISTING
Period	AM PEAK HOUR

Inputs

Cycle length, C (sec.) 100

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Thacher Street	100	0	V_e	90	0.03	3
Valenti Way	100	0	V_w	33	0.01	1
N. Washington	27	73	V_n	210	0.06	6
N. Washington	0	100	V_s	6	0.00	0

Geometric Inputs

Crosswalk East Width, W_e (ft.)	12
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	12
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	25
Crosswalk West Length, L_w (ft.)	52
Crosswalk North Length, L_n (ft.)	70
Crosswalk South Length, L_s (ft.)	0

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	0.0	0.0	26.6	50.0
Pedestrian Delay LOS	**A**	**A**	**C**	**No Crosswalk**
Number of peds arriving during Don't Walk, N_{ped} (p)	0	0	2.129166667	0.083333333
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	9.45	16.2	21.1790625	3.2225
Total time-space, TS (ft^2-s)	29062.5	58344	15330	0
Total crosswalk occupancy time, T (p-s)	24	15	124	1
Number of conflicting right-turning vehicles, N_{tv} (veh)	0	0	0	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	0	0	0	0
Effective time-space, TS_E (ft^2-s)	29062.5	58344	15330	0
Circulation area per pedestrian, M (ft^2/p)	1230.2	3928.9	124.1	0.0
Pedestrian Circulation Area LOS	**A**	**A**	**A**	**No Crosswalk**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/18/2008
Project #	2005014

Site Information

Intersection	North Washington Street/Beverly Street
Condition	EXISTING
Period	AM PEAK HOUR

Inputs

Cycle length, C (sec.) 100

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
		100	V_e	0	0.00	0
Beverly Street	58	42	V_w	33	0.01	1
N Washington Street	44	56	V_n	65	0.02	2
N Washington Street		100	V_s	11	0.00	0

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	12
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	0
Crosswalk West Length, L_w (ft.)	38
Crosswalk North Length, L_n (ft.)	57
Crosswalk South Length, L_s (ft.)	0

Crosswalk Time-Space Analysis

	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	8.8	15.7	50.0
Pedestrian Delay LOS	**A**	**B**	**No Crosswalk**

Number of peds arriving during Don't Walk, N_{ped} (p)	0.1925	0.505555556	0.152777778
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0
Total crossing time, t (s)	12.7433125	17.56375	3.24125
Total time-space, TS (ft^2-s)	24282	25222.5	0
Total crosswalk occupancy time, T (p-s)	12	32	1
Number of conflicting right-turning vehicles, N_{tv} (veh)	9	0	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	4453.333333	0	0
Effective time-space, TS_E (ft^2-s)	19828.66667	25222.5	0
Circulation area per pedestrian, M (ft^2/p)	1697.5	795.4	0.0
Pedestrian Circulation Area LOS	**A**	**A**	**No Crosswalk**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)

Please Note: Enter data in SHADED cells only

General Information		*Site Information*	
Analyst	MML/TK	**Intersection**	N. Washington & Cooper & Cross
Company	Howard/Stein-Hudson	**Condition**	EXISTING
Date	6/10/2008	**Period**	AM PEAK HOUR
Project #	2005014		

Inputs

Cycle length, C (sec.): 100

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Cooper	86	14	V_e	81	0.02	2
Sumner Tunnel	71	29	V_w	104	0.03	3
N. Washington	0	100	V_n	0	0.00	0
Cross	43	57	V_s	82	0.02	2

Geometric Inputs

Crosswalk East Width, W_e (ft.)	12
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	10
Crosswalk East Length, L_e (ft.)	26
Crosswalk West Length, L_w (ft.)	26
Crosswalk North Length, L_n (ft.)	0
Crosswalk South Length, L_s (ft.)	24

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	1.0	4.2	50.0	16.2
Pedestrian Delay LOS	**A**	**A**	**No Crosswalk**	**B**
Number of peds arriving during Don't Walk, N_{ped} (p)	0.1575	0.418888889	0	0.649166667
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	9.7354375	9.79425	3.2	9.375275
Total time-space, TS (ft^2-s)	25818	21138	0	9600
Total crosswalk occupancy time, T (p-s)	22	28	0	21
Number of conflicting right-turning vehicles, N_{tv} (veh)	0	0	0	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	0	0	0	0
Effective time-space, TS_E (ft^2-s)	25818	21138	0	9600
Circulation area per pedestrian, M (ft^2/p)	1178.6	747.1	0.0	449.5
Pedestrian Circulation Area LOS	**A**	**A**	**No Crosswalk**	**A**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/10/2008
Project #	2005014

Site Information

Intersection	N. Washington & New Chardon & Surface & Off-ramp
Condition	EXISTING
Period	AM PEAK HOUR

Inputs

Cycle length, C (sec.) 100

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Off Ramps	58	42	V_e	0	0.00	0
New Chardon	58	42	V_w	129	0.04	4
N. Washington	62	38	V_n	87	0.02	2
Surface Artery	62	38	V_s	0	0.00	0

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	12
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	0
Crosswalk West Length, L_w (ft.)	119
Crosswalk North Length, L_n (ft.)	48
Crosswalk South Length, L_s (ft.)	0

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	8.8	8.8	7.2	7.2
Pedestrian Delay LOS	**No Crosswalk**	**A**	**A**	**No Crosswalk**
Number of peds arriving during Don't Walk, N_{ped} (p)	0	0.7525	0.459166667	0
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	3.2	33.1193125	15.3033125	3.2
Total time-space, TS (ft^2-s)	0	61582.5	32256	0
Total crosswalk occupancy time, T (p-s)	0	119	37	0
Number of conflicting right-turning vehicles, N_{tv} (veh)	0	0	0	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	0	0	0	0
Effective time-space, TS_E (ft^2-s)	0	61582.5	32256	0
Circulation area per pedestrian, M (ft^2/p)	-	518.9	872.2	-
Pedestrian Circulation Area LOS	**No Crosswalk**	**A**	**A**	**No Crosswalk**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/10/2008
Project #	2005014

Site Information

Intersection	Causeway Street/Legends Way
Condition	EXISTING
Period	AM PEAK HOUR

Inputs

Cycle length, C (sec.) 90

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Causeway Street	47	43	V_e	136	0.04	3
Causeway Street	47	43	V_w	892	0.25	22
Legends Way	65	25	V_n	239	0.07	6
Haverhill Street	65	25	V_s	0	0.00	0

Geometric Inputs

Crosswalk East Width, W_e (ft.)	10
Crosswalk West Width, W_w (ft.)	10
Crosswalk North Width, W_n (ft.)	10
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	72
Crosswalk West Length, L_w (ft.)	80
Crosswalk North Length, L_n (ft.)	35
Crosswalk South Length, L_s (ft.)	0

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	10.3	10.3	3.5	-
Pedestrian Delay LOS	**B**	**B**	**A**	**No Crosswalk**
Number of peds arriving during Don't Walk, N_{ped} (p)	0.812222222	5.327222222	0.829861111	-
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	21.4193	24.63835	12.1740625	-
Total time-space, TS (ft^2-s)	27360	29600	21218.75	-
Total crosswalk occupancy time, T (p-s)	73	549	73	-
Number of conflicting right-turning vehicles, N_{tv} (veh)	0	0	0	-
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	10	0	10	-
Effective time-space, TS_E (ft^2-s)	27350	29600	21208.75	-
Circulation area per pedestrian, M (ft^2/p)	375.6	53.9	291.6	-
Pedestrian Circulation Area LOS	**A**	**B**	**A**	**No Crosswalk**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)

Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/10/2008
Project #	2005014

Site Information

Intersection	North Washington Street/Endicott Street
Condition	EXISTING
Period	AM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Endicott Street	10	0.00	46	0.01
0	0	0.00	0	0.00
North Washington Stre	0	0.00	0	0.00
North Washington Stre	0	0.00	0	0.00

Geometric Inputs

Crosswalk East Width, W_e (ft.)	10
Crosswalk West Width, W_w (ft.)	0
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	29
Crosswalk West Length, L_w (ft.)	0
Crosswalk North Length, L_n (ft.)	90
Crosswalk South Length, L_s (ft.)	90

Crosswalk Time-Space Analysis

	Crosswalk East	**Crosswalk West**	**Crosswalk North**	**Crosswalk South**
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	29	0	90	90
Single pedestrian critical gap, t_c (s)	10.25	3.00	25.50	25.50
Typical pedestrian number in crossing platoon, N_c	1.00	0.00	0.00	0.00
Spatial pedestrian distribution, N_p	2	-	-	-
Group critial gap,	11.65	-	-	-
Vehicular flow rate, V	0.01	0.00	0.00	0.00
Average pedestrian delay, D	0.91	-	-	-
Pedestrain Delay LOS	**A**	**No Crosswalk**	**No Crosswalk**	**No Crosswalk**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/10/2008
Project #	2005014

Site Information

Intersection	North Washington Street/Medford Street
Condition	EXISTING
Period	AM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
0	0	0.00	0	0.00
Medford Street	26	0.01	86	0.02
N Washington Street	4	0.00	1889	0.52
N Washington Street	0	0.00	1935	0.54

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	0
Crosswalk West Length, L_w (ft.)	46
Crosswalk North Length, L_n (ft.)	80
Crosswalk South Length, L_s (ft.)	80

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	0	46	80	80
Single pedestrian critical gap, t_c (s)	3.00	14.50	23.00	23.00
Typical pedestrian number in crossing platoon, N_c	0.00	1.02	369.31	1.00
Spatial pedestrian distribution, N_p	-	2	-	-
Group critial gap,	-	15.67	-	-
Vehicular flow rate, V	0.00	0.02	0.52	0.54
Average pedestrian delay, D	-	3.33	-	-
Pedestrain Delay LOS	**No Crosswalk**	**A**	**No Crosswalk**	**No Crosswalk**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/10/2008
Project #	2005014

Site Information

Intersection	Causeway Street/Canal Street
Condition	EXISTING
Period	AM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Causeway Street	115	0.03	1251	0.35
Causeway Street	125	0.03	1214	0.34
Driveway	1212	0.34	25	0.01
Canal Street	993	0.28	202	0.06

Geometric Inputs

Crosswalk East Width, W_e (ft.)	12
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	12
Crosswalk South Width, W_s (ft.)	10
Crosswalk East Length, L_e (ft.)	84
Crosswalk West Length, L_w (ft.)	77
Crosswalk North Length, L_n (ft.)	12
Crosswalk South Length, L_s (ft.)	22

Crosswalk Time-Space Analysis

	Crosswalk East	**Crosswalk West**	**Crosswalk North**	**Crosswalk South**
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	84	77	12	22
Single pedestrian critical gap, t_c (s)	24.00	22.25	6.00	8.50
Typical pedestrian number in crossing platoon, N_c	353.01	169.75	1.02	1.36
Spatial pedestrian distribution, N_p	236	114	2	2
Group critial gap,	494.50	248.25	7.40	10.30
Vehicular flow rate, V	0.35	0.34	0.28	0.06
Average pedestrian delay, D	>45	>45	16.89	3.64
Pedestrain Delay LOS	**F**	**F**	**C**	**A**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/10/2008
Project #	2005014

Site Information

Intersection	Causeway Street/Medford Street
Condition	EXISTING
Period	AM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Causeway Street	26	0.01	1100	0.31
Causeway Street	34	0.01	1142	0.32
0	0	0.00	0	0.00
Medford Street	308	0.09	92	0.03

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	0
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	10
Crosswalk East Length, L_e (ft.)	58
Crosswalk West Length, L_w (ft.)	58
Crosswalk North Length, L_n (ft.)	0
Crosswalk South Length, L_s (ft.)	25

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	58	58	0	25
Single pedestrian critical gap, t_c (s)	17.50	17.50	3.00	9.25
Typical pedestrian number in crossing platoon, N_c	5.71	8.27	0.00	1.08
Spatial pedestrian distribution, N_p	-	-	-	2
Group critial gap,	-	-	-	10.65
Vehicular flow rate, V	0.31	0.32	0.00	0.03
Average pedestrian delay, D	-	-	-	1.59
Pedestrain Delay LOS	**No Crosswalk**	**No Crosswalk**	**No Crosswalk**	**A**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/10/2008
Project #	2005014

Site Information

Intersection	Canal Street/Valenti Way
Condition	EXISTING
Period	AM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Driveway	0	0.00	0	0.00
Valenti Way	320	0.09	109	0.03
Canal Street	524	0.15	166	0.05
Canal Street	91	0.03	157	0.04

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	10
Crosswalk North Width, W_n (ft.)	10
Crosswalk South Width, W_s (ft.)	10
Crosswalk East Length, L_e (ft.)	0
Crosswalk West Length, L_w (ft.)	26
Crosswalk North Length, L_n (ft.)	28
Crosswalk South Length, L_s (ft.)	23

Crosswalk Time-Space Analysis

	Crosswalk East	**Crosswalk West**	**Crosswalk North**	**Crosswalk South**
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	0	26	28	23
Single pedestrian critical gap, t_c (s)	3.00	9.50	10.00	8.75
Typical pedestrian number in crossing platoon, N_c	0.00	1.10	1.26	1.04
Spatial pedestrian distribution, N_p	-	2	2	2
Group critial gap,	-	10.90	11.80	10.15
Vehicular flow rate, V	0.00	0.03	0.05	0.04
Average pedestrian delay, D	-	2.01	3.88	2.62
Pedestrain Delay LOS	**No Crosswalk**	**A**	**A**	**A**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)

Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/11/2008
Project #	2005014

Site Information

Intersection	North Washington Street/Causeway Street
Condition	EXISTING
Period	PM PEAK HOUR

Inputs

Cycle length, C (sec.) 150

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Commercial Street	87	63	V_e	31	0.01	1
Causeway Street	87	63	V_w	13	0.00	1
N Washington Street	63	87	V_n	7	0.00	0
N Washington Street	63	87	V_s	84	0.02	4

Geometric Inputs

Crosswalk East Width, W_e (ft.)	12
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	12
Crosswalk South Width, W_s (ft.)	12
Crosswalk East Length, L_e (ft.)	89
Crosswalk West Length, L_w (ft.)	79
Crosswalk North Length, L_n (ft.)	84
Crosswalk South Length, L_s (ft.)	90

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	13.2	13.2	25.2	25.2
Pedestrian Delay LOS	**B**	**B**	**C**	**C**
Number of peds arriving during Don't Walk, N_{ped} (p)	0.27125	0.11375	0.084583333	1.015
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	25.51103125	22.97559375	24.21903125	25.928375
Total time-space, TS (ft^2-s)	81034.5	73114.5	52920	55890
Total crosswalk occupancy time, T (p-s)	33	12	7	91
Number of conflicting right-turning vehicles, N_{tv} (veh)	19	3	12	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	8980	1660	5700	0
Effective time-space, TS_E (ft^2-s)	72054.5	71454.5	47220	55890
Circulation area per pedestrian, M (ft^2/p)	2186.7	5741.6	6684.7	615.9
Pedestrian Circulation Area LOS	**A**	**A**	**A**	**A**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/11/2008
Project #	2005014

Site Information

Intersection	North Washington Street/Thacher Street/Valenti Way
Condition	EXISTING
Period	PM PEAK HOUR

Inputs

Cycle length, C (sec.) 100

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Thacher Street	100	0	V_e	139	0.04	4
Valenti Way	100	0	V_w	61	0.02	2
N. Washington	27	73	V_n	251	0.07	7
N. Washington	0	100	V_s	0	0.00	0

Geometric Inputs

Crosswalk East Width, W_e (ft.)	12
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	12
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	25
Crosswalk West Length, L_w (ft.)	52
Crosswalk North Length, L_n (ft.)	70
Crosswalk South Length, L_s (ft.)	0

Crosswalk Time-Space Analysis

	Crosswalk East	**Crosswalk West**	**Crosswalk North**	**Crosswalk South**
Average delay, d_p (s)	0.0	0.0	26.6	50.0
Pedestrian Delay LOS	**A**	**A**	**C**	**No Crosswalk**
Number of peds arriving during Don't Walk, N_{ped} (p)	0	0	2.544861111	0
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	9.45	16.2	21.27259375	3.2
Total time-space, TS (ft^2-s)	29062.5	58344	15330	0
Total crosswalk occupancy time, T (p-s)	36	27	148	0
Number of conflicting right-turning vehicles, N_{tv} (veh)	0	0	0	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	0	0	0	0
Effective time-space, TS_E (ft^2-s)	29062.5	58344	15330	0
Circulation area per pedestrian, M (ft^2/p)	796.5	2125.5	103.4	-
Pedestrian Circulation Area LOS	**A**	**A**	**A**	**No Crosswalk**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/18/2008
Project #	2005014

Site Information

Intersection	North Washington Street/Beverly Street
Condition	EXISTING
Period	PM PEAK HOUR

Inputs

Cycle length, C (sec.) 100

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
0		100	V_e	0	0.00	0
Beverly Street	49	51	V_w	69	0.02	2
N Washington Street	53	47	V_n	99	0.03	3
N Washington Street		100	V_s	17	0.00	0

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	12
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	0
Crosswalk West Length, L_w (ft.)	38
Crosswalk North Length, L_n (ft.)	57
Crosswalk South Length, L_s (ft.)	0

Crosswalk Time-Space Analysis

	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	13.0	11.0	50.0
Pedestrian Delay LOS	**B**	**B**	**No Crosswalk**
Number of peds arriving during Don't Walk, N_{ped} (p)	0.48875	0.64625	0.236111111
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0
Total crossing time, t (s)	12.80996875	17.59540625	3.26375
Total time-space, TS (ft^2-s)	20178	31378.5	0
Total crosswalk occupancy time, T (p-s)	25	48	2
Number of conflicting right-turning vehicles, N_{tv} (veh)	8	0	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	3840	0	0
Effective time-space, TS_E (ft^2-s)	16338	31378.5	0
Circulation area per pedestrian, M (ft^2/p)	665.4	648.5	0.0
Pedestrian Circulation Area LOS	**A**	**A**	**No Crosswalk**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/11/2008
Project #	2005014

Site Information

Intersection	N. Washington & Cooper & Cross
Condition	EXISTING
Period	PM PEAK HOUR

Inputs

Cycle length, C (sec.) 100

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Cooper	86	14	V_e	121	0.03	3
Sumner Tunnel	67	33	V_w	175	0.05	5
N. Washington	0	100	V_n	0	0.00	0
Cross	47	53	V_s	105	0.03	3

Geometric Inputs

Crosswalk East Width, W_e (ft.)	12
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	10
Crosswalk East Length, L_e (ft.)	26
Crosswalk West Length, L_w (ft.)	26
Crosswalk North Length, L_n (ft.)	0
Crosswalk South Length, L_s (ft.)	24

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	1.0	5.4	50.0	14.0
Pedestrian Delay LOS	**A**	**A**	**No Crosswalk**	**B**
Number of peds arriving during Don't Walk, N_{ped} (p)	0.235277778	0.802083333	0	0.772916667
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	9.7529375	9.88046875	3.2	9.4086875
Total time-space, TS (ft^2-s)	25818	19890	0	10560
Total crosswalk occupancy time, T (p-s)	33	48	0	27
Number of conflicting right-turning vehicles, N_{tv} (veh)	0	0	0	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	0	0	0	0
Effective time-space, TS_E (ft^2-s)	25818	19890	0	10560
Circulation area per pedestrian, M (ft^2/p)	787.6	414.1	-	384.8
Pedestrian Circulation Area LOS	**A**	**A**	**No Crosswalk**	**A**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/11/2008
Project #	2005014

Site Information

Intersection	North Washington Street/New Chardon/Sufrace/Off-ramp
Condition	EXISTING
Period	PM PEAK HOUR

Inputs

Cycle length, C (sec.) 100

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Off Ramps	54	46	V_e	0	0.00	0
New Chardon	54	46	V_w	162	0.05	5
N. Washington	66	34	V_n	25	0.01	1
Surface Artery	66	34	V_s	0	0.00	0

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	12
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	0
Crosswalk West Length, L_w (ft.)	119
Crosswalk North Length, L_n (ft.)	48
Crosswalk South Length, L_s (ft.)	0

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	10.6	10.6	5.8	5.8
Pedestrian Delay LOS	**No Crosswalk**	**B**	**A**	**No Crosswalk**
Number of peds arriving during Don't Walk, N_{ped} (p)	0	1.035	0.118055556	0
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	3.2	33.182875	15.2265625	3.2
Total time-space, TS (ft^2-s)	0	55870.5	34560	0
Total crosswalk occupancy time, T (p-s)	0	149	11	0
Number of conflicting right-turning vehicles, N_{tv} (veh)	0	0	0	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	0	0	0	0
Effective time-space, TS_E (ft^2-s)	0	55870.5	34560	0
Circulation area per pedestrian, M (ft^2/p)	-	374.2	3268.4	-
Pedestrian Circulation Area LOS	**No Crosswalk**	**A**	**A**	**No Crosswalk**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/11/2008
Project #	2005014

Site Information

Intersection	Causeway Street/Haverhill Street/Legends Way
Condition	EXISTING
Period	PM PEAK HOUR

Inputs

Cycle length, C (sec.) 100

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Causeway Street	47	53	V_e	232	0.06	6
Causeway Street	47	53	V_w	93	0.03	3
Legends Way	75	25	V_n	375	0.10	10
Haverhill Street	75	25	V_s	247	0.07	7

Geometric Inputs

Crosswalk East Width, W_e (ft.)	10
Crosswalk West Width, W_w (ft.)	10
Crosswalk North Width, W_n (ft.)	10
Crosswalk South Width, W_s (ft.)	10
Crosswalk East Length, L_e (ft.)	72
Crosswalk West Length, L_w (ft.)	80
Crosswalk North Length, L_n (ft.)	35
Crosswalk South Length, L_s (ft.)	25

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	14.0	14.0	3.1	3.1
Pedestrian Delay LOS	**B**	**B**	**A**	**No Crosswalk**
Number of peds arriving during Don't Walk, N_{ped} (p)	1.707777778	0.684583333	1.302083333	0.857638889
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	21.6611	23.3848375	12.3015625	9.6815625
Total time-space, TS (ft^2-s)	27360	29600	24718.75	17968.75
Total crosswalk occupancy time, T (p-s)	140	60	128	66
Number of conflicting right-turning vehicles, N_{tv} (veh)	0	0	0	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	11.11111111	0	11.11111111	0
Effective time-space, TS_E (ft^2-s)	27348.88889	29600	24707.63889	17968.75
Circulation area per pedestrian, M (ft^2/p)	195.9	490.0	192.8	270.5
Pedestrian Circulation Area LOS	**A**	**A**	**A**	**No Crosswalk**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/11/2008
Project #	2005014

Site Information

Intersection	North Washington Street/Endicott Street
Condition	EXISTING
Period	AM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Endicott Street	4	0.00	14	0.00
0	0	0.00	0	0.00
North Washington Stre	0	0.00	0	0.00
North Washington Stre	0	0.00	0	0.00

Geometric Inputs

Crosswalk East Width, W_e (ft.)	10
Crosswalk West Width, W_w (ft.)	0
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	29
Crosswalk West Length, L_w (ft.)	0
Crosswalk North Length, L_n (ft.)	90
Crosswalk South Length, L_s (ft.)	90

Crosswalk Time-Space Analysis

	Crosswalk East	**Crosswalk West**	**Crosswalk North**	**Crosswalk South**
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	29	0	90	90
Single pedestrian critical gap, t_c (s)	10.25	3.00	25.50	25.50
Typical pedestrian number in crossing platoon, N_c	1.00	0.00	0.00	0.00
Spatial pedestrian distribution, N_p	2	-	-	-
Group critial gap,	11.65	-	-	-
Vehicular flow rate, V	0.00	0.00	0.00	0.00
Average pedestrian delay, D	0.27	-	-	-
Pedestrain Delay LOS	**A**	**No Crosswalk**	**No Crosswalk**	**No Crosswalk**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/11/2008
Project #	2005014

Site Information

Intersection	North Washington Street/Medford Street
Condition	EXISTING
Period	PM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
0	0	0.00	0	0.00
Medford Street	49	0.01	59	0.02
N Washington Street	5	0.00	1643	0.46
N Washington Street	4	0.00	1664	0.46

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	0
Crosswalk West Length, L_w (ft.)	46
Crosswalk North Length, L_n (ft.)	80
Crosswalk South Length, L_s (ft.)	80

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	0	46	80	80
Single pedestrian critical gap, t_c (s)	3.00	14.50	23.00	23.00
Typical pedestrian number in crossing platoon, N_c	0.00	1.02	110.81	100.26
Spatial pedestrian distribution, N_p	-	2	-	-
Group critial gap,	-	15.67	-	-
Vehicular flow rate, V	0.00	0.02	0.46	0.46
Average pedestrian delay, D	-	2.20	-	-
Pedestrain Delay LOS	**No Crosswalk**	**A**	**No Crosswalk**	**No Crosswalk**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/11/2008
Project #	2005014

Site Information

Intersection	Causeway Street/Canal Street
Condition	EXISTING
Period	PM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Causeway Street	985	0.27	945	0.26
Causeway Street	399	0.11	951	0.26
Driveway	1903	0.53	25	0.01
Canal Street	890	0.25	215	0.06

Geometric Inputs

Crosswalk East Width, W_e (ft.)	12
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	12
Crosswalk South Width, W_s (ft.)	10
Crosswalk East Length, L_e (ft.)	84
Crosswalk West Length, L_w (ft.)	77
Crosswalk North Length, L_n (ft.)	12
Crosswalk South Length, L_s (ft.)	22

Crosswalk Time-Space Analysis

	Crosswalk East	**Crosswalk West**	**Crosswalk North**	**Crosswalk South**
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	84	77	12	22
Single pedestrian critical gap, t_c (s)	24.00	22.25	6.00	8.50
Typical pedestrian number in crossing platoon, N_c	277.93	105.57	1.03	1.36
Spatial pedestrian distribution, N_p	186	71	2	2
Group critial gap,	394.33	162.75	7.17	10.30
Vehicular flow rate, V	0.26	0.26	0.01	0.06
Average pedestrian delay, D	>45	>45	0.18	3.93
Pedestrain Delay LOS	**F**	**F**	**A**	**A**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/11/2008
Project #	2005014

Site Information

Intersection	Causeway Street/Medford Street
Condition	EXISTING
Period	PM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Causeway Street	20	0.01	1049	0.29
Causeway Street	30	0.01	1071	0.30
0	0	0.00	0	0.00
Medford Street	202	0.06	58	0.02

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	0
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	10
Crosswalk East Length, L_e (ft.)	58
Crosswalk West Length, L_w (ft.)	58
Crosswalk North Length, L_n (ft.)	0
Crosswalk South Length, L_s (ft.)	25

Crosswalk Time-Space Analysis

	Crosswalk East	**Crosswalk West**	**Crosswalk North**	**Crosswalk South**
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	58	58	0	25
Single pedestrian critical gap, t_c (s)	17.50	17.50	3.00	9.25
Typical pedestrian number in crossing platoon, N_c	3.96	5.81	0.00	1.03
Spatial pedestrian distribution, N_p	-	-	-	2
Group critial gap,	-	-	-	10.65
Vehicular flow rate, V	0.29	0.30	0.00	0.02
Average pedestrian delay, D	-	-	-	0.97
Pedestrain Delay LOS	**No Crosswalk**	**No Crosswalk**	**No Crosswalk**	**A**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)

Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/11/2008
Project #	2005014

Site Information

Intersection	Canal Street/Valenti Way
Condition	EXISTING
Period	PM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Driveway	0	0.00	0	0.00
Valenti Way	219	0.06	40	0.01
Canal Street	360	0.10	152	0.04
Canal Street	96	0.03	132	0.04

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	10
Crosswalk North Width, W_n (ft.)	10
Crosswalk South Width, W_s (ft.)	10
Crosswalk East Length, L_e (ft.)	0
Crosswalk West Length, L_w (ft.)	26
Crosswalk North Length, L_n (ft.)	28
Crosswalk South Length, L_s (ft.)	23

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	0	26	28	23
Single pedestrian critical gap, t_c (s)	3.00	9.50	10.00	8.75
Typical pedestrian number in crossing platoon, N_c	0.00	1.03	1.18	1.04
Spatial pedestrian distribution, N_p	-	2	2	2
Group critial gap,	-	10.90	11.60	10.15
Vehicular flow rate, V	0.00	0.01	0.04	0.04
Average pedestrian delay, D	-	0.69	3.37	2.15
Pedestrain Delay LOS	**No Crosswalk**	**A**	**A**	**A**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/18/2008
Project #	2005014

Site Information

Intersection	North Washington Street/Causeway Street
Condition	NO BUILD
Period	AM PEAK HOUR

Inputs

Cycle length, C (sec.) 150

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Commercial Street	94	56	V_e	107	0.03	4
Causeway Street	94	56	V_w	2	0.00	0
N Washington Street	56	94	V_n	130	0.04	5
N Washington Street	56	94	V_s	200	0.06	8

Geometric Inputs

Crosswalk East Width, W_e (ft.)	12
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	12
Crosswalk South Width, W_s (ft.)	12
Crosswalk East Length, L_e (ft.)	89
Crosswalk West Length, L_w (ft.)	79
Crosswalk North Length, L_n (ft.)	84
Crosswalk South Length, L_s (ft.)	90

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	10.5	10.5	29.5	29.5
Pedestrian Delay LOS	**B**	**B**	**C**	**C**
Number of peds arriving during Don't Walk, N_{ped} (p)	0.832222222	0.015555556	1.697222222	2.611111111
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	25.63725	22.9535	24.581875	26.2875
Total time-space, TS (ft^2-s)	88510.5	79750.5	45864	48330
Total crosswalk occupancy time, T (p-s)	114	2	133	219
Number of conflicting right-turning vehicles, N_{tv} (veh)	10	0	26	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	4640	0	12340	0
Effective time-space, TS_E (ft^2-s)	83870.5	79750.5	33524	48330
Circulation area per pedestrian, M (ft^2/p)	733.8	41693.2	251.8	220.6
Pedestrian Circulation Area LOS	**A**	**A**	**A**	**A**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/18/2008
Project #	2005014

Site Information

Intersection	N. Washington Street/Thacher Street/Valenti Way
Condition	NO BUILD
Period	AM PEAK HOUR

Inputs

Cycle length, C (sec.) 100

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Thacher Street	100	0	V_e	95	0.03	3
Valenti Way	100	0	V_w	35	0.01	1
N. Washington	27	73	V_n	221	0.06	6
N. Washington	0	100	V_s	6	0.00	0

Geometric Inputs

Crosswalk East Width, W_e (ft.)	12
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	12
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	25
Crosswalk West Length, L_w (ft.)	52
Crosswalk North Length, L_n (ft.)	70
Crosswalk South Length, L_s (ft.)	0

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	0.0	0.0	26.6	50.0
Pedestrian Delay LOS	**A**	**A**	**C**	**No Crosswalk**
Number of peds arriving during Don't Walk, N_{ped} (p)	0	0	2.240694444	0.083333333
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	9.45	16.2	21.20415625	3.2225
Total time-space, TS (ft^2-s)	29062.5	58344	15330	0
Total crosswalk occupancy time, T (p-s)	25	16	130	1
Number of conflicting right-turning vehicles, N_{tv} (veh)	0	0	0	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	0	0	0	0
Effective time-space, TS_E (ft^2-s)	29062.5	58344	15330	0
Circulation area per pedestrian, M (ft^2/p)	1165.4	3704.4	117.8	0.0
Pedestrian Circulation Area LOS	**A**	**A**	**A**	**No Crosswalk**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/18/2008
Project #	2005014

Site Information

Intersection	North Washington Street/Beverly Street
Condition	NO BUILD
Period	AM PEAK HOUR

Inputs

Cycle length, C (sec.) 100

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
0	0	100	V_e	0	0.00	0
Beverly Street	58	42	V_w	34.6833317	0.01	1
North Washington Street	44	56	V_n	68.3156533	0.02	2
North Washington Street	0	100	V_s	12	0.00	0

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	12
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	0
Crosswalk West Length, L_w (ft.)	38
Crosswalk North Length, L_n (ft.)	57
Crosswalk South Length, L_s (ft.)	0

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	50.0	8.8	15.7	50.0
Pedestrian Delay LOS	**No Crosswalk**	**A**	**B**	**No Crosswalk**
Number of peds arriving during Don't Walk, N_{ped} (p)	0	0.202319435	0.53134397	0.166666667
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	3.2	12.74552187	17.56955239	3.245
Total time-space, TS (ft^2-s)	0	24282	25222.5	0
Total crosswalk occupancy time, T (p-s)	0	12	33	1
Number of conflicting right-turning vehicles, N_{tv} (veh)	0	0	0	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	0	0	0	0
Effective time-space, TS_E (ft^2-s)	0	24282	25222.5	0
Circulation area per pedestrian, M (ft^2/p)	-	1977.5	>60	-
Pedestrian Circulation Area LOS	**No Crosswalk**	**A**	**A**	**No Crosswalk**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/18/2008
Project #	2005014

Site Information

Intersection	North Washington Street/Cross Street/Cooper Street
Condition	NO BUILD
Period	AM PEAK HOUR

Inputs

Cycle length, C (sec.) 100

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Cooper	86	14	V_e	85	0.02	2
Sumner Tunnel	71	29	V_w	109	0.03	3
N. Washington	0	100	V_n	0	0.00	0
Cross	43	57	V_s	86	0.02	2

Geometric Inputs

Crosswalk East Width, W_e (ft.)	12
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	10
Crosswalk East Length, L_e (ft.)	26
Crosswalk West Length, L_w (ft.)	26
Crosswalk North Length, L_n (ft.)	0
Crosswalk South Length, L_s (ft.)	24

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	1.0	4.2	50.0	16.2
Pedestrian Delay LOS	**A**	**A**	**No Crosswalk**	**B**
Number of peds arriving during Don't Walk, N_{ped} (p)	0.165277778	0.439027778	0	0.680833333
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	9.7371875	9.79878125	3.2	9.383825
Total time-space, TS (ft^2-s)	25818	21138	0	9600
Total crosswalk occupancy time, T (p-s)	23	30	0	22
Number of conflicting right-turning vehicles, N_{tv} (veh)	0	0	0	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	0	0	0	0
Effective time-space, TS_E (ft^2-s)	25818	21138	0	9600
Circulation area per pedestrian, M (ft^2/p)	1123.0	712.5	0.0	428.2
Pedestrian Circulation Area LOS	**A**	**A**	**No Crosswalk**	**A**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/18/2008
Project #	2005014

Site Information

Intersection	New Chardon Street/Surface Artery/Off-Ramps
Condition	NO BUILD
Period	AM PEAK HOUR

Inputs

Cycle length, C (sec.) 100

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Off Ramps	58	42	V_e	0	0.00	0
New Chardon	58	42	V_w	136	0.04	4
Surface Artery	62	38	V_n	91	0.03	3
Surface Artery	62	38	V_s	0	0.00	0

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	12
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	0
Crosswalk West Length, L_w (ft.)	119
Crosswalk North Length, L_n (ft.)	48
Crosswalk South Length, L_s (ft.)	0

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	8.8	8.8	7.2	7.2
Pedestrian Delay LOS	**No Crosswalk**	**A**	**A**	**No Crosswalk**
Number of peds arriving during Don't Walk, N_{ped} (p)	0	0.793333333	0.480277778	0
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	3.2	33.1285	15.3080625	3.2
Total time-space, TS (ft^2-s)	0	61582.5	32256	0
Total crosswalk occupancy time, T (p-s)	0	125	39	0
Number of conflicting right-turning vehicles, N_{tv} (veh)	0	0	0	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	0	0	0	0
Effective time-space, TS_E (ft^2-s)	0	61582.5	32256	0
Circulation area per pedestrian, M (ft^2/p)	-	492.1	833.6	-
Pedestrian Circulation Area LOS	**No Crosswalk**	**A**	**A**	**No Crosswalk**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/18/2008
Project #	2005014

Site Information

Intersection	Causeway Street/Haverhill Street/Legends Way
Condition	NO BUILD
Period	AM PEAK HOUR

Inputs

Cycle length, C (sec.) 90

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Causeway Street	47	43	V_e	143	0.04	4
Causeway Street	47	43	V_w	938	0.26	23
Legends Way	65	25	V_n	251	0.07	6
Haverhill Street	65	25	V_s	580	0.16	15

Geometric Inputs

Crosswalk East Width, W_e (ft.)	10
Crosswalk West Width, W_w (ft.)	10
Crosswalk North Width, W_n (ft.)	10
Crosswalk South Width, W_s (ft.)	10
Crosswalk East Length, L_e (ft.)	72
Crosswalk West Length, L_w (ft.)	80
Crosswalk North Length, L_n (ft.)	35
Crosswalk South Length, L_s (ft.)	25

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	10.3	10.3	3.5	3.5
Pedestrian Delay LOS	**B**	**B**	**A**	**A**
Number of peds arriving during Don't Walk, N_{ped} (p)	0.854027778	5.601944444	0.871527778	2.013888889
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	21.4305875	24.712525	12.1853125	9.99375
Total time-space, TS (ft^2-s)	27360	29600	21218.75	15468.75
Total crosswalk occupancy time, T (p-s)	77	580	76	145
Number of conflicting right-turning vehicles, N_{tv} (veh)	0	0	0	1
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	130	0	80	270
Effective time-space, TS_E (ft^2-s)	27230	29600	21138.75	15198.75
Circulation area per pedestrian, M (ft^2/p)	355.4	51.1	276.5	104.9
Pedestrian Circulation Area LOS	**A**	**B**	**A**	**A**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/20/2008
Project #	2005014

Site Information

Intersection	Beverly Street/Valenti Way
Condition	NO BUILD
Period	AM PEAK HOUR

Inputs

Cycle length, C (sec.) 100

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Valenti Way	48	52	V_e	60	0.02	2
Valenti Way	48	52	V_w	50	0.01	1
Beverly Street	68	32	V_n	200	0.06	6
Beverly Street	16	84	V_s	100	0.03	3

Geometric Inputs

Crosswalk East Width, W_e (ft.)	11
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	12
Crosswalk South Width, W_s (ft.)	12
Crosswalk East Length, L_e (ft.)	38
Crosswalk West Length, L_w (ft.)	30
Crosswalk North Length, L_n (ft.)	35
Crosswalk South Length, L_s (ft.)	40

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	13.5	13.5	5.1	35.3
Pedestrian Delay LOS	**B**	**B**	**A**	**D**
Number of peds arriving during Don't Walk, N_{ped} (p)	0.433333333	0.361111111	0.888888889	1.166666667
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	12.80636364	10.78125	12.15	13.4625
Total time-space, TS (ft^2-s)	18078.5	15930	26722.5	5280
Total crosswalk occupancy time, T (p-s)	21	15	68	37
Number of conflicting right-turning vehicles, N_{tv} (veh)	0	0	3	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	0	0	1240	0
Effective time-space, TS_E (ft^2-s)	18078.5	15930	25482.5	5280
Circulation area per pedestrian, M (ft^2/p)	847.0	1063.8	377.5	141.2
Pedestrian Circulation Area LOS	**A**	**A**	**A**	**A**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/18/2008
Project #	2005014

Site Information

Intersection	North Washington Street/Endicott Street
Condition	NO BUILD
Period	AM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Endicott Street	11	0.00	46	0.01
0	0	0.00	0	0.00
North Washington Str€	0	0.00	0	0.00
North Washington Str€	0	0.00	0	0.00

Geometric Inputs

Crosswalk East Width, W_e (ft.)	10
Crosswalk West Width, W_w (ft.)	0
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	29
Crosswalk West Length, L_w (ft.)	0
Crosswalk North Length, L_n (ft.)	90
Crosswalk South Length, L_s (ft.)	90

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	29	0	90	90
Single pedestrian critical gap, t_c (s)	10.25	3.00	25.50	25.50
Typical pedestrian number in crossing platoon, N_c	1.00	0.00	0.00	0.00
Spatial pedestrian distribution, N_p	2	-	-	-
Group critial gap,	11.65	-	-	-
Vehicular flow rate, V	0.01	0.00	0.00	0.00
Average pedestrian delay, D	0.91	-	-	-
Pedestrain Delay LOS	**A**	**No Crosswalk**	**No Crosswalk**	**No Crosswalk**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/18/2008
Project #	2005014

Site Information

Intersection	North Washington Street/Medford Street
Condition	NO BUILD
Period	AM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
0	0	0.00	0	0.00
Medford Street	27	0.01	31	0.01
N Washington Street	4	0.00	1694	0.47
N Washington Street	0	0.00	1687	0.47

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	0
Crosswalk West Length, L_w (ft.)	46
Crosswalk North Length, L_n (ft.)	80
Crosswalk South Length, L_s (ft.)	80

Crosswalk Time-Space Analysis

	Crosswalk East	**Crosswalk West**	**Crosswalk North**	**Crosswalk South**
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	0	46	80	80
Single pedestrian critical gap, t_c (s)	3.00	14.50	23.00	23.00
Typical pedestrian number in crossing platoon, N_c	0.00	1.01	119.11	1.00
Spatial pedestrian distribution, N_p	-	2	-	-
Group critial gap,	-	15.67	-	-
Vehicular flow rate, V	0.00	0.01	0.47	0.47
Average pedestrian delay, D	-	1.11	-	-
Pedestrain Delay LOS	**No Crosswalk**	**A**	**No Crosswalk**	**No Crosswalk**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/18/2008
Project #	2005014

Site Information

Intersection	Causeway Street/Canal Street
Condition	NO BUILD
Period	AM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Causeway Street	121	0.03	1452	0.40
Causeway Street	131	0.04	1426	0.40
0	0	0.00	0	0.00
Canal Street	1044	0.29	124	0.03

Geometric Inputs

Crosswalk East Width, W_e (ft.)	12
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	10
Crosswalk East Length, L_e (ft.)	84
Crosswalk West Length, L_w (ft.)	77
Crosswalk North Length, L_n (ft.)	0
Crosswalk South Length, L_s (ft.)	22

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	84	77	0	22
Single pedestrian critical gap, t_c (s)	24.00	22.25	3.00	8.50
Typical pedestrian number in crossing platoon, N_c	1230.76	566.16	0.00	1.21
Spatial pedestrian distribution, N_p	821	378	-	2
Group critial gap,	1664.83	776.92	-	10.10
Vehicular flow rate, V	0.40	0.40	0.00	0.03
Average pedestrian delay, D	>45	>45	-	1.98
Pedestrain Delay LOS	**F**	**F**	**No Crosswalk**	**A**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/18/2008
Project #	2005014

Site Information

Intersection	Causeway Street/Medford Street
Condition	NO BUILD
Period	AM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Causeway Street	27	0.01	1235	0.34
Causeway Street	36	0.01	1231	0.34
0	0	0.00	0	0.00
Medford Street	324	0.09	28	0.01

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	0
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	10
Crosswalk East Length, L_e (ft.)	58
Crosswalk West Length, L_w (ft.)	58
Crosswalk North Length, L_n (ft.)	0
Crosswalk South Length, L_s (ft.)	25

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	58	58	0	25
Single pedestrian critical gap, t_c (s)	17.50	17.50	3.00	9.25
Typical pedestrian number in crossing platoon, N_c	9.52	12.10	0.00	1.02
Spatial pedestrian distribution, N_p	-	-	-	2
Group critial gap,	-	-	-	10.65
Vehicular flow rate, V	0.34	0.34	0.00	0.01
Average pedestrian delay, D	-	-	-	0.45
Pedestrain Delay LOS	**No Crosswalk**	**No Crosswalk**	**No Crosswalk**	**A**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/18/2008
Project #	2005014

Site Information

Intersection	Canal Street/Valenti Way
Condition	NO BUILD
Period	AM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Valenti Way	131	0.04	61	0.02
Valenti Way	168	0.05	149	0.04
Canal Street	551	0.15	113	0.03
Canal Street	96	0.03	25	0.01

Geometric Inputs

Crosswalk East Width, W_e (ft.)	10
Crosswalk West Width, W_w (ft.)	10
Crosswalk North Width, W_n (ft.)	10
Crosswalk South Width, W_s (ft.)	10
Crosswalk East Length, L_e (ft.)	32
Crosswalk West Length, L_w (ft.)	26
Crosswalk North Length, L_n (ft.)	28
Crosswalk South Length, L_s (ft.)	23

Crosswalk Time-Space Analysis

	Crosswalk East	**Crosswalk West**	**Crosswalk North**	**Crosswalk South**
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	32	26	28	23
Single pedestrian critical gap, t_c (s)	11.00	9.50	10.00	8.75
Typical pedestrian number in crossing platoon, N_c	1.03	1.09	1.17	1.01
Spatial pedestrian distribution, N_p	2	2	2	2
Group critial gap,	12.40	10.90	11.60	10.15
Vehicular flow rate, V	0.02	0.04	0.03	0.01
Average pedestrian delay, D	1.40	2.87	2.39	0.37
Pedestrain Delay LOS	**A**	**A**	**A**	**A**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/18/2008
Project #	2005014

Site Information

Intersection	Causeway Street/Beverly Street
Condition	NO BUILD
Period	AM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Causeway Street	32	0.01	1236	0.34
Causeway Street	16	0.00	1435	0.40
0	0	0.00	0	0.00
Beverly Street	330	0.09	233	0.06

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	0
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	10
Crosswalk East Length, L_e (ft.)	68
Crosswalk West Length, L_w (ft.)	68
Crosswalk North Length, L_n (ft.)	0
Crosswalk South Length, L_s (ft.)	30

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	68	68	0	30
Single pedestrian critical gap, t_c (s)	20.00	20.00	3.00	10.50
Typical pedestrian number in crossing platoon, N_c	25.04	32.88	0.00	1.31
Spatial pedestrian distribution, N_p	-	-	-	2
Group critial gap,	-	-	-	12.30
Vehicular flow rate, V	0.34	0.40	0.00	0.06
Average pedestrian delay, D	-	-	-	6.50
Pedestrain Delay LOS	**No Crosswalk**	**No Crosswalk**	**No Crosswalk**	**B**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/18/2008
Project #	2005014

Site Information

Intersection	Valenti Way/Haverhill Street
Condition	NO BUILD
Period	AM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Valenti Way	0	0.00	281	0.08
Valenti Way	0	0.00	189	0.05
Haverhill Street	310	0.09	92	0.03
0	0	0.00	0	0.00

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	0
Crosswalk North Width, W_n (ft.)	10
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	0
Crosswalk West Length, L_w (ft.)	0
Crosswalk North Length, L_n (ft.)	28
Crosswalk South Length, L_s (ft.)	0

Crosswalk Time-Space Analysis

	Crosswalk East	**Crosswalk West**	**Crosswalk North**	**Crosswalk South**
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	0	0	28	0
Single pedestrian critical gap, t_c (s)	3.00	3.00	10.00	3.00
Typical pedestrian number in crossing platoon, N_c	1.00	1.00	1.09	0.00
Spatial pedestrian distribution, N_p	-	-	2	-
Group critial gap,	-	-	11.40	-
Vehicular flow rate, V	0.08	0.05	0.03	0.00
Average pedestrian delay, D	-	-	1.83	-
Pedestrain Delay LOS	**No Crosswalk**	**No Crosswalk**	**A**	**No Crosswalk**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/20/2008
Project #	2005014

Site Information

Intersection	North Washington Street/Causeway Street
Condition	NO BUILD
Period	PM PEAK HOUR

Inputs

Cycle length, C (sec.) 150

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Commercial Street	87	63	V_e	33	0.01	1
Causeway Street	87	63	V_w	14	0.00	1
N Washington Street	63	87	V_n	7	0.00	0
N Washington Street	63	87	V_s	88	0.02	4

Geometric Inputs

Crosswalk East Width, W_e (ft.)	12
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	12
Crosswalk South Width, W_s (ft.)	12
Crosswalk East Length, L_e (ft.)	89
Crosswalk West Length, L_w (ft.)	79
Crosswalk North Length, L_n (ft.)	84
Crosswalk South Length, L_s (ft.)	90

Crosswalk Time-Space Analysis

	Crosswalk East	**Crosswalk West**	**Crosswalk North**	**Crosswalk South**
Average delay, d_p (s)	13.2	13.2	25.2	25.2
Pedestrian Delay LOS	**B**	**B**	**C**	**C**
Number of peds arriving during Don't Walk, N_{ped} (p)	0.28875	0.1225	0.084583333	1.063333333
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	25.51496875	22.9775625	24.21903125	25.93925
Total time-space, TS (ft^2-s)	81034.5	73114.5	52920	55890
Total crosswalk occupancy time, T (p-s)	35	13	7	95
Number of conflicting right-turning vehicles, N_{tv} (veh)	26	0	14	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	12500	120	6640	0
Effective time-space, TS_E (ft^2-s)	68534.5	72994.5	46280	55890
Circulation area per pedestrian, M (ft^2/p)	1953.5	5445.9	6551.6	587.6
Pedestrian Circulation Area LOS	**A**	**A**	**A**	**A**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/20/2008
Project #	2005014

Site Information

Intersection	North Washington Street/Thacher Street/Valenti Way
Condition	NO BUILD
Period	PM PEAK HOUR

Inputs

Cycle length, C (sec.) 100

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Thacher Street	100	0	V_e	146	0.04	4
Valenti Way	100	0	V_w	64	0.02	2
N. Washington	27	73	V_n	264	0.07	7
N. Washington	0	100	V_s	0	0.00	0

Geometric Inputs

Crosswalk East Width, W_e (ft.)	12
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	12
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	25
Crosswalk West Length, L_w (ft.)	52
Crosswalk North Length, L_n (ft.)	70
Crosswalk South Length, L_s (ft.)	0

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	0.0	0.0	26.6	50.0
Pedestrian Delay LOS	**A**	**A**	**C**	**No Crosswalk**
Number of peds arriving during Don't Walk, N_{ped} (p)	0	0	2.676666667	0
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	9.45	16.2	21.30225	3.2
Total time-space, TS (ft^2-s)	29062.5	58344	15330	0
Total crosswalk occupancy time, T (p-s)	38	29	156	0
Number of conflicting right-turning vehicles, N_{tv} (veh)	0	0	0	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	0	0	0	0
Effective time-space, TS_E (ft^2-s)	29062.5	58344	15330	0
Circulation area per pedestrian, M (ft^2/p)	758.3	2025.8	98.1	-
Pedestrian Circulation Area LOS	**A**	**A**	**A**	**No Crosswalk**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/20/2008
Project #	2005014

Site Information

Intersection	North Washington Street/Beverly Street
Condition	NO BUILD
Period	PM PEAK HOUR

Inputs

Cycle length, C (sec.) 100

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
0	0	100	V_e	0	0.00	0
Beverly Street	49	51	V_w	72.5196935	0.02	2
North Washington Street	53	47	V_n	104.049995	0.03	3
North Washington Street	0	100	V_s	0	0.00	0

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	12
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	0
Crosswalk West Length, L_w (ft.)	38
Crosswalk North Length, L_n (ft.)	57
Crosswalk South Length, L_s (ft.)	0

Crosswalk Time-Space Analysis

	Crosswalk East	**Crosswalk West**	**Crosswalk North**	**Crosswalk South**
Average delay, d_p (s)	50.0	13.0	11.0	50.0
Pedestrian Delay LOS	**No Crosswalk**	**B**	**B**	**No Crosswalk**
Number of peds arriving during Don't Walk, N_{ped} (p)	0	0.513681162	0.679215245	0
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	3.2	12.81557826	17.60282343	3.2
Total time-space, TS (ft^2-s)	0	20178	31378.5	0
Total crosswalk occupancy time, T (p-s)	0	26	51	0
Number of conflicting right-turning vehicles, N_{tv} (veh)	0	0	0	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	0	0	0	0
Effective time-space, TS_E (ft^2-s)	0	20178	31378.5	0
Circulation area per pedestrian, M (ft^2/p)	-	781.6	>60	-
Pedestrian Circulation Area LOS	**No Crosswalk**	**A**	**A**	**No Crosswalk**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/20/2008
Project #	2005014

Site Information

Intersection	N. Washington & Cooper & Cross
Condition	NO BUILD
Period	PM PEAK HOUR

Inputs

Cycle length, C (sec.) 100

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Cooper	86	14	V_e	127	0.04	4
Sumner Tunnel	67	33	V_w	184	0.05	5
N. Washington	0	100	V_n	0	0.00	0
Cross	47	53	V_s	110	0.03	3

Geometric Inputs

Crosswalk East Width, W_e (ft.)	12
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	10
Crosswalk East Length, L_e (ft.)	26
Crosswalk West Length, L_w (ft.)	26
Crosswalk North Length, L_n (ft.)	0
Crosswalk South Length, L_s (ft.)	24

Crosswalk Time-Space Analysis

	Crosswalk East	**Crosswalk West**	**Crosswalk North**	**Crosswalk South**
Average delay, d_p (s)	1.0	5.4	50.0	14.0
Pedestrian Delay LOS	**A**	**A**	**No Crosswalk**	**B**
Number of peds arriving during Don't Walk, N_{ped} (p)	0.246944444	0.843333333	0	0.809722222
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	9.7555625	9.88975	3.2	9.418625
Total time-space, TS (ft^2-s)	25818	19890	0	10560
Total crosswalk occupancy time, T (p-s)	34	51	0	29
Number of conflicting right-turning vehicles, N_{tv} (veh)	0	0	0	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	0	0	0	0
Effective time-space, TS_E (ft^2-s)	25818	19890	0	10560
Circulation area per pedestrian, M (ft^2/p)	750.2	393.5	#DIV/0!	366.9
Pedestrian Circulation Area LOS	**A**	**A**	**No Crosswalk**	**A**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	10/6/2006
Project #	2006040

Site Information

Intersection	New Chardon Street/Surface Artery/Off-Ramps
Condition	NO BUILD
Period	PM PEAK HOUR

Inputs

Cycle length, C (sec.) 100

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Off Ramps	54	46	V_e	0	0.00	0
New Chardon	54	46	V_w	170	0.05	5
Surface Artery	66	34	V_n	26	0.01	1
Surface Artery	66	34	V_s	0	0.00	0

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	12
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	0
Crosswalk West Length, L_w (ft.)	119
Crosswalk North Length, L_n (ft.)	48
Crosswalk South Length, L_s (ft.)	0

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	10.6	10.6	5.8	5.8
Pedestrian Delay LOS	**No Crosswalk**	**B**	**A**	**No Crosswalk**
Number of peds arriving during Don't Walk, N_{ped} (p)	0	1.086111111	0.122777778	0
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	3.2	33.194375	15.227625	3.2
Total time-space, TS (ft^2-s)	0	55870.5	34560	0
Total crosswalk occupancy time, T (p-s)	0	157	11	0
Number of conflicting right-turning vehicles, N_{tv} (veh)	0	0	0	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	0	0	0	0
Effective time-space, TS_E (ft^2-s)	0	55870.5	34560	0
Circulation area per pedestrian, M (ft^2/p)	#DIV/0!	356.4	3142.5	#DIV/0!
Pedestrian Circulation Area LOS	**No Crosswalk**	**A**	**A**	**No Crosswalk**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/20/2008
Project #	2005014

Site Information

Intersection	Causeway Street/Haverhill Street/Legends Way
Condition	NO BUILD
Period	PM PEAK HOUR

Inputs

Cycle length, C (sec.) 100

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Causeway Street	47	53	V_e	244	0.07	7
Causeway Street	47	53	V_w	98	0.03	3
Legends Way	75	25	V_n	394	0.11	11
Haverhill Street	75	25	V_s	430	0.12	12

Geometric Inputs

Crosswalk East Width, W_e (ft.)	10
Crosswalk West Width, W_w (ft.)	10
Crosswalk North Width, W_n (ft.)	10
Crosswalk South Width, W_s (ft.)	10
Crosswalk East Length, L_e (ft.)	72
Crosswalk West Length, L_w (ft.)	80
Crosswalk North Length, L_n (ft.)	35
Crosswalk South Length, L_s (ft.)	25

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	14.0	14.0	3.1	3.1
Pedestrian Delay LOS	**B**	**B**	**A**	**A**
Number of peds arriving during Don't Walk, N_{ped} (p)	1.796111111	0.721388889	1.368055556	1.493055556
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	21.68495	23.394775	12.319375	9.853125
Total time-space, TS (ft^2-s)	27360	29600	24718.75	17968.75
Total crosswalk occupancy time, T (p-s)	147	64	135	118
Number of conflicting right-turning vehicles, N_{tv} (veh)	0	0	0	1
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	33.33333333	0	133.3333333	300
Effective time-space, TS_E (ft^2-s)	27326.66667	29600	24585.41667	17668.75
Circulation area per pedestrian, M (ft^2/p)	185.9	464.8	182.3	150.1
Pedestrian Circulation Area LOS	**A**	**A**	**A**	**A**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)

Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/20/2008
Project #	2005014

Site Information

Intersection	Beverly Street/Valenti Way
Condition	NO BUILD
Period	PM PEAK HOUR

Inputs

Cycle length, C (sec.) 100

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Valenti Way	52	48	V_e	50	0.01	1
Valenti Way	52	48	V_w	30	0.01	1
Beverly Street	64	36	V_n	200	0.06	6
Beverly Street	16	84	V_s	75	0.02	2

Geometric Inputs

Crosswalk East Width, W_e (ft.)	11
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	12
Crosswalk South Width, W_s (ft.)	12
Crosswalk East Length, L_e (ft.)	38
Crosswalk West Length, L_w (ft.)	30
Crosswalk North Length, L_n (ft.)	35
Crosswalk South Length, L_s (ft.)	40

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	11.5	11.5	6.5	35.3
Pedestrian Delay LOS	**B**	**B**	**A**	**D**
Number of peds arriving during Don't Walk, N_{ped} (p)	0.333333333	0.2	1	0.875
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	12.78181818	10.745	12.175	13.396875
Total time-space, TS (ft^2-s)	19750.5	17370	25042.5	5280
Total crosswalk occupancy time, T (p-s)	18	9	68	28
Number of conflicting right-turning vehicles, N_{tv} (veh)	0	0	2	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	0	0	933.3333333	0
Effective time-space, TS_E (ft^2-s)	19750.5	17370	24109.16667	5280
Circulation area per pedestrian, M (ft^2/p)	1112.5	1939.9	356.4	189.2
Pedestrian Circulation Area LOS	**A**	**A**	**A**	**A**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)

Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/20/2008
Project #	2005014

Site Information

Intersection	North Washington Street/Endicott Street
Condition	NO BUILD
Period	PM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Endicott Street	4	0.00	14	0.00
0	0	0.00	0	0.00
North Washington Stre	0	0.00	0	0.00
North Washington Stre	0	0.00	0	0.00

Geometric Inputs

Crosswalk East Width, W_e (ft.)	10
Crosswalk West Width, W_w (ft.)	0
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	29
Crosswalk West Length, L_w (ft.)	0
Crosswalk North Length, L_n (ft.)	90
Crosswalk South Length, L_s (ft.)	90

Crosswalk Time-Space Analysis

	Crosswalk East	**Crosswalk West**	**Crosswalk North**	**Crosswalk South**
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	29	0	90	90
Single pedestrian critical gap, t_c (s)	10.25	3.00	25.50	25.50
Typical pedestrian number in crossing platoon, N_c	1.00	0.00	0.00	0.00
Spatial pedestrian distribution, N_p	2	-	-	-
Group critial gap,	11.65	-	-	-
Vehicular flow rate, V	0.00	0.00	0.00	0.00
Average pedestrian delay, D	0.27	-	-	-
Pedestrain Delay LOS	**A**	**No Crosswalk**	**No Crosswalk**	**No Crosswalk**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)

Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/20/2008
Project #	2005014

Site Information

Intersection	North Washington Street/Medford Street
Condition	NO BUILD
Period	PM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
0	0	0.00	0	0.00
Medford Street	51	0.01	21	0.01
N Washington Street	5	0.00	1900	0.53
N Washington Street	4	0.00	1883	0.52

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	0
Crosswalk West Length, L_w (ft.)	46
Crosswalk North Length, L_n (ft.)	80
Crosswalk South Length, L_s (ft.)	80

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	0	46	80	80
Single pedestrian critical gap, t_c (s)	3.00	14.50	23.00	23.00
Typical pedestrian number in crossing platoon, N_c	0.00	1.01	491.79	356.58
Spatial pedestrian distribution, N_p	-	2	-	-
Group critial gap,	-	15.67	-	-
Vehicular flow rate, V	0.00	0.01	0.53	0.52
Average pedestrian delay, D	-	0.74	-	-
Pedestrain Delay LOS	**No Crosswalk**	**A**	**No Crosswalk**	**No Crosswalk**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/20/2008
Project #	2005014

Site Information

Intersection	Causeway Street/Canal Street
Condition	NO BUILD
Period	PM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Causeway Street	1035	0.29	1155	0.32
Causeway Street	419	0.12	1193	0.33
Canal Street	935	0.26	130	0.04

Geometric Inputs

Crosswalk East Width, W_e (ft.)	12
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	10
Crosswalk East Length, L_e (ft.)	84
Crosswalk West Length, L_w (ft.)	77
Crosswalk North Length, L_n (ft.)	0
Crosswalk South Length, L_s (ft.)	22

Crosswalk Time-Space Analysis

	Crosswalk East	**Crosswalk West**	**Crosswalk North**	**Crosswalk South**
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	84	77	0	22
Single pedestrian critical gap, t_c (s)	24.00	22.25	3.00	8.50
Typical pedestrian number in crossing platoon, N_c	1043.67	414.13	0.00	1.21
Spatial pedestrian distribution, N_p	697	277	-	2
Group critial gap,	1415.33	574.25	-	10.10
Vehicular flow rate, V	0.32	0.33	0.00	0.04
Average pedestrian delay, D	>45	>45	-	2.09
Pedestrain Delay LOS	**F**	**F**	**No Crosswalk**	**A**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/20/2008
Project #	2005014

Site Information

Intersection	Causeway Street/Medford Street
Condition	NO BUILD
Period	PM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Causeway Street	21	0.01	992	0.28
Causeway Street	32	0.01	978	0.27
0	0	0.00	0	0.00
Medford Street	212	0.06	18	0.01

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	0
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	10
Crosswalk East Length, L_e (ft.)	58
Crosswalk West Length, L_w (ft.)	58
Crosswalk North Length, L_n (ft.)	0
Crosswalk South Length, L_s (ft.)	25

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	58	58	0	25
Single pedestrian critical gap, t_c (s)	17.50	17.50	3.00	9.25
Typical pedestrian number in crossing platoon, N_c	3.46	4.51	0.00	1.01
Spatial pedestrian distribution, N_p	-	-	-	2
Group critial gap,	-	-	-	10.65
Vehicular flow rate, V	0.28	0.27	0.00	0.01
Average pedestrian delay, D	-	-	-	0.29
Pedestrain Delay LOS	**No Crosswalk**	**No Crosswalk**	**No Crosswalk**	**A**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/20/2008
Project #	2005014

Site Information

Intersection	Canal Street/Valenti Way
Condition	NO BUILD
Period	PM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Valenti Way	116	0.03	17	0.00
Valenti Way	115	0.03	106	0.03
Canal Street	378	0.11	93	0.03
Canal Street	101	0.03	42	0.01

Geometric Inputs

Crosswalk East Width, W_e (ft.)	10
Crosswalk West Width, W_w (ft.)	10
Crosswalk North Width, W_n (ft.)	10
Crosswalk South Width, W_s (ft.)	10
Crosswalk East Length, L_e (ft.)	32
Crosswalk West Length, L_w (ft.)	26
Crosswalk North Length, L_n (ft.)	28
Crosswalk South Length, L_s (ft.)	23

Crosswalk Time-Space Analysis

	Crosswalk East	**Crosswalk West**	**Crosswalk North**	**Crosswalk South**
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	32	26	28	23
Single pedestrian critical gap, t_c (s)	11.00	9.50	10.00	8.75
Typical pedestrian number in crossing platoon, N_c	1.01	1.04	1.11	1.01
Spatial pedestrian distribution, N_p	2	2	2	2
Group critial gap,	12.40	10.90	11.40	10.15
Vehicular flow rate, V	0.00	0.03	0.03	0.01
Average pedestrian delay, D	0.37	1.95	1.86	0.63
Pedestrain Delay LOS	**A**	**A**	**A**	**A**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/20/2008
Project #	2005014

Site Information

Intersection	Causeway Street/Beverly Street
Condition	NO BUILD
Period	PM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Causeway Street	39	0.01	1040	0.29
Causeway Street	26	0.01	1134	0.32
0	0	0.00	0	0.00
Beverly Street	210	0.06	126	0.04

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	0
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	10
Crosswalk East Length, L_e (ft.)	68
Crosswalk West Length, L_w (ft.)	68
Crosswalk North Length, L_n (ft.)	0
Crosswalk South Length, L_s (ft.)	30

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	68	68	0	30
Single pedestrian critical gap, t_c (s)	20.00	20.00	3.00	10.50
Typical pedestrian number in crossing platoon, N_c	12.45	13.05	0.00	1.11
Spatial pedestrian distribution, N_p	-	-	-	2
Group critial gap,	-	-	-	11.90
Vehicular flow rate, V	0.29	0.32	0.00	0.04
Average pedestrian delay, D	-	-	-	2.86
Pedestrain Delay LOS	**No Crosswalk**	**No Crosswalk**	**No Crosswalk**	**A**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	MML/TK
Company	Howard/Stein-Hudson
Date	6/20/2008
Project #	2005014

Site Information

Intersection	Valenti Way/Haverhill Street
Condition	NO BUILD
Period	PM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Valenti Way	0	0.00	104	0.03
Valenti Way	0	0.00	110	0.03
Haverhill Street	250	0.07	94	0.03
0	0	0.00	0	0.00

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	0
Crosswalk North Width, W_n (ft.)	10
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	0
Crosswalk West Length, L_w (ft.)	0
Crosswalk North Length, L_n (ft.)	28
Crosswalk South Length, L_s (ft.)	0

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	0	0	28	0
Single pedestrian critical gap, t_c (s)	3.00	3.00	10.00	3.00
Typical pedestrian number in crossing platoon, N_c	1.00	1.00	1.08	0.00
Spatial pedestrian distribution, N_p	-	-	2	-
Group critial gap,	-	-	11.40	-
Vehicular flow rate, V	0.03	0.03	0.03	0.00
Average pedestrian delay, D	-	-	1.88	-
Pedestrain Delay LOS	**No Crosswalk**	**No Crosswalk**	**A**	**No Crosswalk**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/21/2008
Project #	2005014

Site Information

Intersection	North Washington Street/Causeway Street
Condition	BUILD
Period	AM PEAK HOUR

Inputs

Cycle length, C (sec.) 150

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Commercial Street	94	56	V_e	126	0.04	5
Causeway Street	94	56	V_w	23	0.01	1
N Washington Street	56	94	V_n	147	0.04	6
N Washington Street	56	94	V_s	234	0.07	10

Geometric Inputs

Crosswalk East Width, W_e (ft.)	12
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	12
Crosswalk South Width, W_s (ft.)	12
Crosswalk East Length, L_e (ft.)	89
Crosswalk West Length, L_w (ft.)	79
Crosswalk North Length, L_n (ft.)	84
Crosswalk South Length, L_s (ft.)	90

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	10.5	10.5	29.5	29.5
Pedestrian Delay LOS	**B**	**B**	**C**	**C**
Number of peds arriving during Don't Walk, N_{ped} (p)	0.98	0.178888889	1.919166667	3.055
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	25.6705	22.99025	24.6318125	26.387375
Total time-space, TS (ft^2-s)	88510.5	79750.5	45864	48330
Total crosswalk occupancy time, T (p-s)	135	22	151	257
Number of conflicting right-turning vehicles, N_{tv} (veh)	10	0	26	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	4660	0	12380	0
Effective time-space, TS_E (ft^2-s)	83850.5	79750.5	33484	48330
Circulation area per pedestrian, M (ft^2/p)	622.2	3619.7	221.9	187.9
Pedestrian Circulation Area LOS	**A**	**A**	**A**	**A**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)

Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/21/2008
Project #	2005014

Site Information

Intersection	N. Washington Street/Thacher Street/Valenti Way
Condition	BUILD
Period	AM PEAK HOUR

Inputs

Cycle length, C (sec.) 100

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Thacher Street	100	0	V_e	95	0.03	3
Valenti Way	100	0	V_w	38	0.01	1
N. Washington	27	73	V_n	252	0.07	7
N. Washington	0	100	V_s	6	0.00	0

Geometric Inputs

Crosswalk East Width, W_e (ft.)	12
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	12
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	25
Crosswalk West Length, L_w (ft.)	52
Crosswalk North Length, L_n (ft.)	70
Crosswalk South Length, L_s (ft.)	0

Crosswalk Time-Space Analysis

	Crosswalk East	**Crosswalk West**	**Crosswalk North**	**Crosswalk South**
Average delay, d_p (s)	0.0	0.0	26.6	50.0
Pedestrian Delay LOS	**A**	**A**	**C**	**No Crosswalk**
Number of peds arriving during Don't Walk, N_{ped} (p)	0	0	2.555	0.083333333
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	9.45	16.2	21.274875	3.2225
Total time-space, TS (ft^2-s)	29062.5	58344	15330	0
Total crosswalk occupancy time, T (p-s)	25	17	149	1
Number of conflicting right-turning vehicles, N_{tv} (veh)	0	0	0	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	0	0	0	0
Effective time-space, TS_E (ft^2-s)	29062.5	58344	15330	0
Circulation area per pedestrian, M (ft^2/p)	1165.4	3411.9	102.9	0.0
Pedestrian Circulation Area LOS	**A**	**A**	**A**	**No Crosswalk**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/18/2008
Project #	2005014

Site Information

Intersection	North Washington Street/Beverly Street
Condition	BUILD
Period	AM PEAK HOUR

Inputs

Cycle length, C (sec.) 100

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
0	0	100	V_e	0	0.00	0
Beverly Street	58	42	V_w	36	0.01	1
North Washington Street	44	56	V_n	107	0.03	3
North Washington Street	0	100	V_s	0	0.00	0

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	12
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	0
Crosswalk West Length, L_w (ft.)	38
Crosswalk North Length, L_n (ft.)	57
Crosswalk South Length, L_s (ft.)	0

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	50.0	8.8	15.7	50.0
Pedestrian Delay LOS	**No Crosswalk**	**A**	**B**	**No Crosswalk**
Number of peds arriving during Don't Walk, N_{ped} (p)	0	0.21	0.832222222	0
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	3.2	12.74725	17.63725	3.2
Total time-space, TS (ft^2-s)	0	24282	25222.5	0
Total crosswalk occupancy time, T (p-s)	0	13	52	0
Number of conflicting right-turning vehicles, N_{tv} (veh)	0	0	0	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	0	0	0	0
Effective time-space, TS_E (ft^2-s)	0	24282	25222.5	0
Circulation area per pedestrian, M (ft^2/p)	-	1904.9	>60	-
Pedestrian Circulation Area LOS	**No Crosswalk**	**A**	**A**	**No Crosswalk**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)

Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/21/2008
Project #	2005014

Site Information

Intersection	North Washington Street/Cross Street/Cooper Street
Condition	BUILD
Period	AM PEAK HOUR

Inputs

Cycle length, C (sec.) 100

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Cooper	86	14	V_e	85	0.02	2
Sumner Tunnel	71	29	V_w	151	0.04	4
N. Washington	0	100	V_n	0	0.00	0
Cross	43	57	V_s	128	0.04	4

Geometric Inputs

Crosswalk East Width, W_e (ft.)	12
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	10
Crosswalk East Length, L_e (ft.)	26
Crosswalk West Length, L_w (ft.)	26
Crosswalk North Length, L_n (ft.)	0
Crosswalk South Length, L_s (ft.)	24

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	1.0	4.2	50.0	16.2
Pedestrian Delay LOS	**A**	**A**	**No Crosswalk**	**B**
Number of peds arriving during Don't Walk, N_{ped} (p)	0.165277778	0.608194444	0	1.013333333
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	9.7371875	9.83684375	3.2	9.4736
Total time-space, TS (ft^2-s)	25818	21138	0	9600
Total crosswalk occupancy time, T (p-s)	23	41	0	34
Number of conflicting right-turning vehicles, N_{tv} (veh)	0	0	0	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	0	0	0	0
Effective time-space, TS_E (ft^2-s)	25818	21138	0	9600
Circulation area per pedestrian, M (ft^2/p)	1123.0	512.3	0.0	285.0
Pedestrian Circulation Area LOS	**A**	**A**	**No Crosswalk**	**A**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/21/2008
Project #	2005014

Site Information

Intersection	New Chardon Street/Surface Artery/Off-ramp
Condition	BUILD
Period	AM PEAK HOUR

Inputs

Cycle length, C (sec.) 100

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Off Ramps	58	42	V_e	0	0.00	0
New Chardon	58	42	V_w	223	0.06	6
N. Washington	62	38	V_n	91	0.03	3
Surface Artery	62	38	V_s	0	0.00	0

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	12
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	0
Crosswalk West Length, L_w (ft.)	119
Crosswalk North Length, L_n (ft.)	48
Crosswalk South Length, L_s (ft.)	0

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	8.8	8.8	7.2	7.2
Pedestrian Delay LOS	**No Crosswalk**	**A**	**A**	**No Crosswalk**
Number of peds arriving during Don't Walk, N_{ped} (p)	0	1.300833333	0.480277778	0
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	3.2	33.2426875	15.3080625	3.2
Total time-space, TS (ft^2-s)	0	61582.5	32256	0
Total crosswalk occupancy time, T (p-s)	0	206	39	0
Number of conflicting right-turning vehicles, N_{tv} (veh)	0	0	0	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	0	0	0	0
Effective time-space, TS_E (ft^2-s)	0	61582.5	32256	0
Circulation area per pedestrian, M (ft^2/p)	-	299.1	833.6	-
Pedestrian Circulation Area LOS	**No Crosswalk**	**A**	**A**	**No Crosswalk**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)

Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/21/2008
Project #	2005014

Site Information

Intersection	Causeway Street/Haverhill Street/Legends Way
Condition	BUILD
Period	AM PEAK HOUR

Inputs

Cycle length, C (sec.) 90

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Causeway Street	47	43	V_e	195	0.05	5
Causeway Street	47	43	V_w	946	0.26	24
Legends Way	65	25	V_n	259	0.07	6
Haverhill Street	65	25	V_s	653	0.18	16

Geometric Inputs

Crosswalk East Width, W_e (ft.)	10
Crosswalk West Width, W_w (ft.)	10
Crosswalk North Width, W_n (ft.)	10
Crosswalk South Width, W_s (ft.)	10
Crosswalk East Length, L_e (ft.)	72
Crosswalk West Length, L_w (ft.)	80
Crosswalk North Length, L_n (ft.)	35
Crosswalk South Length, L_s (ft.)	25

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	10.3	10.3	3.5	3.5
Pedestrian Delay LOS	**B**	**B**	**A**	**A**
Number of peds arriving during Don't Walk, N_{ped} (p)	1.164583333	5.649722222	0.899305556	2.267361111
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	21.5144375	24.725425	12.1928125	10.0621875
Total time-space, TS (ft^2-s)	27360	29600	21218.75	15468.75
Total crosswalk occupancy time, T (p-s)	105	585	79	164
Number of conflicting right-turning vehicles, N_{tv} (veh)	0	0	0	1
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	130	0	80	290
Effective time-space, TS_E (ft^2-s)	27230	29600	21138.75	15178.75
Circulation area per pedestrian, M (ft^2/p)	259.6	50.6	267.8	92.4
Pedestrian Circulation Area LOS	**A**	**B**	**A**	**A**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)

Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/21/2008
Project #	2005014

Site Information

Intersection	Beverly Street/Valenti Way
Condition	BUILD
Period	AM PEAK HOUR

Inputs

Cycle length, C (sec.) 100

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Valenti Way	48	52	V_e	99	0.03	3
Valenti Way	48	52	V_w	159	0.04	4
Beverly Street	68	32	V_n	472	0.13	13
Beverly Street	16	84	V_s	100	0.03	3

Geometric Inputs

Crosswalk East Width, W_e (ft.)	11
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	12
Crosswalk South Width, W_s (ft.)	12
Crosswalk East Length, L_e (ft.)	38
Crosswalk West Length, L_w (ft.)	30
Crosswalk North Length, L_n (ft.)	35
Crosswalk South Length, L_s (ft.)	40

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	13.5	13.5	5.1	35.3
Pedestrian Delay LOS	**B**	**B**	**A**	**D**
Number of peds arriving during Don't Walk, N_{ped} (p)	0.715	1.148333333	2.097777778	1.166666667
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	12.8755	10.958375	12.422	13.4625
Total time-space, TS (ft^2-s)	18078.5	15930	26722.5	5280
Total crosswalk occupancy time, T (p-s)	35	48	163	37
Number of conflicting right-turning vehicles, N_{tv} (veh)	0	0	3	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	0	0	1413.333333	0
Effective time-space, TS_E (ft^2-s)	18078.5	15930	25309.16667	5280
Circulation area per pedestrian, M (ft^2/p)	510.6	329.1	155.4	141.2
Pedestrian Circulation Area LOS	**A**	**A**	**A**	**A**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)

Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/21/2008
Project #	2005014

Site Information

Intersection	North Washington Street/Endicott Street
Condition	BUILD
Period	AM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Endicott Street	11	0.00	46	0.01
0	0	0.00	0	0.00
North Washington Stre	0	0.00	1649	0.46
North Washington Stre	0	0.00	1605	0.45

Geometric Inputs

Crosswalk East Width, W_e (ft.)	10
Crosswalk West Width, W_w (ft.)	0
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	29
Crosswalk West Length, L_w (ft.)	0
Crosswalk North Length, L_n (ft.)	90
Crosswalk South Length, L_s (ft.)	90

Crosswalk Time-Space Analysis

	Crosswalk East	**Crosswalk West**	**Crosswalk North**	**Crosswalk South**
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	29	0	90	90
Single pedestrian critical gap, t_c (s)	10.25	3.00	25.50	25.50
Typical pedestrian number in crossing platoon, N_c	1.00	0.00	0.00	0.00
Spatial pedestrian distribution, N_p	2	-	-	-
Group critial gap,	11.65	-	-	-
Vehicular flow rate, V	0.01	0.00	0.00	0.45
Average pedestrian delay, D	0.91	-	-	-
Pedestrain Delay LOS	**A**	**No Crosswalk**	**No Crosswalk**	**No Crosswalk**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/21/2008
Project #	2005014

Site Information

Intersection	North Washington Street/Medford Street
Condition	BUILD
Period	AM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
0	0	0.00	0	0.00
Medford Street	37	0.01	31	0.01
N Washington Street	4	0.00	1617	0.45
N Washington Street	0	0.00	1610	0.45

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	0
Crosswalk West Length, L_w (ft.)	46
Crosswalk North Length, L_n (ft.)	80
Crosswalk South Length, L_s (ft.)	80

Crosswalk Time-Space Analysis

	Crosswalk East	**Crosswalk West**	**Crosswalk North**	**Crosswalk South**
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	0	46	80	80
Single pedestrian critical gap, t_c (s)	3.00	14.50	23.00	23.00
Typical pedestrian number in crossing platoon, N_c	0.00	1.01	76.64	1.00
Spatial pedestrian distribution, N_p	-	2	-	-
Group critial gap,	-	15.67	-	-
Vehicular flow rate, V	0.00	0.01	0.45	0.45
Average pedestrian delay, D	-	1.11	-	-
Pedestrain Delay LOS	**No Crosswalk**	**A**	**No Crosswalk**	**No Crosswalk**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/21/2008
Project #	2005014

Site Information

Intersection	Causeway Street/Canal Street
Condition	BUILD
Period	AM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Causeway Street	128	0.04	1574	0.44
Causeway Street	136	0.04	1526	0.42
0	0	0.00	0	0.00
Canal Street	1065	0.30	146	0.04

Geometric Inputs

Crosswalk East Width, W_e (ft.)	12
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	10
Crosswalk East Length, L_e (ft.)	84
Crosswalk West Length, L_w (ft.)	77
Crosswalk North Length, L_n (ft.)	0
Crosswalk South Length, L_s (ft.)	22

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	84	77	0	22
Single pedestrian critical gap, t_c (s)	24.00	22.25	3.00	8.50
Typical pedestrian number in crossing platoon, N_c	2713.38	1021.26	0.00	1.25
Spatial pedestrian distribution, N_p	1810	682	-	2
Group critial gap,	3641.67	1383.75	-	10.30
Vehicular flow rate, V	0.44	0.42	0.00	0.04
Average pedestrian delay, D	>45	>45	-	2.48
Pedestrain Delay LOS	**F**	**F**	**No Crosswalk**	**A**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/21/2008
Project #	2005014

Site Information

Intersection	Causeway Street/Medford Street
Condition	BUILD
Period	AM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Causeway Street	27	0.01	1158	0.32
Causeway Street	36	0.01	1154	0.32
0	0	0.00	0	0.00
Medford Street	369	0.10	28	0.01

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	0
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	10
Crosswalk East Length, L_e (ft.)	58
Crosswalk West Length, L_w (ft.)	58
Crosswalk North Length, L_n (ft.)	0
Crosswalk South Length, L_s (ft.)	25

Crosswalk Time-Space Analysis

	Crosswalk East	**Crosswalk West**	**Crosswalk North**	**Crosswalk South**
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	58	58	0	25
Single pedestrian critical gap, t_c (s)	17.50	17.50	3.00	9.25
Typical pedestrian number in crossing platoon, N_c	7.20	9.07	0.00	1.03
Spatial pedestrian distribution, N_p	-	-	-	2
Group critial gap,	-	-	-	10.65
Vehicular flow rate, V	0.32	0.32	0.00	0.01
Average pedestrian delay, D	-	-	-	0.45
Pedestrain Delay LOS	**No Crosswalk**	**No Crosswalk**	**No Crosswalk**	**A**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/21/2008
Project #	2005014

Site Information

Intersection	Canal Street/Valenti Way
Condition	BUILD
Period	AM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Valenti Way	152	0.04	62	0.02
Valenti Way	186	0.05	128	0.04
Canal Street	604	0.17	113	0.03
Canal Street	117	0.03	25	0.01

Geometric Inputs

Crosswalk East Width, W_e (ft.)	10
Crosswalk West Width, W_w (ft.)	10
Crosswalk North Width, W_n (ft.)	10
Crosswalk South Width, W_s (ft.)	10
Crosswalk East Length, L_e (ft.)	32
Crosswalk West Length, L_w (ft.)	26
Crosswalk North Length, L_n (ft.)	28
Crosswalk South Length, L_s (ft.)	23

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	32	26	28	23
Single pedestrian critical gap, t_c (s)	11.00	9.50	10.00	8.75
Typical pedestrian number in crossing platoon, N_c	1.04	1.08	1.18	1.01
Spatial pedestrian distribution, N_p	2	2	2	2
Group critial gap,	12.40	10.90	11.60	10.15
Vehicular flow rate, V	0.02	0.04	0.03	0.01
Average pedestrian delay, D	1.42	2.41	2.39	0.37
Pedestrain Delay LOS	**A**	**A**	**A**	**A**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/21/2008
Project #	2005014

Site Information

Intersection	Causeway Street/Beverly Street
Condition	BUILD
Period	AM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Causeway Street	32	0.01	1165	0.32
Causeway Street	16	0.00	1446	0.40
0	0	0.00	0	0.00
Beverly Street	455	0.13	313	0.09

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	0
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	10
Crosswalk East Length, L_e (ft.)	68
Crosswalk West Length, L_w (ft.)	68
Crosswalk North Length, L_n (ft.)	0
Crosswalk South Length, L_s (ft.)	30

Crosswalk Time-Space Analysis

	Crosswalk East	**Crosswalk West**	**Crosswalk North**	**Crosswalk South**
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	68	68	0	30
Single pedestrian critical gap, t_c (s)	20.00	20.00	3.00	10.50
Typical pedestrian number in crossing platoon, N_c	18.11	34.63	0.00	1.58
Spatial pedestrian distribution, N_p	-	-	-	2
Group critial gap,	-	-	-	12.70
Vehicular flow rate, V	0.32	0.40	0.00	0.09
Average pedestrian delay, D	-	-	-	10.50
Pedestrain Delay LOS	**No Crosswalk**	**No Crosswalk**	**No Crosswalk**	**C**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/21/2008
Project #	2005014

Site Information

Intersection	Valenti Way/Haverhill Street
Condition	BUILD
Period	AM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Valenti Way	0	0.00	385	0.11
Valenti Way	0	0.00	202	0.06
Haverhill Street	473	0.13	183	0.05
0	0	0.00	0	0.00

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	0
Crosswalk North Width, W_n (ft.)	10
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	0
Crosswalk West Length, L_w (ft.)	0
Crosswalk North Length, L_n (ft.)	28
Crosswalk South Length, L_s (ft.)	0

Crosswalk Time-Space Analysis

	Crosswalk East	**Crosswalk West**	**Crosswalk North**	**Crosswalk South**
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	0	0	28	0
Single pedestrian critical gap, t_c (s)	3.00	3.00	10.00	3.00
Typical pedestrian number in crossing platoon, N_c	1.00	1.00	1.27	0.00
Spatial pedestrian distribution, N_p	-	-	2	-
Group critial gap,	-	-	11.80	-
Vehicular flow rate, V	0.11	0.06	0.05	0.00
Average pedestrian delay, D	-	-	4.37	-
Pedestrain Delay LOS	**No Crosswalk**	**No Crosswalk**	**A**	**No Crosswalk**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/21/2008
Project #	2005014

Site Information

Intersection	Beverly Street/West Site Driveway
Condition	BUILD
Period	AM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
West Site Driveway	259	0.07	113	0.03
0	0	0.00	0	0.00
Beverly Street	0	0.00	313	0.09
Beverly Street	0	0.00	268	0.07

Geometric Inputs

Crosswalk East Width, W_e (ft.)	12
Crosswalk West Width, W_w (ft.)	0
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	24
Crosswalk West Length, L_w (ft.)	0
Crosswalk North Length, L_n (ft.)	0
Crosswalk South Length, L_s (ft.)	0

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	24	0	0	0
Single pedestrian critical gap, t_c (s)	9.00	3.00	3.00	3.00
Typical pedestrian number in crossing platoon, N_c	1.08	#DIV/0!	1.00	0.00
Spatial pedestrian distribution, N_p	2	-	#DIV/0!	-
Group critial gap,	10.17	-	#DIV/0!	-
Vehicular flow rate, V	0.03	0.00	0.09	0.07
Average pedestrian delay, D	1.81	-	#DIV/0!	-
Pedestrain Delay LOS	**A**	**No Crosswalk**	**No Crosswalk**	**No Crosswalk**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/21/2008
Project #	2005014

Site Information

Intersection	Valenti Way/South Site Driveway
Condition	BUILD
Period	AM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Valenti Way	0	0.00	649	0.18
Valenti Way	0	0.00	584	0.16
South Site Driveway	248	0.07	73	0.02
0	0	0.00	0	0.00

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	0
Crosswalk North Width, W_n (ft.)	12
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	0
Crosswalk West Length, L_w (ft.)	0
Crosswalk North Length, L_n (ft.)	24
Crosswalk South Length, L_s (ft.)	0

Crosswalk Time-Space Analysis

	Crosswalk East	**Crosswalk West**	**Crosswalk North**	**Crosswalk South**
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	0	0	24	0
Single pedestrian critical gap, t_c (s)	3.00	3.00	9.00	3.00
Typical pedestrian number in crossing platoon, N_c	1.00	1.00	1.05	0.00
Spatial pedestrian distribution, N_p	-	-	2	-
Group critial gap,	-	-	10.17	-
Vehicular flow rate, V	0.18	0.16	0.02	0.00
Average pedestrian delay, D	-	-	1.12	-
Pedestrain Delay LOS	**No Crosswalk**	**No Crosswalk**	**A**	**No Crosswalk**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/22/2008
Project #	2005014

Site Information

Intersection	North Washington Street/Causeway Street
Condition	BUILD
Period	PM PEAK HOUR

Inputs

Cycle length, C (sec.) 150

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Commercial Street	87	63	V_e	61	0.02	3
Causeway Street	87	63	V_w	46	0.01	2
N Washington Street	63	87	V_n	32	0.01	1
N Washington Street	63	87	V_s	137	0.04	6

Geometric Inputs

Crosswalk East Width, W_e (ft.)	12
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	12
Crosswalk South Width, W_s (ft.)	12
Crosswalk East Length, L_e (ft.)	89
Crosswalk West Length, L_w (ft.)	79
Crosswalk North Length, L_n (ft.)	84
Crosswalk South Length, L_s (ft.)	90

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	13.2	13.2	25.2	25.2
Pedestrian Delay LOS	**B**	**B**	**C**	**C**
Number of peds arriving during Don't Walk, N_{ped} (p)	0.53375	0.4025	0.386666667	1.655416667
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	25.57009375	23.0405625	24.287	26.07246875
Total time-space, TS (ft^2-s)	81034.5	73114.5	52920	55890
Total crosswalk occupancy time, T (p-s)	65	44	32	149
Number of conflicting right-turning vehicles, N_{tv} (veh)	26	0	14	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	12540	120	6660	0
Effective time-space, TS_E (ft^2-s)	68494.5	72994.5	46260	55890
Circulation area per pedestrian, M (ft^2/p)	1053.9	1652.9	1428.5	375.5
Pedestrian Circulation Area LOS	**A**	**A**	**A**	**A**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)

Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/22/2008
Project #	2005014

Site Information

Intersection	North Washington Street/Thacher Street/Valenti Way
Condition	BUILD
Period	PM PEAK HOUR

Inputs

Cycle length, C (sec.) 100

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Thacher Street	100	0	V_e	164	0.05	5
Valenti Way	100	0	V_w	72	0.02	2
N. Washington	27	73	V_n	313	0.09	9
N. Washington	0	100	V_s	0	0.00	0

Geometric Inputs

Crosswalk East Width, W_e (ft.)	12
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	12
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	25
Crosswalk West Length, L_w (ft.)	52
Crosswalk North Length, L_n (ft.)	70
Crosswalk South Length, L_s (ft.)	0

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	0.0	0.0	26.6	50.0
Pedestrian Delay LOS	**A**	**A**	**C**	**No Crosswalk**
Number of peds arriving during Don't Walk, N_{ped} (p)	0	0	3.173472222	0
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	9.45	16.2	21.41403125	3.2
Total time-space, TS (ft^2-s)	29062.5	58344	15330	0
Total crosswalk occupancy time, T (p-s)	43	32	186	0
Number of conflicting right-turning vehicles, N_{tv} (veh)	0	0	0	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	0	0	0	0
Effective time-space, TS_E (ft^2-s)	29062.5	58344	15330	0
Circulation area per pedestrian, M (ft^2/p)	675.1	1800.7	82.3	-
Pedestrian Circulation Area LOS	**A**	**A**	**A**	**No Crosswalk**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/22/2008
Project #	2005014

Site Information

Intersection	North Washington Street/Beverly Street
Condition	BUILD
Period	PM PEAK HOUR

Inputs

Cycle length, C (sec.) 100

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
0	0	100	V_e	0	0.00	0
Beverly Street	49	51	V_w	77	0.02	2
North Washington Street	53	47	V_n	170	0.05	5
North Washington Street	0	100	V_s	18	0.01	1

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	12
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	0
Crosswalk West Length, L_w (ft.)	38
Crosswalk North Length, L_n (ft.)	57
Crosswalk South Length, L_s (ft.)	0

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	50.0	13.0	11.0	50.0
Pedestrian Delay LOS	**No Crosswalk**	**B**	**B**	**No Crosswalk**
Number of peds arriving during Don't Walk, N_{ped} (p)	0	0.545416667	1.109722222	0.25
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	3.2	12.82271875	17.6996875	3.2675
Total time-space, TS (ft^2-s)	0	20178	31378.5	0
Total crosswalk occupancy time, T (p-s)	0	27	84	2
Number of conflicting right-turning vehicles, N_{tv} (veh)	0	0	0	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	0	0	0	0
Effective time-space, TS_E (ft^2-s)	0	20178	31378.5	0
Circulation area per pedestrian, M (ft^2/p)	-	735.7	>60	-
Pedestrian Circulation Area LOS	**No Crosswalk**	**A**	**A**	**No Crosswalk**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/22/2008
Project #	2005014

Site Information

Intersection	N. Washington & Cooper & Cross
Condition	BUILD
Period	PM PEAK HOUR

Inputs

Cycle length, C (sec.) 100

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Cooper	86	14	V_e	127	0.04	4
Sumner Tunnel	67	33	V_w	250	0.07	7
N. Washington	0	100	V_n	0	0.00	0
Cross	47	53	V_s	176	0.05	5

Geometric Inputs

Crosswalk East Width, W_e (ft.)	12
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	10
Crosswalk East Length, L_e (ft.)	26
Crosswalk West Length, L_w (ft.)	26
Crosswalk North Length, L_n (ft.)	0
Crosswalk South Length, L_s (ft.)	24

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	1.0	5.4	50.0	14.0
Pedestrian Delay LOS	**A**	**A**	**No Crosswalk**	**B**
Number of peds arriving during Don't Walk, N_{ped} (p)	0.246944444	1.145833333	0	1.295555556
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	9.7555625	9.9578125	3.2	9.5498
Total time-space, TS (ft^2-s)	25818	19890	0	10560
Total crosswalk occupancy time, T (p-s)	34	69	0	47
Number of conflicting right-turning vehicles, N_{tv} (veh)	0	0	0	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	0	0	0	0
Effective time-space, TS_E (ft^2-s)	25818	19890	0	10560
Circulation area per pedestrian, M (ft^2/p)	750.2	287.6	#DIV/0!	226.2
Pedestrian Circulation Area LOS	**A**	**A**	**No Crosswalk**	**A**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/22/2008
Project #	2005014

Site Information

Intersection	New Chardon Street/Surface Road/Off-ramp
Condition	BUILD
Period	PM PEAK HOUR

Inputs

Cycle length, C (sec.) 100

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Off Ramps	54	46	V_e	0	0.00	0
New Chardon	54	46	V_w	276	0.08	8
Surface Artery	66	34	V_n	26	0.01	1
Surface Artery	66	34	V_s	0	0.00	0

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	12
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	0
Crosswalk West Length, L_w (ft.)	119
Crosswalk North Length, L_n (ft.)	48
Crosswalk South Length, L_s (ft.)	0

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	10.6	10.6	5.8	5.8
Pedestrian Delay LOS	**No Crosswalk**	**B**	**A**	**No Crosswalk**
Number of peds arriving during Don't Walk, N_{ped} (p)	0	1.763333333	0.122777778	0
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	3.2	33.34675	15.227625	3.2
Total time-space, TS (ft^2-s)	0	55870.5	34560	0
Total crosswalk occupancy time, T (p-s)	0	256	11	0
Number of conflicting right-turning vehicles, N_{tv} (veh)	0	0	0	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	0	0	0	0
Effective time-space, TS_E (ft^2-s)	0	55870.5	34560	0
Circulation area per pedestrian, M (ft^2/p)		218.5	3142.5	
Pedestrian Circulation Area LOS	**No Crosswalk**	**A**	**A**	**No Crosswalk**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/22/2008
Project #	2005014

Site Information

Intersection	Causeway Street/Haverhill Street/Legends Way
Condition	BUILD
Period	PM PEAK HOUR

Inputs

Cycle length, C (sec.) 100

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Causeway Street	47	53	V_e	301	0.08	8
Causeway Street	47	53	V_w	110	0.03	3
Legends Way	75	25	V_n	405	0.11	11
Haverhill Street	75	25	V_s	526	0.15	15

Geometric Inputs

Crosswalk East Width, W_e (ft.)	10
Crosswalk West Width, W_w (ft.)	10
Crosswalk North Width, W_n (ft.)	10
Crosswalk South Width, W_s (ft.)	10
Crosswalk East Length, L_e (ft.)	72
Crosswalk West Length, L_w (ft.)	80
Crosswalk North Length, L_n (ft.)	35
Crosswalk South Length, L_s (ft.)	25

Crosswalk Time-Space Analysis

	Crosswalk East	**Crosswalk West**	**Crosswalk North**	**Crosswalk South**
Average delay, d_p (s)	14.0	14.0	3.1	3.1
Pedestrian Delay LOS	**B**	**B**	**A**	**A**
Number of peds arriving during Don't Walk, N_{ped} (p)	2.215694444	0.809722222	1.40625	1.826388889
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	21.7982375	23.418625	12.3296875	9.943125
Total time-space, TS (ft^2-s)	27360	29600	24718.75	17968.75
Total crosswalk occupancy time, T (p-s)	182	72	139	145
Number of conflicting right-turning vehicles, N_{tv} (veh)	0	0	0	1
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	33.33333333	0	133.3333333	244.4444444
Effective time-space, TS_E (ft^2-s)	27326.66667	29600	24585.41667	17724.30556
Circulation area per pedestrian, M (ft^2/p)	149.9	413.7	177.2	122.0
Pedestrian Circulation Area LOS	**A**	**A**	**A**	**A**

Crosswalk Analysis at Signalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/22/2008
Project #	2005014

Site Information

Intersection	Beverly Street/Valenti Way
Condition	BUILD
Period	PM PEAK HOUR

Inputs

Cycle length, C (sec.) 100

	Effective green	Red phase		(ped/hour)	(ped/sec.)	(ped/C)
Valenti Way	52	48	V_e	112	0.03	3
Valenti Way	52	48	V_w	182	0.05	5
Beverly Street	64	36	V_n	581	0.16	16
Beverly Street	16	84	V_s	75	0.02	2

Geometric Inputs

Crosswalk East Width, W_e (ft.)	11
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	12
Crosswalk South Width, W_s (ft.)	12
Crosswalk East Length, L_e (ft.)	38
Crosswalk West Length, L_w (ft.)	30
Crosswalk North Length, L_n (ft.)	35
Crosswalk South Length, L_s (ft.)	40

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average delay, d_p (s)	11.5	11.5	6.5	35.3
Pedestrian Delay LOS	**B**	**B**	**A**	**D**
Number of peds arriving during Don't Walk, N_{ped} (p)	0.746666667	1.213333333	2.905	0.875
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Total crossing time, t (s)	12.88327273	10.973	12.603625	13.396875
Total time-space, TS (ft^2-s)	19750.5	17370	25042.5	5280
Total crosswalk occupancy time, T (p-s)	40	55	203	28
Number of conflicting right-turning vehicles, N_{tv} (veh)	0	0	4	0
Time-space of right-turning vehicles, TS_{tv} (ft^2-s)	0	0	1720	0
Effective time-space, TS_E (ft^2-s)	19750.5	17370	23322.5	5280
Circulation area per pedestrian, M (ft^2/p)	492.8	313.1	114.7	189.2
Pedestrian Circulation Area LOS	**A**	**A**	**A**	**A**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/22/2008
Project #	2005014

Site Information

Intersection	North Washington Street/Endicott Street
Condition	BUILD
Period	PM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Endicott Street	4	0.00	14	0.00
0	0	0.00	0	0.00
North Washington Stre	0	0.00	1882	0.52
North Washington Stre	0	0.00	1878	0.52

Geometric Inputs

Crosswalk East Width, W_e (ft.)	10
Crosswalk West Width, W_w (ft.)	0
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	29
Crosswalk West Length, L_w (ft.)	0
Crosswalk North Length, L_n (ft.)	90
Crosswalk South Length, L_s (ft.)	90

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	29	0	90	90
Single pedestrian critical gap, t_c (s)	10.25	3.00	25.50	25.50
Typical pedestrian number in crossing platoon, N_c	1.00	0.00	0.00	0.00
Spatial pedestrian distribution, N_p	2	-	-	-
Group critial gap,	11.65	-	-	-
Vehicular flow rate, V	0.00	0.00	0.00	0.52
Average pedestrian delay, D	0.27	-	-	-
Pedestrain Delay LOS	**A**	**No Crosswalk**	**No Crosswalk**	**No Crosswalk**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/22/2008
Project #	2005014

Site Information

Intersection	North Washington Street/Medford Street
Condition	BUILD
Period	PM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
0	0	0.00	0	0.00
Medford Street	78	0.02	21	0.01
N Washington Street	5	0.00	1878	0.52
N Washington Street	4	0.00	1861	0.52

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	0
Crosswalk West Length, L_w (ft.)	46
Crosswalk North Length, L_n (ft.)	80
Crosswalk South Length, L_s (ft.)	80

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	0	46	80	80
Single pedestrian critical gap, t_c (s)	3.00	14.50	23.00	23.00
Typical pedestrian number in crossing platoon, N_c	0.00	1.01	432.42	313.60
Spatial pedestrian distribution, N_p	-	2	-	-
Group critial gap,	-	15.67	-	-
Vehicular flow rate, V	0.00	0.01	0.52	0.52
Average pedestrian delay, D	-	0.74	-	-
Pedestrain Delay LOS	**No Crosswalk**	**A**	**No Crosswalk**	**No Crosswalk**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/22/2008
Project #	2005014

Site Information

Intersection	Causeway Street/Canal Street
Condition	BUILD
Period	PM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Causeway Street	1045	0.29	1366	0.38
Causeway Street	425	0.12	1278	0.36
0	0	0.00	0	0.00
Canal Street	963	0.27	256	0.07

Geometric Inputs

Crosswalk East Width, W_e (ft.)	12
Crosswalk West Width, W_w (ft.)	12
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	10
Crosswalk East Length, L_e (ft.)	84
Crosswalk West Length, L_w (ft.)	77
Crosswalk North Length, L_n (ft.)	0
Crosswalk South Length, L_s (ft.)	22

Crosswalk Time-Space Analysis

	Crosswalk East	**Crosswalk West**	**Crosswalk North**	**Crosswalk South**
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	84	77	0	22
Single pedestrian critical gap, t_c (s)	24.00	22.25	3.00	8.50
Typical pedestrian number in crossing platoon, N_c	3907.46	672.35	0.00	1.47
Spatial pedestrian distribution, N_p	2606	449	-	2
Group critial gap,	5233.67	918.42	-	10.50
Vehicular flow rate, V	0.38	0.36	0.00	0.07
Average pedestrian delay, D	>45	>45	-	5.11
Pedestrain Delay LOS	**F**	**F**	**No Crosswalk**	**B**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/22/2008
Project #	2005014

Site Information

Intersection	Causeway Street/Medford Street
Condition	BUILD
Period	PM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Causeway Street	21	0.01	969	0.27
Causeway Street	32	0.01	955	0.27
0	0	0.00	0	0.00
Medford Street	268	0.07	18	0.01

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	0
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	10
Crosswalk East Length, L_e (ft.)	58
Crosswalk West Length, L_w (ft.)	58
Crosswalk North Length, L_n (ft.)	0
Crosswalk South Length, L_s (ft.)	25

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	58	58	0	25
Single pedestrian critical gap, t_c (s)	17.50	17.50	3.00	9.25
Typical pedestrian number in crossing platoon, N_c	3.24	4.19	0.00	1.01
Spatial pedestrian distribution, N_p	-	-	-	2
Group critial gap,	-	-	-	10.65
Vehicular flow rate, V	0.27	0.27	0.00	0.01
Average pedestrian delay, D	-	-	-	0.29
Pedestrain Delay LOS	**No Crosswalk**	**No Crosswalk**	**No Crosswalk**	**A**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/22/2008
Project #	2005014

Site Information

Intersection	Canal Street/Valenti Way
Condition	BUILD
Period	PM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Valenti Way	152	0.04	230	0.06
Valenti Way	144	0.04	193	0.05
Canal Street	466	0.13	219	0.06
Canal Street	137	0.04	42	0.01

Geometric Inputs

Crosswalk East Width, W_e (ft.)	10
Crosswalk West Width, W_w (ft.)	10
Crosswalk North Width, W_n (ft.)	10
Crosswalk South Width, W_s (ft.)	10
Crosswalk East Length, L_e (ft.)	32
Crosswalk West Length, L_w (ft.)	26
Crosswalk North Length, L_n (ft.)	28
Crosswalk South Length, L_s (ft.)	23

Crosswalk Time-Space Analysis

	Crosswalk East	Crosswalk West	Crosswalk North	Crosswalk South
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	32	26	28	23
Single pedestrian critical gap, t_c (s)	11.00	9.50	10.00	8.75
Typical pedestrian number in crossing platoon, N_c	1.18	1.10	1.34	1.02
Spatial pedestrian distribution, N_p	2	2	2	2
Group critial gap,	12.60	10.90	11.80	10.15
Vehicular flow rate, V	0.06	0.05	0.06	0.01
Average pedestrian delay, D	6.76	3.91	5.46	0.63
Pedestrain Delay LOS	**B**	**A**	**B**	**A**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/22/2008
Project #	2005014

Site Information

Intersection	Causeway Street/Beverly Street
Condition	BUILD
Period	PM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Causeway Street	39	0.01	1018	0.28
Causeway Street	26	0.01	1268	0.35
0	0	0.00	0	0.00
Beverly Street	363	0.10	280	0.08

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	0
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	10
Crosswalk East Length, L_e (ft.)	68
Crosswalk West Length, L_w (ft.)	68
Crosswalk North Length, L_n (ft.)	0
Crosswalk South Length, L_s (ft.)	30

Crosswalk Time-Space Analysis

	Crosswalk East	**Crosswalk West**	**Crosswalk North**	**Crosswalk South**
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	68	68	0	30
Single pedestrian critical gap, t_c (s)	20.00	20.00	3.00	10.50
Typical pedestrian number in crossing platoon, N_c	11.32	23.88	0.00	1.43
Spatial pedestrian distribution, N_p	-	-	-	2
Group critial gap,	-	-	-	12.50
Vehicular flow rate, V	0.28	0.35	0.00	0.08
Average pedestrian delay, D	-	-	-	8.63
Pedestrain Delay LOS	**No Crosswalk**	**No Crosswalk**	**No Crosswalk**	**B**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)
Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/22/2008
Project #	2005014

Site Information

Intersection	Valenti Way/Haverhill Street
Condition	BUILD
Period	PM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Valenti Way	0	0.00	283	0.08
Valenti Way	0	0.00	115	0.03
Haverhill Street	479	0.13	168	0.05
0	0	0.00	0	0.00

Geometric Inputs

Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	0
Crosswalk North Width, W_n (ft.)	10
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	0
Crosswalk West Length, L_w (ft.)	0
Crosswalk North Length, L_n (ft.)	28
Crosswalk South Length, L_s (ft.)	0

Crosswalk Time-Space Analysis

	Crosswalk East	**Crosswalk West**	**Crosswalk North**	**Crosswalk South**
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	0	0	28	0
Single pedestrian critical gap, t_c (s)	3.00	3.00	10.00	3.00
Typical pedestrian number in crossing platoon, N_c	1.00	1.00	1.25	0.00
Spatial pedestrian distribution, N_p	-	-	2	-
Group critial gap,	-	-	11.60	-
Vehicular flow rate, V	0.08	0.03	0.05	0.00
Average pedestrian delay, D	-	-	3.79	-
Pedestrain Delay LOS	**No Crosswalk**	**No Crosswalk**	**A**	**No Crosswalk**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)

Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/22/2008
Project #	2005014

Site Information

Intersection	Beverly Street/West Site Driveway
Condition	BUILD
Period	PM PEAK HOUR

Inputs

	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
West Site Driveway	316	0.09	163	0.05
0	0	0.00	0	0.00
Beverly Street	0	0.00	280	0.08
Beverly Street	0	0.00	357	0.10

Geometric Inputs

Crosswalk East Width, W_e (ft.)	12
Crosswalk West Width, W_w (ft.)	0
Crosswalk North Width, W_n (ft.)	0
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	24
Crosswalk West Length, L_w (ft.)	0
Crosswalk North Length, L_n (ft.)	0
Crosswalk South Length, L_s (ft.)	0

Crosswalk Time-Space Analysis

	Crosswalk East	**Crosswalk West**	**Crosswalk North**	**Crosswalk South**
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	24	0	0	0
Single pedestrian critical gap, t_c (s)	9.00	3.00	3.00	3.00
Typical pedestrian number in crossing platoon, N_c	1.15	#DIV/0!	1.00	0.00
Spatial pedestrian distribution, N_p	2	-	-	-
Group critial gap,	10.33	-	-	-
Vehicular flow rate, V	0.05	0.00	0.08	0.10
Average pedestrian delay, D	2.84	-	-	-
Pedestrain Delay LOS	**A**	**No Crosswalk**	**No Crosswalk**	**No Crosswalk**

Crosswalk Analysis at Unsignalized Intersections Worksheet (HCM 2000)

Please Note: Enter data in SHADED cells only

General Information

Analyst	TK
Company	Howard/Stein-Hudson
Date	6/22/2008
Project #	2005014

Site Information

Intersection	Valenti Way/South Site Driveway
Condition	BUILD
Period	PM PEAK HOUR

Inputs

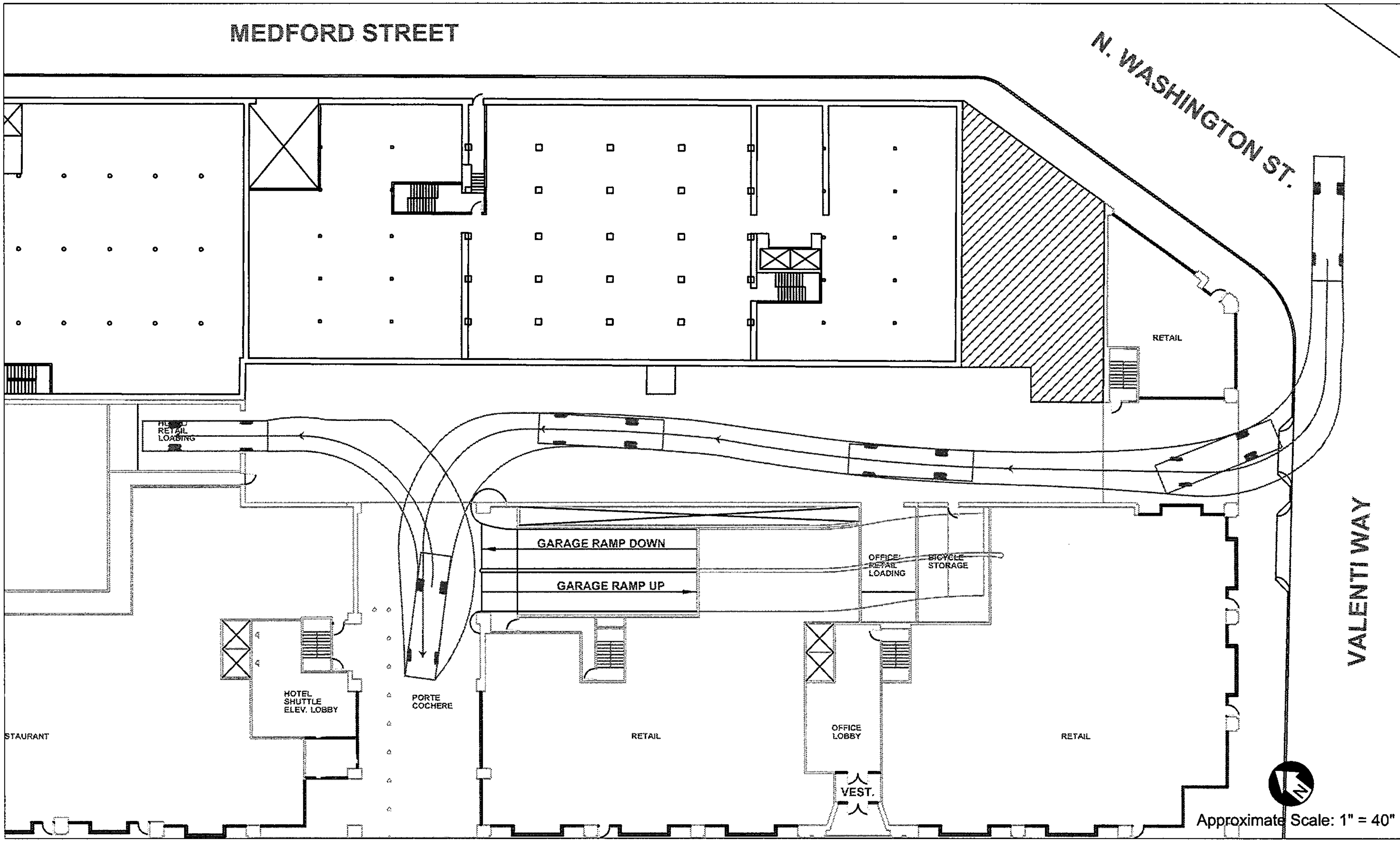
	Ped Volumes		Traffic Volumes	
	(ped/hour)	(ped/sec.)	(veh/hour)	(veh/sec.)
Valenti Way	0	0.00	514	0.14
Valenti Way	0	0.00	504	0.14
South Site Driveway	242	0.07	54	0.02
0	0	0.00	0	0.00

Geometric Inputs

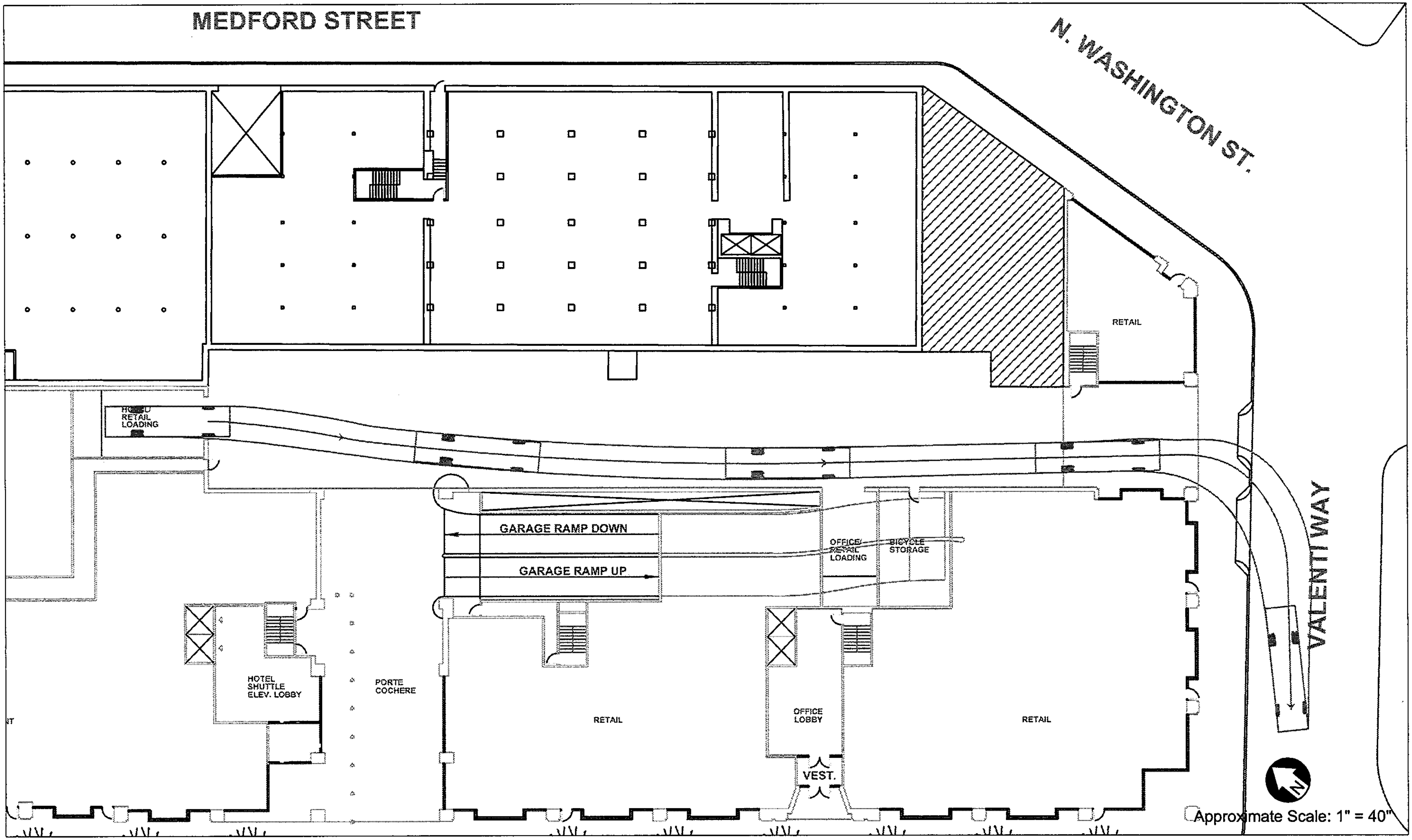
Crosswalk East Width, W_e (ft.)	0
Crosswalk West Width, W_w (ft.)	0
Crosswalk North Width, W_n (ft.)	12
Crosswalk South Width, W_s (ft.)	0
Crosswalk East Length, L_e (ft.)	0
Crosswalk West Length, L_w (ft.)	0
Crosswalk North Length, L_n (ft.)	24
Crosswalk South Length, L_s (ft.)	0

Crosswalk Time-Space Analysis

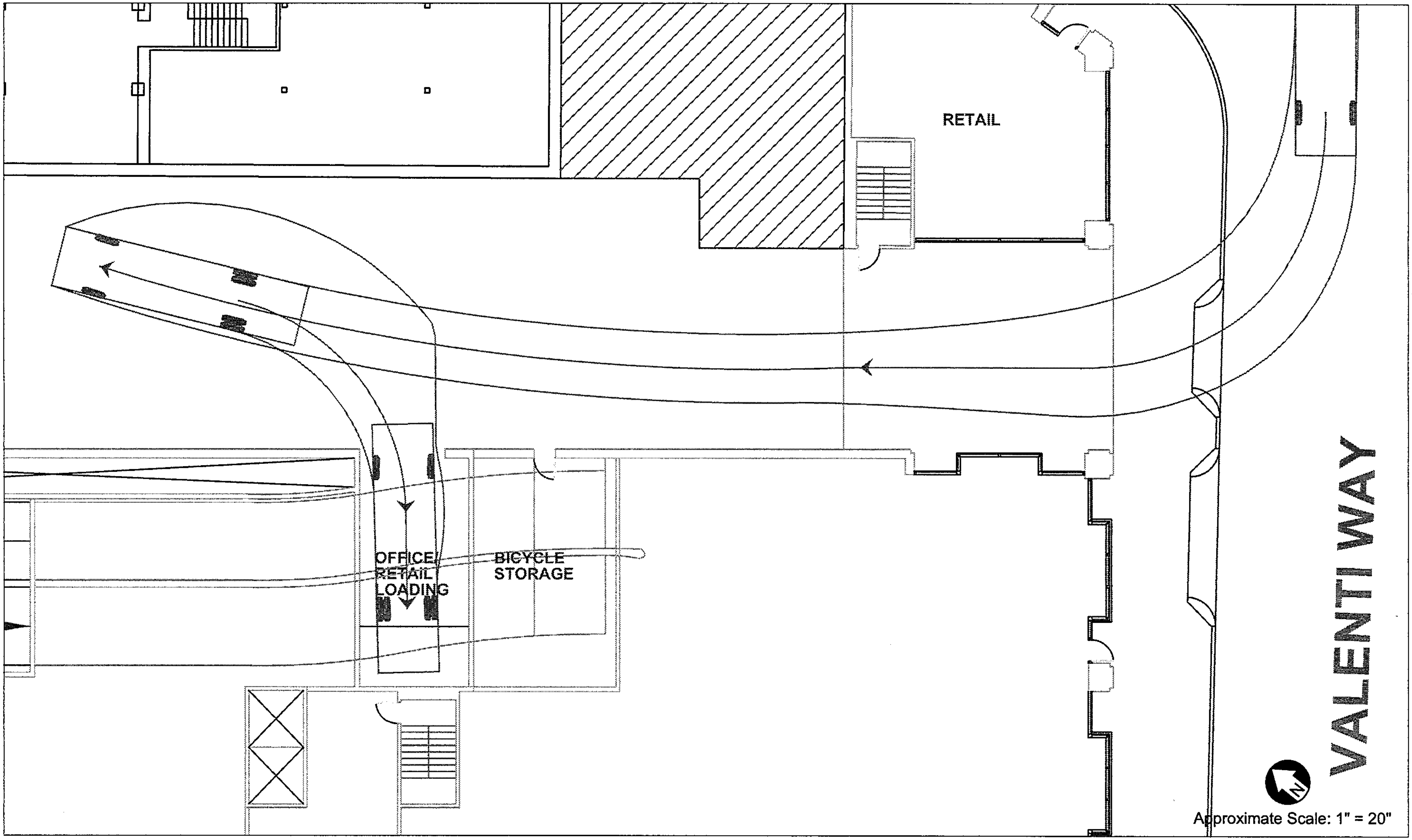
	Crosswalk East	**Crosswalk West**	**Crosswalk North**	**Crosswalk South**
Average pedestrian walking speed, S_p (ft/s)	4.0	4.0	4.0	4.0
Pedestrian start-up time, t (s)	3.0	3.0	3.0	3.0
Length of crosswalk, L (ft)	0	0	24	0
Single pedestrian critical gap, t_c (s)	3.00	3.00	9.00	3.00
Typical pedestrian number in crossing platoon, N_c	1.00	1.00	1.04	0.00
Spatial pedestrian distribution, N_p	-	-	2	-
Group critial gap,	-	-	10.17	-
Vehicular flow rate, V	0.14	0.14	0.02	0.00
Average pedestrian delay, D	-	-	0.82	-
Pedestrain Delay LOS	**No Crosswalk**	**No Crosswalk**	**A**	**No Crosswalk**



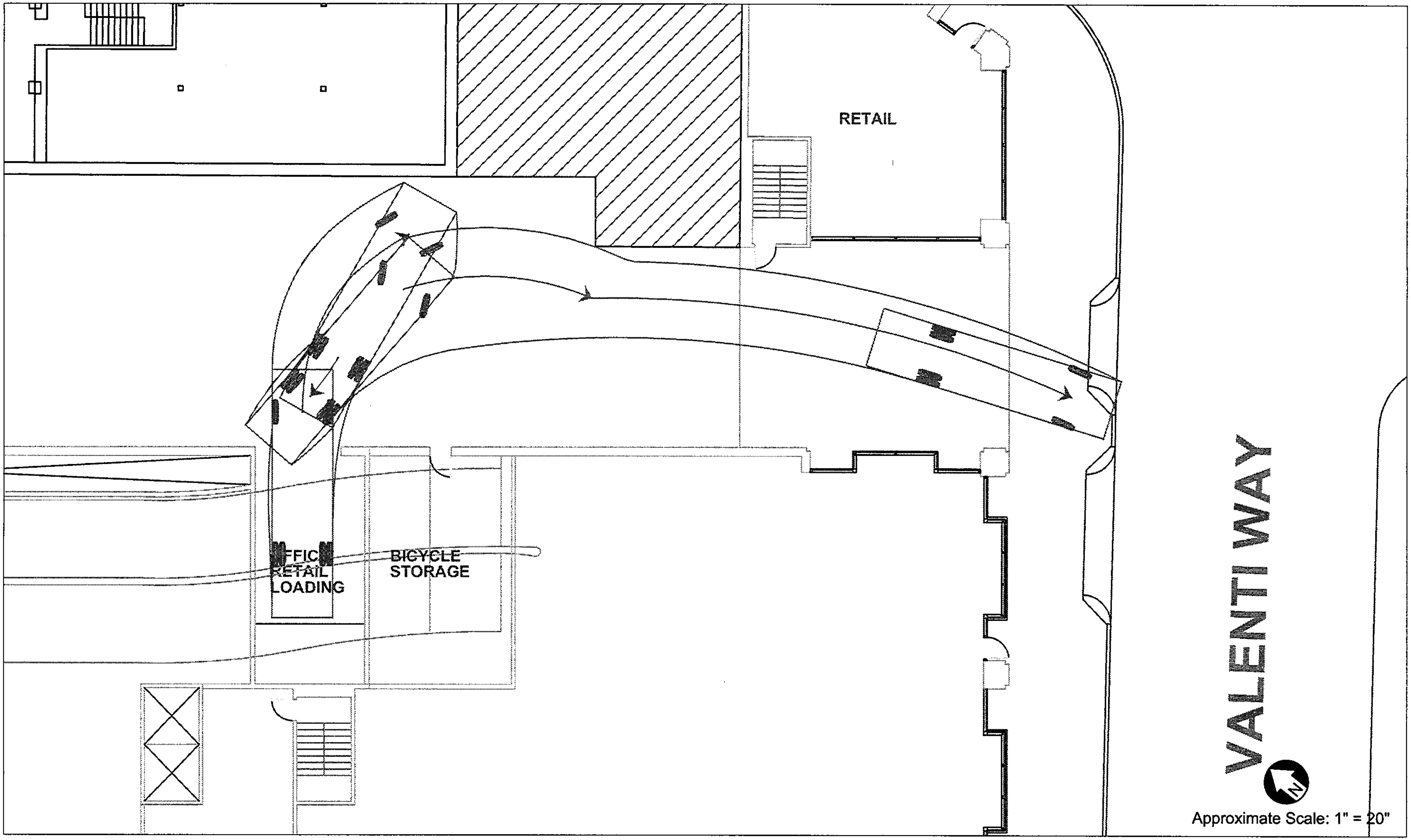
SU-35 Entering Hotel/Restaurant Loading Area



SU-35 Exiting Hotel/Restaurant Loading Area



SU-35 Entering Office/Retail Loading Area



SU-35 Exiting Office/Retail Loading Area

Merano at the Bulfinch Triangle (Parcel 1B) - Proposed

Detailed Trip Generation Estimate

Howard/Stein-Hudson Associates
June 16, 2008

Land Use	Size	Category	Trip Rates (Trips/ksf or unit)	Unadjusted Vehicle Trips	Internal Capture	Less capture trips	Assumed national vehicle occupancy rate[1]	**Converted to Person trips**	Transit Share[2]	**Transit Trips**	Walk/Bike/ Other Share[2]	**Walk/ Bike/ Other Trips**	Vehicle Share[2]	Vehicle Person Trips	Assumed local vehicle occupancy rate[3]	**Total Adjusted Vehicle Trips**
Daily Trip Generation																
***Restaurant*[4]**																
	17.0	Total	89.95	1529	43%	879	2.1	**1,846**	15%	**277**	54%	**997**	31%	572	2.1	**273**
	KSF	In	44.98	765	43%	440	2.1	**923**	15%	**138**	54%	**499**	31%	286	2.1	**136**
		Out	44.98	765	43%	440	2.1	**923**	15%	**138**	54%	**499**	31%	286	2.1	**136**
***Retail*[5]**																
	19.0	Total	121.44	2307	33%	1553	1.8	**2,796**	15%	**419**	54%	**1,509**	31%	867	1.8	**481**
	KSF	In	60.72	1154	33%	776	1.8	**1,398**	15%	**210**	54%	**755**	31%	433	1.8	**241**
		Out	60.72	1154	33%	776	1.8	**1398**	15%	**210**	54%	**755**	31%	433	1.8	**241**
***Hotel*[6]**																
Short-Term Stay	153	Total	8.17	1250	19%	1018	1.8	**1,832**	15%	**275**	54%	**989**	31%	568	1.8	**315**
	Rooms	In	4.09	625	19%	509	1.8	**916**	15%	**137**	54%	**495**	31%	284	1.8	**158**
		Out	4.09	625	19%	509	1.8	**916**	15%	**137**	54%	**495**	31%	284	1.8	**158**
***Hotel*[6]**																
Long-Term Stay	121	Total	8.17	989	19%	805	1.8	**1,448**	15%	**217**	54%	**782**	31%	449	1.8	**249**
	Rooms	In	4.09	494	19%	402	1.8	**724**	15%	**109**	54%	**391**	31%	225	1.8	**125**
		Out	4.09	494	19%	402	1.8	**724**	15%	**109**	54%	**391**	31%	225	1.8	**125**
***Office*[7]**																
	213.0	Total	11.01	2345	5%	2233	1.2	**2,680**	30%	**804**	27%	**724**	43%	1,152	1.2	**960**
	KSF	In	5.51	1173	5%	1117	1.2	**1,340**	30%	**402**	27%	**362**	43%	576	1.2	**480**
		Out	5.51	1173	5%	1117	1.2	**1340**	30%	**402**	27%	**362**	43%	576	1.2	**480**
Total		Total		8,420		6,487		**10,601**		**1,992**		**5,001**		3,608		**2,279**
		In		4,210		3,244		**5,301**		**996**		**2,501**		1,804		**1,140**
		Out		4,210		3,244		**5,301**		**996**		**2,501**		1,804		**1,140**

Notes:

1. 2001 National vehicle occupancy rates - 1.2: Home to work; 1.8: Retail; 2.1: Social and Recreational
2. Mode shares based on 2000 Census data and BTD Data for Area 1
3. Local vehicle occupancy rates based on 2000 Census data and 2001 National VOR.
4. ITE Trip Generation Equation, 7th Edition, LUC 931 (Quality Restaurant)
5. ITE Trip Generation Equation, 7th Edition, LUC 820 (Shopping Center)
6. ITE Trip Generation Rate, 7th Edition, LUC 310 (Hotel)
7. ITE Trip Generation Rate, 7th Edition, LUC 710 (General Office)

Merano at the Bulfinch Triangle (Parcel 1B) - Proposed

Detailed Trip Generation Estimate

Howard/Stein-Hudson Associates
June 16, 2008

Land Use	Size	Category	Trip Rates (Trips/ksf or unit)	Unadjusted Vehicle Trips	Internal Capture	Less capture trips	Assumed national vehicle occupancy rate[1]	Converted to Person trips	Transit Share[2]	Transit Trips	Walk/Bike/ Other Share[2]	Walk/ Bike/ Other Trips	Vehicle Share[2]	Vehicle Person Trips	Assumed local vehicle occupancy rate[3]	Total Adjusted Vehicle Trips
AM Peak Hour Trip Generation																
Restaurant[4]																
	17.0	Total	0.81	14		14	2.1	**29**		**4**		**17**		8	2.1	**4**
	KSF	In	0.66	11		11	2.1	**24**	16%	**4**	57%	**14**	27%	6	2.1	**3**
		Out	0.15	2		2	2.1	**5**	13%	**1**	60%	**3**	27%	1	2.1	**1**
Retail[5]																
	19.0	Total	3.04	58		58	1.8	**104**		**16**		**61**		28	1.8	**16**
	KSF	In	1.86	35		35	1.8	**63**	16%	**10**	57%	**36**	27%	17	1.8	**10**
		Out	1.19	23		23	1.8	**41**	13%	**5**	60%	**24**	27%	11	1.8	**6**
Hotel[6]																
Short-Term Stay	153	Total	0.56	86		86	1.8	**154**		**23**		**90**		42	1.8	**23**
	Rooms	In	0.34	52		52	1.8	**94**	16%	**15**	57%	**54**	27%	25	1.8	**14**
		Out	0.22	33		33	1.8	**60**	13%	**8**	60%	**36**	27%	16	1.8	**9**
Hotel[6]																
Long-Term Stay	121	Total	0.56	68		68	1.8	**122**		**18**		**71**		33	1.8	**18**
	Rooms	In	0.34	41		41	1.8	**74**	16%	**12**	57%	**42**	27%	20	1.8	**11**
		Out	0.22	26		26	1.8	**48**	13%	**6**	60%	**29**	27%	13	1.8	**7**
Office[7]																
	213.0	Total	1.55	330		330	1.2	**396**		**129**		**117**		151	1.2	**125**
	KSF	In	1.36	291		291	1.2	**349**	33%	**115**	29%	**101**	38%	132	1.2	**110**
		Out	0.19	40		40	1.2	**48**	29%	**14**	33%	**16**	38%	18	1.2	**15**
Total		Total		555		555		**805**		**190**		**355**		261		**186**
		In		431		431		**604**		**156**		**247**		202		**148**
		Out		124		124		**201**		**34**		**108**		60		**38**

Notes:

1. 2001 National vehicle occupancy rates - 1.2: Home to work; 1.8: Retail; 2.1: Social and Recreational
2. Mode shares based on 2000 Census data and BTD Data for Area 1
3. Local vehicle occupancy rates based on 2000 Census data and 2001 National VOR.
4. ITE Trip Generation Equation, 7th Edition, LUC 931 (Quality Restaurant)
5. ITE Trip Generation Equation, 7th Edition, LUC 820 (Shopping Center)
6. ITE Trip Generation Rate, 7th Edition, LUC 310 (Hotel)
7. ITE Trip Generation Rate, 7th Edition, LUC 710 (General Office)

Merano at the Bulfinch Triangle (Parcel 1B) - Proposed

Detailed Trip Generation Estimate

Howard/Stein-Hudson Associates
June 16, 2008

Land Use	Size	Category	Trip Rates (Trips/ksf or unit)	Unadjusted Vehicle Trips	Internal Capture	Less capture trips	Assumed national vehicle occupancy rate[1]	**Converted to Person trips**	Transit Share[2]	**Transit Trips**	Walk/Bike/ Other Share[2]	**Walk/ Bike/ Other Trips**	Vehicle Share[2]	Vehicle Person Trips	Assumed local vehicle occupancy rate[3]	**Total Adjusted Vehicle Trips**
PM Peak Hour Trip Generation																
Restaurant[4]																
	17.0	Total	7.49	127	32%	87	2.1	**182**		**25**		**107**		49	2.1	**23**
	KSF	In	5.02	85	31%	59	2.1	**124**	13%	**16**	60%	**74**	27%	33	2.1	**16**
		Out	2.47	42	35%	28	2.1	**58**	16%	**9**	57%	**33**	27%	16	2.1	**7**
Retail[5]																
	19.0	Total	11.01	209	25%	157	1.8	**282**		**41**		**165**		76	1.8	**42**
	KSF	In	5.29	100	19%	81	1.8	**146**	13%	**19**	60%	**88**	27%	40	1.8	**22**
		Out	5.73	109	31%	76	1.8	**136**	16%	**22**	57%	**78**	27%	37	1.8	**20**
Hotel[6]																
Short-Term Stay	153	Total	0.59	90	23%	70	1.8	**125**		**18**		**73**		34	1.8	**19**
	Rooms	In	0.31	48	23%	37	1.8	**66**	13%	**9**	60%	**40**	27%	18	1.8	**10**
		Out	0.28	42	23%	33	1.8	**59**	16%	**9**	57%	**34**	27%	16	1.8	**9**
Hotel[6]																
Long-Term Stay	121	Total	0.59	71	23%	55	1.8	**99**		**14**		**58**		27	1.8	**15**
	Rooms	In	0.31	38	23%	29	1.8	**52**	13%	**7**	60%	**31**	27%	14	1.8	**8**
		Out	0.28	34	23%	26	1.8	**47**	16%	**7**	57%	**27**	27%	13	1.8	**7**
Office[7]																
	213.0	Total	1.49	317	2%	311	1.2	**373**		**121**		**111**		142	1.2	**118**
	KSF	In	0.25	54	6%	51	1.2	**61**	29%	**18**	33%	**20**	38%	23	1.2	**19**
		Out	1.24	263	2%	260	1.2	**312**	33%	**103**	29%	**91**	38%	119	1.2	**99**
Total		Total		816		679		**1,062**		**219**		**515**		328		**218**
		In		325		257		**450**		**68**		**253**		128		**75**
		Out		490		422		**612**		**151**		**261**		200		**143**

Notes:

1. 2001 National vehicle occupancy rates - 1.2: Home to work; 1.8: Retail; 2.1: Social and Recreational
2. Mode shares based on 2000 Census data and BTD Data for Area 1
3. Local vehicle occupancy rates based on 2000 Census data and 2001 National VOR.
4. ITE Trip Generation Equation, 7th Edition, LUC 931 (Quality Restaurant)
5. ITE Trip Generation Equation, 7th Edition, LUC 820 (Shopping Center)
6. ITE Trip Generation Rate, 7th Edition, LUC 310 (Hotel)
7. ITE Trip Generation Rate, 7th Edition, LUC 710 (General Office)

Appendix C

Air Quality Appendix

APPENDIX C AIR QUALITY

Introduction

The Air Quality Appendix C to the Merano-Parcel 1B Project PNF 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 modeling outputs for the EPA MOBILE6 emission model and EPA SCREEN3 model.

Motor Vehicle Emissions

The EPA MOBILE6.2 computer program generated motor vehicle emissions used in the garage analysis along with the CAL3QHC modeling. The model input parameters were based on MA DEP approved inputs as outlined in the Department's February 12, 2003 letter addressing the use of the model in indirect source air quality analyses and any updates since the letter. Emission rates were derived for 2013 for speed limits of 2.5 mph and 25 mph. The 2.5 mph rate was used to determine idle mode emissions conservatively used to estimate garage and loading/unloading dock emissions.

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 321 cm was used. Idle emission rates for queue links were based on 2.5 mph emission rates derived in MOBILE6.2 and converted from grams per mile to grams per hour.

SCREEN3

The EPA SCREEN3 model was used to calculate air quality impacts due to the parking garage vent, and the mechanical equipment. For non-combustion sources, ambient temperature releases were assumed; otherwise temperatures from the exhaust gas were used. Urban dispersion coefficients were used. Building downwash was accounted in the modeling based on the building heights and projected widths of the buildings. The maximum modeled impact from the garage and the heating sources was conservatively added to monitored background values for comparison to the CO NAAQS.

Emissions

Emissions for the heating combustion and emergency generator units were calculated using the latest DEP emission limits for boilers and generators based on the Boiler Environmental Results Program (ERP). The project consists of boilers with a total heat input of 24.6 MMBtu/hr. The total firing rate of 24.6 MMBtu/hr was multiplied by the ERP emission factor for CO of 0.08 lbs/MMBtu. The resulting hourly emission rate in pounds per hour were converted to grams per second and input to the SCREEN3 model. For the other pollutants, a similar approach was conducted for SO2, NOx, and PM. The emergency generator emissions were also calculated based on the emission factors provided in the DEP ERP for a 550 kW size units.

MOBILE6.2 Output

```
*****************************************************************************
* MOBILE6.2.03 (24-Sep-2003)                                                *
* Input file: MA13_BOY.INP (file 1, run 1).                                 *
*****************************************************************************
* *** Summer 2013 ***

* Reading Registration Distributions from the following external
* data file: 2005_REG.D
  M 49 Warning:
                 1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
                0.998     MYR sum not = 1. (will normalize)
  M 49 Warning:
                0.998     MYR sum not = 1. (will normalize)
  M 49 Warning:
                0.998     MYR sum not = 1. (will normalize)
  M 49 Warning:
                 1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
                 1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
                0.999     MYR sum not = 1. (will normalize)
  M 49 Warning:
                0.998     MYR sum not = 1. (will normalize)
  M 49 Warning:
                 1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
                0.999     MYR sum not = 1. (will normalize)
  M 49 Warning:
                 1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
                 1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
                 1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
                 1.00     MYR sum not = 1. (will normalize)

* Reading I/M program description records from the following external
* data file: MA13_IM.D
* I/M program inputs for 2013 calendar year model run
* MA31 Exhaust I/M program for Light Duty pre-1996 MY vehicles <=10,0000 lb GVWR

* Reading non-default I/M CUTPOINTS from the following external
* data file: MA13_CUT.D
* Two-Speed Idle Exhaust I/M program for Heavy Duty vehicles >10,000 lb GVWR
* OBD Exhaust I/M program for Light Duty MY 1996+ vehicles <=10,000 lb GVWR
* Gas Cap Evap I/M program thru CY 2003 for all Light Duty vehicles <=8,500 lb GVWR
* Gas Cap Evap I/M program for all MY Heavy Duty vehicles >8,500 lb GVWR
* OBD + Gas Cap Evap I/M program for MY 1996 - 2003 Light Duty vehicles <=8,500 lb GVWR starting 2004
* OBD Evap I/M program for MY 2004+
  M601 Comment:
              User has enabled STAGE II REFUELING.


* Reading 94+ LEV IMPLEMENTATION SCHEDULE from the following external
* data file: MA_LEV2.D

  Reading User Supplied Tier2 Exhaust bin phase-in fractions

     Data read from file: LEV2EXH.D


  Reading User Supplied Tier2 EVAP phase-in fractions

     Data read from file: LEV2EVAP.D


  Reading User Supplied Tier2 50K certification standards

     Data read from file: LEV2CERT.D

  M616 Comment:
              User has supplied post-1999 sulfur levels.
  M614 Comment:
              User supplied diesel sale fractions.

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2013 DEFAULT SPEED - Summer
* File 1, Run 1, Scenario 1.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
*** I/M credits for Tech1&2 vehicles were read from the following external
    data file: TECH12.D
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
 HDDV DEFEAT DEVICE EFFECTS ARE PRESENT. THE REBUILD FRACTION IS 0.10.

 LEV phase-in data read from file MA_LEV2.D
                   Calendar Year:  2013
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  68.0 (F)
             Maximum Temperature:  94.0 (F)
               Absolute Humidity:   75. grains/lb
             Fuel Sulfur Content:   30. ppm
```

```
          Exhaust I/M Program:  Yes
             Evap I/M Program:  Yes
                  ATP Program:  Yes
            Reformulated Gas:   Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34     LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:               <6000     >6000     (All)
                        ------   ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:     0.2983   0.4117    0.1620              0.0369    0.0001    0.0015    0.0857    0.0038    1.0000
 ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :     0.330    0.277     0.334     0.293     0.375     0.192     0.165     0.311      3.74     0.322
     Composite CO  :     4.51     4.48      4.83      4.58      6.36      1.413     0.424     0.929     17.09     4.350
     Composite NOX :     0.267    0.273     0.398     0.308     0.922     0.433     0.220     4.300      1.27     0.664
 ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2013 Idle Scenario - Summer (multiply g/mi by 2.5 mph to get g/hr)
* File 1, Run 1, Scenario 2.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
 M583 Warning:
           The user supplied arterial average speed of  2.5
           will be used for all hours of the day.  100% of VMT
           has been assigned to the arterial/collector roadway
           type for all hours of the day and all vehicle types.
 M 48 Warning:
             there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                  Calendar Year:  2013
                          Month:  July
                       Altitude:  Low
            Minimum Temperature:  68.0 (F)
            Maximum Temperature:  94.0 (F)
              Absolute Humidity:   75. grains/lb
            Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34     LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:               <6000     >6000     (All)
                        ------   ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:     0.2983   0.4117    0.1620              0.0369    0.0001    0.0015    0.0857    0.0038    1.0000
 ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :     2.344    1.786     1.999     1.846     2.684     0.443     0.394     0.963     12.03     1.986
     Composite CO  :    12.84    11.20     12.11     11.46     29.47      4.148     1.357     4.120    119.90    12.298
     Composite NOX :     0.620    0.531     0.766     0.597     0.675     0.698     0.355     6.699      1.12     1.132
 ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2013 25 MPH Scenario - Summer
* File 1, Run 1, Scenario 3.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
 M583 Warning:
           The user supplied arterial average speed of 25.0
           will be used for all hours of the day.  100% of VMT
           has been assigned to the arterial/collector roadway
           type for all hours of the day and all vehicle types.
 M 48 Warning:
             there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                  Calendar Year:  2013
                          Month:  July
                       Altitude:  Low
            Minimum Temperature:  68.0 (F)
            Maximum Temperature:  94.0 (F)
              Absolute Humidity:   75. grains/lb
            Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34     LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:               <6000     >6000     (All)
                        ------   ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:     0.2983   0.4117    0.1620              0.0369    0.0001    0.0015    0.0857    0.0038    1.0000
 ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :     0.330    0.275     0.334     0.292     0.399     0.213     0.185     0.367      3.79     0.327
     Composite CO  :     4.01     3.99      4.33      4.09      6.42      1.473     0.445     0.999     16.90     3.927
     Composite NOX :     0.273    0.274     0.401     0.310     0.833     0.377     0.191     3.637      1.12     0.606
 ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2013 30 MPH Scenario - Summer
* File 1, Run 1, Scenario 4.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
 M583 Warning:
```

The user supplied arterial average speed of 30.0
will be used for all hours of the day. 100% of VMT
has been assigned to the arterial/collector roadway
type for all hours of the day and all vehicle types.

M 48 Warning:
there are no sales for vehicle class HDGV8b

LEV phase-in data read from file MA_LEV2.D

Calendar Year:	2013
Month:	July
Altitude:	Low
Minimum Temperature:	68.0 (F)
Maximum Temperature:	94.0 (F)
Absolute Humidity:	75. grains/lb
Fuel Sulfur Content:	30. ppm
Exhaust I/M Program:	Yes
Evap I/M Program:	Yes
ATP Program:	Yes
Reformulated Gas:	Yes

Vehicle Type: GVWR:	LDGV	LDGT12 <6000	LDGT34 >6000	LDGT (All)	HDGV	LDDV	LDDT	HDDV	MC	All Veh
VMT Distribution:	0.2983	0.4117	0.1620		0.0369	0.0001	0.0015	0.0857	0.0038	1.0000
Composite Emission Factors (g/mi):										
Composite VOC :	0.313	0.261	0.317	0.277	0.354	0.193	0.166	0.315	3.59	0.306
Composite CO :	3.96	3.95	4.28	4.04	5.32	1.325	0.394	0.826	14.61	3.825
Composite NOX :	0.257	0.262	0.385	0.297	0.868	0.361	0.183	3.488	1.18	0.583

```
**************************************************************************
* MOBILE6.2.03 (24-Sep-2003)                                             *
* Input file: MA13_BOY.INP (file 1, run 2).                              *
**************************************************************************
* *** Winter 2013 ***

* Reading Registration Distributions from the following external
* data file: 2005_REG.D
  M 49 Warning:
              1.00      MYR sum not = 1. (will normalize)
  M 49 Warning:
             0.998      MYR sum not = 1. (will normalize)
  M 49 Warning:
             0.998      MYR sum not = 1. (will normalize)
  M 49 Warning:
             0.998      MYR sum not = 1. (will normalize)
  M 49 Warning:
              1.00      MYR sum not = 1. (will normalize)
  M 49 Warning:
              1.00      MYR sum not = 1. (will normalize)
  M 49 Warning:
             0.999      MYR sum not = 1. (will normalize)
  M 49 Warning:
             0.998      MYR sum not = 1. (will normalize)
  M 49 Warning:
              1.00      MYR sum not = 1. (will normalize)
  M 49 Warning:
             0.999      MYR sum not = 1. (will normalize)
  M 49 Warning:
              1.00      MYR sum not = 1. (will normalize)
  M 49 Warning:
              1.00      MYR sum not = 1. (will normalize)
  M 49 Warning:
              1.00      MYR sum not = 1. (will normalize)
  M 49 Warning:
              1.00      MYR sum not = 1. (will normalize)

* Reading I/M program description records from the following external
* data file: MA13_IM.D
* I/M program inputs for 2013 calendar year model run
* MA31 Exhaust I/M program for Light Duty pre-1996 MY vehicles <=10,0000 lb GVWR

* Reading non-default I/M CUTPOINTS from the following external
* data file: MA13_CUT.D
* Two-Speed Idle Exhaust I/M program for Heavy Duty vehicles >10,000 lb GVWR
* OBD Exhaust I/M program for Light Duty MY 1996+ vehicles <=10,000 lb GVWR
* Gas Cap Evap I/M program thru CY 2003 for all Light Duty vehicles <=8,500 lb GVWR
* Gas Cap Evap I/M program for all MY Heavy Duty vehicles >8,500 lb GVWR
* OBD + Gas Cap Evap I/M program for MY 1996 - 2003 Light Duty vehicles <=8,500 lb GVWR starting 2004
* OBD Evap I/M program for MY 2004+
  M601 Comment:
             User has enabled STAGE II REFUELING.

* Reading 94+ LEV IMPLEMENTATION SCHEDULE from the following external
* data file: MA_LEV2.D

  Reading User Supplied Tier2 Exhaust bin phase-in fractions

     Data read from file: LEV2EXH.D

  Reading User Supplied Tier2 EVAP phase-in fractions
```

Data read from file: LEV2EVAP.D

Reading User Supplied Tier2 50K certification standards

Data read from file: LEV2CERT.D

M616 Comment:
User has supplied post-1999 sulfur levels.
M614 Comment:
User supplied diesel sale fractions.

* #
* 2013 DEFAULT SPEED - Winter
* File 1, Run 2, Scenario 1.
* #
M112 Warning:
Wintertime Reformulated Gasoline Rules Apply
*** I/M credits for Tech1&2 vehicles were read from the following external
data file: TECH12.D
M 48 Warning:
there are no sales for vehicle class HDGV8b
HDDV DEFEAT DEVICE EFFECTS ARE PRESENT. THE REBUILD FRACTION IS 0.10.

LEV phase-in data read from file MA_LEV2.D
Calendar Year: 2013
Month: Jan.
Altitude: Low
Minimum Temperature: 35.0 (F)
Maximum Temperature: 45.0 (F)
Absolute Humidity: 75. grains/lb
Fuel Sulfur Content: 30. ppm

Exhaust I/M Program: Yes
Evap I/M Program: Yes
ATP Program: Yes
Reformulated Gas: Yes

Vehicle Type: GVWR:	LDGV	LDGT12 <6000	LDGT34 >6000	LDGT (All)	HDGV	LDDV	LDDT	HDDV	MC	All Veh
VMT Distribution:	0.3031	0.4092	0.1608		0.0365	0.0002	0.0015	0.0851	0.0037	1.0000
Composite Emission Factors (g/mi):										
Composite VOC :	0.329	0.289	0.378	0.314	0.384	0.187	0.171	0.318	3.35	0.332
Composite CO :	10.34	9.62	9.79	9.67	7.80	1.385	0.430	0.993	15.79	9.073
Composite NOX :	0.280	0.311	0.469	0.356	1.069	0.429	0.234	4.656	1.68	0.730

* #
* 2013 Idle Scenario - Winter (multiply g/mi by 2.5 mph to get g/hr)
* File 1, Run 2, Scenario 2.
* #
M583 Warning:
The user supplied arterial average speed of 2.5
will be used for all hours of the day. 100% of VMT
has been assigned to the arterial/collector roadway
type for all hours of the day and all vehicle types.
M112 Warning:
Wintertime Reformulated Gasoline Rules Apply
M 48 Warning:
there are no sales for vehicle class HDGV8b

LEV phase-in data read from file MA_LEV2.D
Calendar Year: 2013
Month: Jan.
Altitude: Low
Minimum Temperature: 35.0 (F)
Maximum Temperature: 45.0 (F)
Absolute Humidity: 75. grains/lb
Fuel Sulfur Content: 30. ppm

Exhaust I/M Program: Yes
Evap I/M Program: Yes
ATP Program: Yes
Reformulated Gas: Yes

Vehicle Type: GVWR:	LDGV	LDGT12 <6000	LDGT34 >6000	LDGT (All)	HDGV	LDDV	LDDT	HDDV	MC	All Veh
VMT Distribution:	0.3031	0.4092	0.1608		0.0365	0.0002	0.0015	0.0851	0.0037	1.0000
Composite Emission Factors (g/mi):										
Composite VOC :	2.372	1.782	2.083	1.867	3.015	0.434	0.409	0.983	11.36	2.020
Composite CO :	20.61	19.08	20.45	19.46	36.17	4.093	1.379	4.404	100.99	19.416
Composite NOX :	0.520	0.570	0.854	0.650	0.782	0.692	0.378	7.251	1.48	1.180

* #
* 2013 25 MPH Scenario - Winter
* File 1, Run 2, Scenario 3.
* #
M583 Warning:
The user supplied arterial average speed of 25.0
will be used for all hours of the day. 100% of VMT

has been assigned to the arterial/collector roadway
type for all hours of the day and all vehicle types.

M112 Warning:
Wintertime Reformulated Gasoline Rules Apply

M 48 Warning:
there are no sales for vehicle class HDGV8b

LEV phase-in data read from file MA_LEV2.D

Calendar Year: 2013
Month: Jan.
Altitude: Low
Minimum Temperature: 35.0 (F)
Maximum Temperature: 45.0 (F)
Absolute Humidity: 75. grains/lb
Fuel Sulfur Content: 30. ppm

Exhaust I/M Program: Yes
Evap I/M Program: Yes
ATP Program: Yes
Reformulated Gas: Yes

Vehicle Type: GVWR:	LDGV	LDGT12 <6000	LDGT34 >6000	LDGT (All)	HDGV	LDDV	LDDT	HDDV	MC	All Veh
VMT Distribution:	0.3031	0.4092	0.1608		0.0365	0.0002	0.0015	0.0851	0.0037	1.0000
Composite Emission Factors (g/mi):										
Composite VOC :	0.325	0.283	0.375	0.309	0.410	0.208	0.191	0.375	3.40	0.335
Composite CO :	9.73	9.01	9.14	9.05	7.88	1.444	0.451	1.068	15.67	8.542
Composite NOX :	0.277	0.310	0.469	0.355	0.965	0.373	0.204	3.938	1.48	0.662

* #
* 2013 30 MPH Scenario - Winter
* File 1, Run 2, Scenario 4.
* #

M583 Warning:
The user supplied arterial average speed of 30.0
will be used for all hours of the day. 100% of VMT
has been assigned to the arterial/collector roadway
type for all hours of the day and all vehicle types.

M112 Warning:
Wintertime Reformulated Gasoline Rules Apply

M 48 Warning:
there are no sales for vehicle class HDGV8b

LEV phase-in data read from file MA_LEV2.D

Calendar Year: 2013
Month: Jan.
Altitude: Low
Minimum Temperature: 35.0 (F)
Maximum Temperature: 45.0 (F)
Absolute Humidity: 75. grains/lb
Fuel Sulfur Content: 30. ppm

Exhaust I/M Program: Yes
Evap I/M Program: Yes
ATP Program: Yes
Reformulated Gas: Yes

Vehicle Type: GVWR:	LDGV	LDGT12 <6000	LDGT34 >6000	LDGT (All)	HDGV	LDDV	LDDT	HDDV	MC	All Veh
VMT Distribution:	0.3031	0.4092	0.1608		0.0365	0.0002	0.0015	0.0851	0.0037	1.0000
Composite Emission Factors (g/mi):										
Composite VOC :	0.308	0.270	0.359	0.295	0.353	0.189	0.172	0.321	3.21	0.314
Composite CO :	9.66	8.94	9.06	8.98	6.53	1.297	0.400	0.883	13.78	8.408
Composite NOX :	0.266	0.298	0.453	0.342	1.006	0.358	0.195	3.776	1.56	0.640

06/12/08
15:00:24

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 96043 ***

SCREEN3 Modeling Runs Boilers Parcel 1B

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	POINT
EMISSION RATE (G/S)	=	1.00000
STACK HEIGHT (M)	=	47.9000
STK INSIDE DIAM (M)	=	.6100
STK EXIT VELOCITY (M/S)	=	11.1000
STK GAS EXIT TEMP (K)	=	293.0000
AMBIENT AIR TEMP (K)	=	293.0000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	URBAN
BUILDING HEIGHT (M)	=	48.5000
MIN HORIZ BLDG DIM (M)	=	45.7000
MAX HORIZ BLDG DIM (M)	=	129.5000

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = 11.462 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN DISCRETE DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
50.	.0000	0	.0	.0	.0	.00	.00	.00	NA
60.	.0000	0	.0	.0	.0	.00	.00	.00	NA
75.	.0000	0	.0	.0	.0	.00	.00	.00	NA
100.	.0000	0	.0	.0	.0	.00	.00	.00	NA
125.	.0000	0	.0	.0	.0	.00	.00	.00	NA
150.	114.7	5	1.0	1.6	10000.0	48.04	16.03	29.98	SS
200.	98.42	5	1.0	1.6	10000.0	48.04	21.17	32.91	SS
250.	86.23	5	1.0	1.6	10000.0	48.04	26.22	35.84	SS
300.	76.38	5	1.0	1.6	10000.0	48.04	31.18	38.78	SS
350.	68.15	5	1.0	1.6	10000.0	48.04	36.06	41.71	SS
400.	61.14	5	1.0	1.6	10000.0	48.04	40.85	44.64	SS
500.	49.80	5	1.0	1.6	10000.0	48.04	50.21	51.47	SS
600.	41.70	5	1.0	1.6	10000.0	48.04	59.27	54.89	SS
700.	35.73	5	1.0	1.6	10000.0	48.04	68.06	58.17	SS
800.	31.17	5	1.0	1.6	10000.0	48.04	76.59	61.32	SS
900.	27.56	5	1.0	1.6	10000.0	48.04	84.89	64.35	SS
1000.	24.65	5	1.0	1.6	10000.0	48.04	92.97	67.28	SS

DWASH= MEANS NO CALC MADE (CONC = 0.0)

```
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

********************************************
*  SUMMARY OF TERRAIN HEIGHTS ENTERED FOR  *
*    SIMPLE ELEVATED TERRAIN PROCEDURE     *
********************************************

     TERRAIN        DISTANCE RANGE (M)
      HT (M)       MINIMUM     MAXIMUM
     -------       --------    --------
          0.           50.         --
          0.           60.         --
          0.           75.         --
          0.          100.         --
          0.          125.         --
          0.          150.         --
          0.          200.         --
          0.          250.         --
          0.          300.         --
          0.          350.         --
          0.          400.         --
          0.          500.         --
          0.          600.         --
          0.          700.         --
          0.          800.         --
          0.          900.         --
          0.         1000.         --

****************************************
    *** REGULATORY (Default) ***
   PERFORMING CAVITY CALCULATIONS
  WITH ORIGINAL SCREEN CAVITY MODEL
          (BRODE, 1988)
****************************************


 *** CAVITY CALCULATION - 1 ***       *** CAVITY CALCULATION - 2 ***
  CONC (UG/M**3)      =    106.1        CONC (UG/M**3)      =    89.47
  CRIT WS @10M (M/S)  =     1.00        CRIT WS @10M (M/S)  =     4.92
  CRIT WS @ HS (M/S)  =     1.37        CRIT WS @ HS (M/S)  =     6.72
  DILUTION WS (M/S)   =     1.00        DILUTION WS (M/S)   =     3.36
  CAVITY HT (M)       =    71.30        CAVITY HT (M)       =    50.91
  CAVITY LENGTH (M)   =   160.64        CAVITY LENGTH (M)   =    64.73
  ALONGWIND DIM (M)   =    45.70        ALONGWIND DIM (M)   =   129.50

****************************************
     END OF CAVITY CALCULATIONS
****************************************


     ***************************************
     *** SUMMARY OF SCREEN MODEL RESULTS ***
     ***************************************
```

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)	
SIMPLE TERRAIN	114.7	150.	0.	
BLDG. CAVITY-1	106.1	161.	--	(DIST = CAVITY LENGTH)
BLDG. CAVITY-2	89.47	65.	--	(DIST = CAVITY LENGTH)

```
***************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
***************************************************
```

06/12/08
15:05:59

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 96043 ***

SCREEN3 Modeling Runs Emergency Generators Parcel 1B

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	POINT
EMISSION RATE (G/S)	=	1.00000
STACK HEIGHT (M)	=	47.9000
STK INSIDE DIAM (M)	=	.0305
STK EXIT VELOCITY (M/S)	=	60.0000
STK GAS EXIT TEMP (K)	=	293.0000
AMBIENT AIR TEMP (K)	=	293.0000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	URBAN
BUILDING HEIGHT (M)	=	48.5000
MIN HORIZ BLDG DIM (M)	=	45.7000
MAX HORIZ BLDG DIM (M)	=	129.5000

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .836 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN DISCRETE DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
50.	.0000	0	.0	.0	.0	.00	.00	.00	NA
60.	.0000	0	.0	.0	.0	.00	.00	.00	NA
75.	.0000	0	.0	.0	.0	.00	.00	.00	NA
100.	.0000	0	.0	.0	.0	.00	.00	.00	NA
125.	.0000	0	.0	.0	.0	.00	.00	.00	NA
150.	62.41	1	1.0	1.3	320.0	47.90	48.37	38.61	SS
200.	54.91	3	1.0	1.4	320.0	47.90	51.72	40.00	SS
250.	53.41	3	1.0	1.4	320.0	47.90	55.07	50.00	SS
300.	46.03	4	1.0	1.5	320.0	47.90	58.42	42.88	SS
350.	44.07	4	1.0	1.5	320.0	47.90	61.77	46.61	SS
400.	41.45	4	1.0	1.5	320.0	47.90	65.12	52.92	SS
500.	33.88	4	1.0	1.5	320.0	47.90	74.32	65.28	SS
600.	29.38	5	1.0	1.6	10000.0	47.90	81.97	60.19	SS
700.	26.20	5	1.0	1.6	10000.0	47.90	90.12	63.26	SS
800.	23.58	5	1.0	1.6	10000.0	47.90	98.06	66.23	SS
900.	21.40	5	1.0	1.6	10000.0	47.90	105.80	69.09	SS
1000.	19.56	5	1.0	1.6	10000.0	47.90	113.35	71.86	SS

DWASH= MEANS NO CALC MADE (CONC = 0.0)

```
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

********************************************
*  SUMMARY OF TERRAIN HEIGHTS ENTERED FOR  *
*    SIMPLE ELEVATED TERRAIN PROCEDURE     *
********************************************

     TERRAIN       DISTANCE RANGE (M)
      HT (M)       MINIMUM    MAXIMUM
     -------      --------   --------
          0.          50.        --
          0.          60.        --
          0.          75.        --
          0.         100.        --
          0.         125.        --
          0.         150.        --
          0.         200.        --
          0.         250.        --
          0.         300.        --
          0.         350.        --
          0.         400.        --
          0.         500.        --
          0.         600.        --
          0.         700.        --
          0.         800.        --
          0.         900.        --
          0.        1000.        --

****************************************
     *** REGULATORY (Default) ***
    PERFORMING CAVITY CALCULATIONS
  WITH ORIGINAL SCREEN CAVITY MODEL
          (BRODE, 1988)
****************************************


 *** CAVITY CALCULATION - 1 ***       *** CAVITY CALCULATION - 2 ***
  CONC (UG/M**3)      =    106.1       CONC (UG/M**3)      =    300.8
  CRIT WS @10M (M/S)  =     1.00       CRIT WS @10M (M/S)  =     1.35
  CRIT WS @ HS (M/S)  =     1.37       CRIT WS @ HS (M/S)  =     1.85
  DILUTION WS (M/S)   =     1.00       DILUTION WS (M/S)   =     1.00
  CAVITY HT (M)       =    71.30       CAVITY HT (M)       =    50.91
  CAVITY LENGTH (M)   =   160.64       CAVITY LENGTH (M)   =    64.73
  ALONGWIND DIM (M)   =    45.70       ALONGWIND DIM (M)   =   129.50

****************************************
      END OF CAVITY CALCULATIONS
****************************************


     ***************************************
     *** SUMMARY OF SCREEN MODEL RESULTS ***
     ***************************************
```

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)	
SIMPLE TERRAIN	62.41	150.	0.	
BLDG. CAVITY-1	106.1	161.	--	(DIST = CAVITY LENGTH)
BLDG. CAVITY-2	300.8	65.	--	(DIST = CAVITY LENGTH)

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***************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
***************************************************
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06/18/08
10:53:55

```
***  SCREEN3 MODEL RUN  ***
*** VERSION DATED 96043 ***

SCREEN3 Modeling Runs Garage Parcel 1B

SIMPLE TERRAIN INPUTS:
   SOURCE TYPE             =        POINT
   EMISSION RATE (G/S)     =      1.00000
   STACK HEIGHT (M)        =      44.8000
   STK INSIDE DIAM (M)     =        .3050
   STK EXIT VELOCITY (M/S)=         .0000
   STK GAS EXIT TEMP (K)   =     293.0000
   AMBIENT AIR TEMP (K)    =     293.0000
   RECEPTOR HEIGHT (M)     =        .0000
   URBAN/RURAL OPTION      =        URBAN
   BUILDING HEIGHT (M)     =      48.5000
   MIN HORIZ BLDG DIM (M) =       45.7000
   MAX HORIZ BLDG DIM (M) =      129.5000

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.


BUOY. FLUX =     .000 M**4/S**3;  MOM. FLUX =     .000 M**4/S**2.

*** FULL METEOROLOGY ***

**********************************
*** SCREEN DISCRETE DISTANCES ***
**********************************

*** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***
```

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
50.	.0000	0	.0	.0	.0	.00	.00	.00	NA
60.	.0000	0	.0	.0	.0	.00	.00	.00	NA
75.	.0000	0	.0	.0	.0	.00	.00	.00	NA
100.	.0000	0	.0	.0	.0	.00	.00	.00	NA
125.	.0000	0	.0	.0	.0	.00	.00	.00	NA
150.	69.43	1	1.0	1.3	320.0	44.80	48.37	38.61	SS
200.	60.89	3	1.0	1.3	320.0	44.80	51.72	40.00	SS
250.	57.33	3	1.0	1.3	320.0	44.80	55.07	50.00	SS
300.	50.70	4	1.0	1.5	320.0	44.80	58.42	44.30	SS
350.	47.78	4	1.0	1.5	320.0	44.80	61.77	47.65	SS
400.	44.37	4	1.0	1.5	320.0	44.80	65.12	52.92	SS
500.	35.64	4	1.0	1.5	320.0	44.80	74.32	65.28	SS
600.	30.81	5	1.0	1.6	10000.0	44.80	81.97	61.81	SS
700.	27.36	5	1.0	1.6	10000.0	44.80	90.12	64.83	SS
800.	24.56	5	1.0	1.6	10000.0	44.80	98.06	67.74	SS
900.	22.23	5	1.0	1.6	10000.0	44.80	105.80	70.55	SS
1000.	20.27	5	1.0	1.6	10000.0	44.80	113.35	73.28	SS

DWASH=   MEANS NO CALC MADE (CONC = 0.0)

DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
* SUMMARY OF TERRAIN HEIGHTS ENTERED FOR *
* SIMPLE ELEVATED TERRAIN PROCEDURE *
****

TERRAIN HT (M)	DISTANCE RANGE (M) MINIMUM	MAXIMUM
0.	50.	--
0.	60.	--
0.	75.	--
0.	100.	--
0.	125.	--
0.	150.	--
0.	200.	--
0.	250.	--
0.	300.	--
0.	350.	--
0.	400.	--
0.	500.	--
0.	600.	--
0.	700.	--
0.	800.	--
0.	900.	--
0.	1000.	--

****
*** REGULATORY (Default) ***
PERFORMING CAVITY CALCULATIONS
WITH ORIGINAL SCREEN CAVITY MODEL
(BRODE, 1988)
****

*** CAVITY CALCULATION - 1 ***		*** CAVITY CALCULATION - 2 ***	
CONC (UG/M**3) =	106.1	CONC (UG/M**3) =	300.8
CRIT WS @10M (M/S) =	1.00	CRIT WS @10M (M/S) =	1.00
CRIT WS @ HS (M/S) =	1.35	CRIT WS @ HS (M/S) =	1.35
DILUTION WS (M/S) =	1.00	DILUTION WS (M/S) =	1.00
CAVITY HT (M) =	71.30	CAVITY HT (M) =	50.91
CAVITY LENGTH (M) =	160.64	CAVITY LENGTH (M) =	64.73
ALONGWIND DIM (M) =	45.70	ALONGWIND DIM (M) =	129.50

****
END OF CAVITY CALCULATIONS
****

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)	
SIMPLE TERRAIN	69.43	150.	0.	
BLDG. CAVITY-1	106.1	161.	--	(DIST = CAVITY LENGTH)
BLDG. CAVITY-2	300.8	65.	--	(DIST = CAVITY LENGTH)

```
***************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
***************************************************
```

MADEP Boiler Emissions Limits & Emergency Generator Emissions

Parcel 1B

Potential Emissions

Unit	Output		Input		MMBtu/hr	Emission Rate					Units	Hours	Annual Emissions - tpy				
						NOx	CO	VOC	PM	SO2			NOx	CO	VOC	PM	SO2
Egen#1	550	kW	746	BHP		3.000	2.6000	1.0000	0.1500	0.0388	g/bhphr	300	0.74	0.64	0.25	0.04	0.01
Egen#2	550	kW	746	BHP		3.000	2.6000	1.0000	0.1500	0.0388	g/bhphr	300	0.74	0.64	0.25	0.04	0.01
									Total Emergency Generators:				1.48	1.28	0.49	0.07	0.02
Boilers Total	24	MMBtu/hr			24.00	0.035	0.08	0.03	0.01	0.0006	lb/MMBtu	8,760	3.68	8.41	3.15	1.05	0.063
Energy Recovery/Makeup	0.55	MMBtu/hr			0.55	0.035	0.08	0.03	0.01	0.0006	lb/MMBtu	8,760	0.08	0.19	0.07	0.02	0.001
												Total	5.24	9.88	3.72	1.15	0.08

Unit	Output		Input		MMBtu/hr	short term per unit(g/s)						Hours	long term per unit (g/s)				
						NOx	CO	VOC	PM	SO2			NOx	CO	VOC	PM	SO2
Egen#1	550	kW	746	BHP		0.62	0.54	0.21	0.03	0.01		300	0.021	0.018	0.007	0.001	0.000
Egen#1	550	kW	746	BHP		0.62	0.54	0.21	0.03	0.01		300	0.021	0.018	0.007	0.001	0.000
Boilers Total	24.1	MMBtu/hr			24.10	0.11	0.24	0.09	0.03	0.00		8,760	0.106	0.242	0.091	0.030	0.002
Energy Recovery/Makeup	0.55	MMBtu/hr			0.55	0.002	0.006	0.002	0.001	0.000		8,760	0.002	0.006	0.002	0.001	0.000

Modeling Parameters

Unit	Egen#1	Egen#2	Boilers All	Energy Recovery	
flow (per unit)	15,000	15000	36000	36000	cfm
Diam	12	12	24.0	8.0	inches
Diam	1	1	2.0	0.8	ft
Area	0.79	0.79	16.54	16.54	ft2
Flow	318.3	318.3	36.28	36.28	fps
Flow	97.0	97.0	11.1	11.1	mps
Temp	973.2	973.2	440	440	F
Temp	796	796	500	500	K
Stack Elev	169	169	169	169	ft agl
Ground Elev	0	0	0	0	ft asl

Note 1: All stacks are 10 feet above roof level

Table -2

SCREEN3 Modeling Results
Parcel 1B

Emergency Generator + Heating Boilers

	Emissions	
Pollutant	Emergency Generator x 2 (g/s)	Heating Boilers (combined) (g/s)
NOx	1.48	0.11
SO2	0.02	0.001
CO	1.28	0.24
PM	0.07	0.03

SCREEN3 Maximum 1-hour Concentration		
ug/m3	300.8	114.7

SCREEN3 Modeling Summary Compared to NAAQS

Pollutant	Period	Generator Concentration (ug/m^3)	Loading Dock Concentration (ug/m^3)	Monitored Background (ug/m^3)	Total Concentration (ug/m^3)	NAAQS (ug/m^3)
NOx	Annual	2.23		47	49	100
SO2	3-Hour	5.52		84	90	1300
	24-Hour	2.45		52	54	365
	Annual	0.026		11	11	80
PM	24-Hour	9.80		58	68	150
	Annual	0.33		29	29	50
CO	1-Hour	412.55		2552	2964.55	40000
	8-Hour	288.79		1740	2028.79	10000

Hrs of Operation E.G.	300
Hrs of Operation boilers	8760

Notes:
Nox, PM, and SO2 background values based on the highest values in the Boston area per DEP Monitors for 2005 to 2007.

Mesoscale Analysis

Parcel 1B

Mesoscale Analysis

Intersection	Peak	Exist	No-Build	Build	Miles Per Intersection	Exist	No-Build	Build
1 North Washington Street/Causeway	AM	3356	3346	3346	0.5	1678	1673	1673
	PM	3536	3737	3737	0.5	1768	1868.5	1868.5
2 North Washington Street/Valenti Wa	AM	2118	2192	2275	0.5	1059	1096	1137.5
	PM	2150	2357	2399	0.5	1075	1178.5	1199.5
3 North Washington Street/Beverly St	AM	1477	1559	1581	0.5	738.5	779.5	790.5
	PM	1290	1537	1620	0.5	645	768.5	810
4 New Chardon Street/Surface Road	AM	2372	2476	2498	0.2	474.4	495.2	499.6
	PM	2692	3055	3138	0.2	538.4	611	627.6
5 North Washington Street/Endicott S	AM	1709	1650	1650	0.5	854.5	825	825
	PM	1781	1887	1887	0.5	890.5	943.5	943.5

Notes:

Total	AM	11032	11223	11350	4804.4	4868.7	4925.6
	PM	11449	12573	12781	4916.9	5370	5449.1

Table 3-5-2

Mesoscale Analysis Summary

Boston, MA

Parcels 1B

Pollutant	Time	Units	Full Build	No-Build	BD-NB	% Difference (BD-NB)
VOC	AM Peak	grams/hr	1,546.6	1,528.8	17.9	1.17%
		tons/hr	0.00170	0.00169	0.00002	1.17%
		tons/day*	0.017	0.017	0.000	1.17%
	PM Peak	grams/hr	1711.017	1686.180	24.8	1.47%
		tons/hr	0.00189	0.00186	0.00003	1.47%
		tons/day*	0.019	0.019	0.000	1.47%
NOx	AM Peak	grams/hr	3,152.4	3,116.0	36.4	1.17%
		tons/hr	0.00347	0.00343	0.00004	1.17%
		tons/day*	0.035	0.034	0.000	1.17%
	PM Peak	grams/hr	3,487.4	3,436.8	50.6	1.47%
		tons/hr	0.00384	0.00379	0.00006	1.47%
		tons/day*	0.038	0.038	0.001	1.47%

* Tons/day estimated by assuming hourly peak is 10 percent of total volume.

Appendix D

LEED Checklist

LEED for New Construction v2.2
Registered Project Checklist

Project Name: Parcel 1B, The Merano, Boston, Massachusetts
Project Address: Boston, Massachusetts

Yes	?	No			
8	2	4		**Sustainable Sites**	14 Points
Y			Prereq 1	**Construction Activity Pollution Prevention**	Required
1			Credit 1	**Site Selection**	1
1			Credit 2	**Development Density & Community Connectivity**	1
		1	Credit 3	**Brownfield Redevelopment**	1
1			Credit 4.1	**Alternative Transportation**, Public Transportation Access	1
1			Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	1
1			Credit 4.3	**Alternative Transportation**, Low-Emitting & Fuel-Efficient Vehicles	1
1			Credit 4.4	**Alternative Transportation**, Parking Capacity	1
		1	Credit 5.1	**Site Development,** Protect or Restore Habitat	1
	1		Credit 5.2	**Site Development,** Maximize Open Space	1
	1		Credit 6.1	**Stormwater Design,** Quantity Control	1
		1	Credit 6.2	**Stormwater Design,** Quality Control	1
1			Credit 7.1	**Heat Island Effect,** Non-Roof	1
1			Credit 7.2	**Heat Island Effect,** Roof	1
		1	Credit 8	**Light Pollution Reduction**	1

Yes	?	No			
2	2	1		**Water Efficiency**	5 Points
1			Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%	1
	1		Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1
		1	Credit 2	**Innovative Wastewater Technologies**	1
1			Credit 3.1	**Water Use Reduction**, 20% Reduction	1
	1		Credit 3.2	**Water Use Reduction**, 30% Reduction	1

2	4	11			**Energy & Atmosphere**	17 Points
Y			Prereq 1		**Fundamental Commissioning of the Building Energy Systems**	Required
Y			Prereq 2		**Minimum Energy Performance**	Required
Y			Prereq 3		**Fundamental Refrigerant Management**	Required

***Note for EAc1**: All LEED for New Construction projects registered after June 26th, 2007 are required to achieve at least two (2) points under EAc1.

2	1	7	Credit 1		**Optimize Energy Performance**	1 to 10
					10.5% New Buildings or 3.5% Existing Building Renovations	1
				2	14% New Buildings or 7% Existing Building Renovations	2
					17.5% New Buildings or 10.5% Existing Building Renovations	3
					21% New Buildings or 14% Existing Building Renovations	4
					24.5% New Buildings or 17.5% Existing Building Renovations	5
					28% New Buildings or 21% Existing Building Renovations	6
					31.5% New Buildings or 24.5% Existing Building Renovations	7
					35% New Buildings or 28% Existing Building Renovations	8
					38.5% New Buildings or 31.5% Existing Building Renovations	9
					42% New Buildings or 35% Existing Building Renovations	10
		3	Credit 2		**On-Site Renewable Energy**	1 to 3
					2.5% Renewable Energy	1
					7.5% Renewable Energy	2
					12.5% Renewable Energy	3
	1		Credit 3		**Enhanced Commissioning**	1
	1		Credit 4		**Enhanced Refrigerant Management**	1
		1	Credit 5		**Measurement & Verification**	1
	1		Credit 6		**Green Power**	1

Yes	?	No			
4	3	6		**Materials & Resources**	**13** Points
Y			Prereq 1	**Storage & Collection of Recyclables**	Required
		1	Credit 1.1	**Building Reuse**, Maintain 75% of Existing Walls, Floors & Roof	1
		1	Credit 1.2	**Building Reuse**, Maintain 100% of Existing Walls, Floors & Roof	1
		1	Credit 1.3	**Building Reuse**, Maintain 50% of Interior Non-Structural Elements	1
1			Credit 2.1	**Construction Waste Management**, Divert 50% from Disposal	1
1			Credit 2.2	**Construction Waste Management**, Divert 75% from Disposal	1
		1	Credit 3.1	**Materials Reuse**, 5%	1
		1	Credit 3.2	**Materials Reuse**,10%	1
1			Credit 4.1	**Recycled Content**, 10% (post-consumer + ½ pre-consumer)	1
	1		Credit 4.2	**Recycled Content**, 20% (post-consumer + ½ pre-consumer)	1
1			Credit 5.1	**Regional Materials**, 10% Extracted, Processed & Manufactured Regional	1
	1		Credit 5.2	**Regional Materials**, 20% Extracted, Processed & Manufactured Regional	1
		1	Credit 6	**Rapidly Renewable Materials**	1
	1		Credit 7	**Certified Wood**	1

Yes	?	No			
8	3	4		**Indoor Environmental Quality**	**15** Points
Y			Prereq 1	**Minimum IAQ Performance**	Required
Y			Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	Required
		1	Credit 1	**Outdoor Air Delivery Monitoring**	1
		1	Credit 2	**Increased Ventilation**	1
1			Credit 3.1	**Construction IAQ Management Plan**, During Construction	1
1			Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy	1
1			Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1
1			Credit 4.2	**Low-Emitting Materials**, Paints & Coatings	1
1			Credit 4.3	**Low-Emitting Materials**, Carpet Systems	1
1			Credit 4.4	**Low-Emitting Materials**, Composite Wood & Agrifiber Products	1
1			Credit 5	**Indoor Chemical & Pollutant Source Control**	1
1			Credit 6.1	**Controllability of Systems**, Lighting	1
	1		Credit 6.2	**Controllability of Systems**, Thermal Comfort	1
	1		Credit 7.1	**Thermal Comfort**, Design	1
		1	Credit 7.2	**Thermal Comfort**, Verification	1
		1	Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces	1
	1		Credit 8.2	**Daylight & Views**, Views for 90% of Spaces	1

Yes	?	No			
5				**Innovation & Design Process**	**5** Points
1			Credit 1.1	**Innovation in Design**: SS Credit 7.1 - 100% of parking is under cover	1
1			Credit 1.2	Innovation in Design: Education Program	1
1			Credit 1.3	**Innovation in Design**: SS 4.1 Alternative transit options	1
1			Credit 1.4	**Innovation in Design**: Green Housekeeping Program	1
1			Credit 2	**LEED® Accredited Professional: CBT, LEED Consultant, RWS**	1

Yes	?	No			
29	14	26		**Project Totals (pre-certification estimates)**	**69** Points

Certified: 26-32 points, **Silver:** 33-38 points, **Gold:** 39-51 points, **Platinum:** 52-69 points

Appendix E

Survey

NOTES:

1) BENCH MARK INFORMATION:

BENCH MARK USED :

CENTRAL ARTERY PROJECT SURVEY CONTROL STATION 779– A STANDARD BRASS CA/T SURVEY DISC STAMPED "779" SET IN GRANITE CURB OF A CONCRETE ISLAND AT THE EASTERLY SIDE OF THE INTERSECTION OF COMMERCIAL AND NORTH WASHINGTON STREETS.
ELEVATION= 21.31

CENTRAL ARTERY PROJECT SURVEY CONTROL STATION 891– A STANDARD BRASS CA/T SURVEY DISC STAMPED "891" SET IN CONCRETE SIDEWALK ON THE NORTHERLY SIDE OF CAUSEWAY STREET AT THE INTERSECTION WITH MEDFORD STREET, AS SHOWN ON PLAN.
ELEVATION= 15.38

CENTRAL ARTERY PROJECT SURVEY CONTROL STATION 894– AN EPLP SET IN THE CONCRETE SIDEWALK ON THE EASTERLY SIDE OF NORTH WASHINGTON STREET, NORTH OF THE INTERSECTION WITH THATCHER STREET IN FRONT OF ROSIE'S ITALIAN KITCHEN, #95 NORTH WASHINGTON STREET, AS SHOWN ON PLAN.
ELEVATION= 16.45

TEMPORARY BENCH MARKS SET :

TBM–D CHISELED "X" ON TOP BOLT OF FIRE HYRANT LOCATED AT THE SOUTH SIDE OF CAUSEWAY STREET AS SHOWN ON PLAN.
ELEVATION= 16.82

TBM–E CHISELED "X" ON TOP BOLT OF FIRE HYRANT LOCATED AT THE NORTHWEST CORNER OF NORTH WASHINGTON STREET AND ANTHONY "RIP" VALENTI WAY, AS SHOWN ON PLAN.
ELEVATION= 18.15

TBM–F CHISELED SQUARE SET ON THE SOUTHWEST CORNER OF A TRAFFIC BOX LOCATED AT THE NORTHWEST CORNER OF BEVERLY STREET AND ANTHONY "RIP" VALENTI WAY, AS SHOWN ON PLAN.
ELEVATION= 18.33

TBM–G CHISELED SQUARE SET ON THE SOUTHWEST CORNER OF GRANITE WALL LOCATED ON THE NORTHERLY SIDE OF CAUSEWAY STREET, AS SHOWN ON PLAN.
ELEVATION= 20.43

2) ELEVATIONS REFER TO BOSTON CITY BASE.

3) CONTOUR INTERVAL EQUALS ONE (1) FOOT.

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

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

LEGEND:

	SEWER MANHOLE
	DRAIN MANHOLE
	TELEPHONE MANHOLE
	MBTA MANHOLE
	ELECTRIC MANHOLE
	WATER MANHOLE
MH	MANHOLE
	HANDICAP RAMP
	GAS SHUT OFF
	WATER SHUT OFF
	CENTRAL ARTERY TUNNEL
	BOSTON WATER VALVE
	CATCH BASIN
	LIGHT POLE
	HYDRANT
	SIGN
	TRAFFIC SIGNAL
P.M.	PARKING METER
	ELECTRIC HANDHOLE
	BOLLARD
	OBSERVATION WELL
FA	FIRE ALARM
	TRAFFIC CONTROL BOX
CONC.	CONCRETE
BIT.	BITUMINOUS
VGC	VERTICAL GRANITE CURB
BCB	BIT. CONC. BERM
FND.	FOUND
REC.	RECORD
CALC.	CALCULATED
TYP.	TYPICAL
PIL	PIN IN LEAD
P.O.B.	POINT OF BEGINNING
BWSC	BOSTON WATER AND SEWER COMMISION
TP	TEST PIT
	VAULT

NE	NORTHEAST
SE	SOUTHEAST
SW	SOUTHWEST
NW	NORTHWEST
RET	RETAINING
T.	TOP
B.	BOTTOM
	DECIDUOUS TREE
TD	TOP OF DUCT BANK
BW	BOTTOM OF WALL
TW	TOP OF WALL
N/F	NOW OR FORMERLY
FFE	FIRST FLOOR ELEVATION
TBM	TEMPORARY BENCH MARK
BC	BOTTOM OF CURB
TC	TOP OF CURB
TS	TOP OF SLAP
[##.##]	AS–BUILT ELEVATIONS
##.#	ROOF ELEVATIONS
R=	RIM ELEVATION
I=	INVERT ELEVATION
TT	TOP OF TRAP
N.V.P.	NO VISIBLE PIPES
T.O.W.	TOP OF WATER
T.O.D.	TOP OF DEBRIS
FOW	FULL OF WATER
ST–L	STREET LIGHTING
S	SEWER
D	DRAIN
CS	COMBINED SEWER
W	WATER
G	GAS
E	ELECTRIC
M	MBTA
T	TELEPHONE
C	CABLE TELEVISION
ST	STEAM
PTC	PIPE TYPE CABLE

5–29–2007	ADDED ROOF ELEVATIONS
REVISION DATE	DESCRIPTION

TOPOGRAPHIC SITE PLAN
PARCEL "1B"
BOSTON, MASS.

SCALE: 1"=20' — OCTOBER 13, 2006
HARRY R. FELDMAN, INC. — LAND SURVEYORS
112 SHAWMUT AVENUE — PHONE: (617)357–9740
BOSTON, MASS. 02118 — WWW.HARRYRFELDMAN.COM

FELDMAN
Professional Land Surveyors

GRAPHIC SCALE
20 0 10 20 40 80

RESEARCH DGM	FIELD CHIEF RB	CHECKED	APPROVED	FILE NAME 11635EC.DWG
CALC DGM	CADD BH	FIELD CHECKED	CRD FILE 11635	JOB NO. 11635B