EXPANDED PROJECT NOTIFICATION FORM

Excel Academy East Boston Middle School/High School

Boston, Massachusetts

Submitted to:

Boston Redevelopment Authority
1 City Hall Square
Boston, Massachusetts 02201

Submitted by:

Friends of Excel Academy Charter Schools, Inc.
58 Moore Street
East Boston, Massachusetts 02128

Prepared by:

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

December 2, 2013

Expanded Project Notification Form

Submitted Pursuant to Article 80 of the Boston Zoning Code

Excel Academy East Boston Middle School/High School

Submitted to:

BOSTON REDEVELOPMENT AUTHORITY
One City Hall Square
Boston, Massachusetts 02201

Submitted by:

FRIENDS OF EXCEL ACADEMY CHARTER SCHOOLS, INC.
58 Moore Street
East Boston, Massachusetts 02128

Prepared by:

EPSILON ASSOCIATES, INC.
3 Clock Tower Place, Suite 250
Maynard, Massachusetts 01754

In Association with:

Pacific Charter School Development
Robert H. Baldwin
Studio G Architects
MDM Transportation Consultants, Inc.
Nitsch Engineering
Klein Hornig LLP
Jeffrey R. Drago, Esq.
Carol R. Johnson Associates
Garcia, Galuska, Desousa Consulting Engineers, Inc.
Ransom Consulting

December 2, 2013

Table of Contents

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

List of Attachments

List of Figures

List of Figures (Continued)

List of Tables

List of Acronyms

AC	Area Context
ADAAG	Americans with Disabilities Act Design Guidelines
AMR	Automatic Meter Reading
ANSI	American National Standards Institute
AST	Above-Ground Storage Tank
BCDC	Boston Civic Design Commission
BLC	Boston Landmarks Commission
BMP	Best Management Practice
BRA	Boston Redevelopment Authority
BRADA	Boston Redevelopment Authority Daylight Analysis
BTD	Boston Transportation Department
BWSC	Boston Water and Sewer Commission
CE	Corridor Enhancement

List of Acronyms

CFC	Chlorofluorocarbon
CMP	Construction Management Plan
CO	Carbon Monoxide
DEIR	Draft Environmental Impact Report
DPIR	Draft Project Impact Report
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
GPD	Gallons per Day
HCM	Highway Capacity Manual
HVAC	Heating, Ventilation, and Air Conditioning
I&M	Inspection and Maintenance
LEED	Leadership in Energy and Environmental Design
LOS	Level of Service
LSP	Licensed Site Professional
MAAQS	Massachusetts Ambient Air Quality Standards
MassDEP	Massachusetts Department of Environmental Protection
MassDOT	Massachusetts Department of Transportation
MBTA	Massachusetts Bay Transportation Authority
MCP	Massachusetts Contingency Plan
MEPA	Massachusetts Environmental Policy Act
MHC	Massachusetts Historical Commission
MSDS	Material Safety Data Sheet
MTU	Meter Transmitter Unit
MWRA	Massachusetts Water Resource Authority
NAAQS	National Ambient Air Quality Standards
O&M	Operation and Maintenance
PM	Particulate Matter
PNF	Project Notification Form
PPM	Parts per Million
RTU	Rooftop Unit
TMP	Traffic Management Plan
TSS	Total Suspended Solids
USGBC	U.S. Green Building Council
VOC	Volatile Organic Compound

Section 1.0

Summary

1.0 SUMMARY

1.1 Project Identification

Project Name	Excel Academy East Boston Middle School/High School
Location	The Project site is located at 413 Bremen Street in East Boston, Massachusetts. The Project site is a portion of Assessors Parcels 0104196000 and 0104197000.
Proponent	Friends of Excel Academy Charter Schools, Inc. 58 Moore Street East Boston, MA 02128 Christopher J. DeLorey, Chair
Sponsor/Tenant	Excel Academy 58 Moore Street East Boston, MA 02128 Alex McCafferty
Development Consultant	Pacific Charter School Development 316 West 2nd Street, Suite 900 Los Angeles, CA 90012 Lindsay Phillips Kate Hirsch
Support Organization for Excel Academy	Friends of Excel Academy Charter Schools, Inc. 58 Moore Street East Boston, MA 02128 Christopher J. DeLorey, Chair
Development Program Manager	Robert Baldwin 440 Humphrey Street Swampscott, MA 01907 (781)592-1600 Bob Baldwin
Architects	Studio G Architects The Brewery 179 Boylston Street Jamaica Plain, MA 02130 (617) 524-5558 Gail Sullivan Tamar Warburg Steve Michener

Permitting Consultants	Epsilon Associates, Inc. 3 Clock Tower Place, Suite 250 Maynard, MA 01754 (978) 897-7100 Peggy Briggs Holly Carlson
Transportation and Parking Consultants	MDM Transportation Consultants, Inc. 28 Lord Road, Suite 280 Marlborough, MA 01752 (508)303-0370 Robert Michaud Dan Mills
Legal Counsel	Klein Hornig LLP 101 Arch Street, Suite 1101 Boston, MA 02110 (617)224-0600 John Achatz Law Offices of Jeffrey R. Drago 62B Commercial Wharf Boston, MA 02110 (617) 646-4468 Jeffrey Drago
Civil Engineer	Nitsch Engineering 2 Center Plaza, Suite 430 Boston, MA 02108-1928 (617)338-0063 Chelsea Christenson
MEP Engineer	Garcia, Galuska, DeSousa Consulting Engineers, Inc. 370 Faunce Corner Road North Dartmouth, MA 02747 (508)998-5700 David Pereira
Geotechnical and Environmental Consultants	Ransom Consulting 12 Kent Way, Suite 100 Byfield, MA 01922-1221 (978)465-1822 Timothy Snay

Landscape Architect	Carol R. Johnson Associates 115 Broad Street Boston, MA 02110 (617)896-2500 Jeanne Lukenda
Structural Engineer	Souza True + Partners 265 Winter Street, 3rd Floor Waltham, MA 02451 (617)926-6100 Terry Louderback

1.2 Introduction and Project Summary

The Excel Academy East Boston Middle School/High School Project (Excel East Boston MS/HS) is a new charter school development proposed to consist of a building that will be a maximum of three stories. The 70,000-square-foot Project will create 35 classrooms, community rooms, a cafeteria, gymnasium, administration, office space, and support space for the charter school's program. At capacity, the school will have the capacity to accommodate 896 students: 224 middle school students, and 672 high school students. The Project also includes an on-site 30-car pick-up/drop-off area, a dedicated bus pull-off area, a 50-space parking lot, and outdoor space for student use.

The Project site is located on Bremen Street in East Boston immediately adjacent to the East Boston branch of the Boston Public Library and the East Boston Greenway, a public green space and park. Figures 1-1 and 1-2 contain a Project locus map and aerial photograph showing the site and surroundings. An existing conditions plan is provided as Figure 1-3, and a proposed conditions plan is provided as Figure 1-4. The East Boston YMCA is approximately 0.4 miles southwest on Bremen Street. The Massachusetts Bay Transportation Authority's (MBTA's) Airport Station on the Blue Line is approximately 0.3 miles southwest of the Project site and has a secure walking path to the site entrance. The MBTA's Wood Island Station on the Blue Line is approximately 0.3 miles northeast of the site and will be accessible following completion of the Greenway Extension project. Residential properties are located northwest of the site, and Logan International Airport is located to the southeast. A zoning variance is needed to allow for use by a school.

The proposed Project is subject to Article 80 Large Project Review by the Boston Redevelopment Authority (BRA) because it is proposed to be greater than 50,000 square feet. This Expanded Project Notification Form (PNF) is being submitted to initiate comprehensive project review under procedures of Article 80 of the Boston Zoning Code.

To ensure a complete and thorough review, and to minimize the need for additional information, this Expanded PNF assesses a wide range of development review components including, but limited to, transportation, infrastructure, shadow, daylight, air quality, stormwater, noise, and construction management.

G:\Projects2\MA\Boston\3768\EN\usgs.mxd

Excel East Boston MS/HS Boston, Massachusetts

Epsilon ASSOCIATES INC.

Figure 1-1
USGS Locus Map

G:\Projects2\MA\Boston\3768\ENF\aerial.mxd

Excel East Boston MS/HS Boston, Massachusetts

Epsilon Associates Inc.

Figure 1-2
Aerial Locus Map

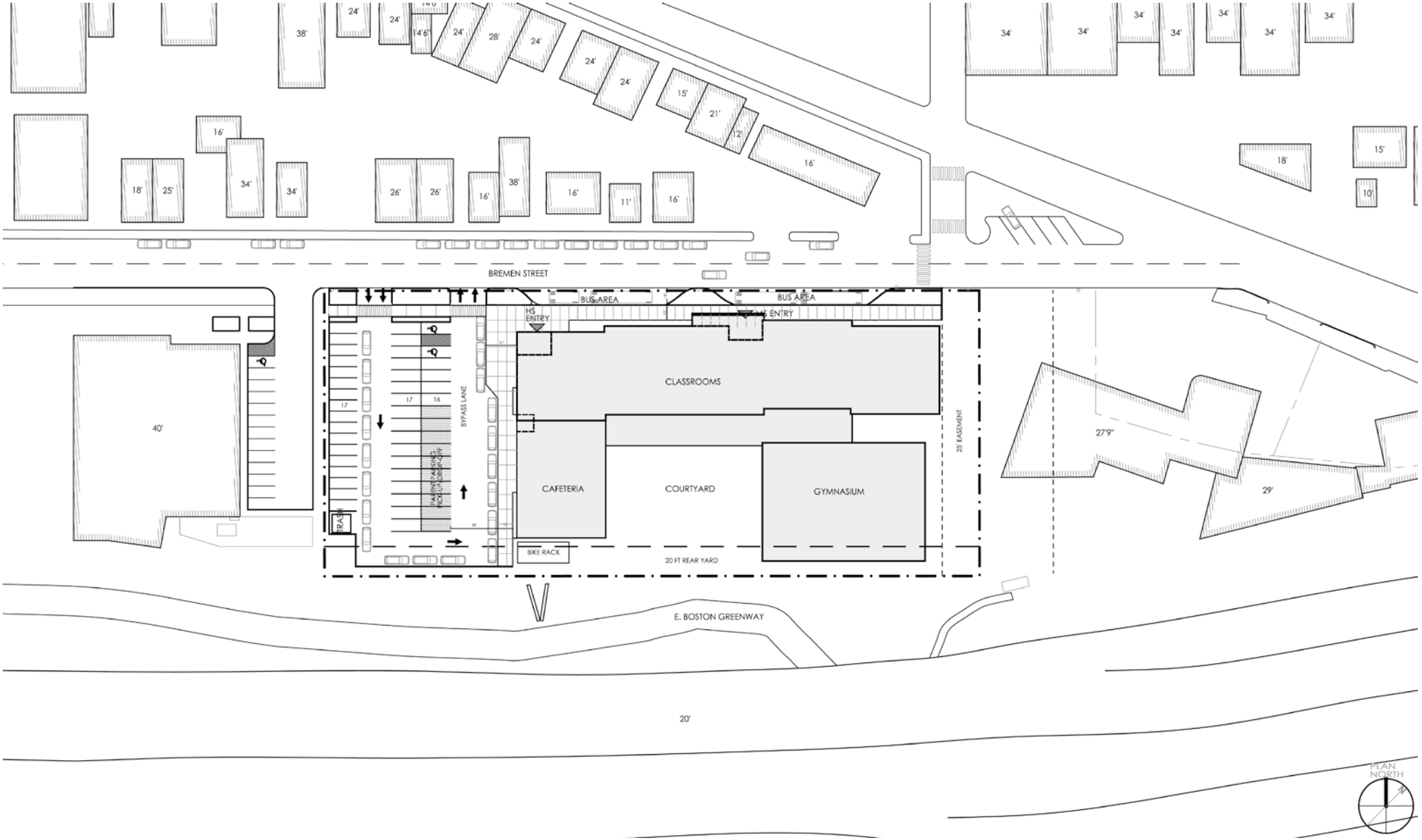
Excel East Boston MS/HS **Boston, Massachusetts**

Epsilon Associates Inc.

studio g Architects

Figure 1-3

Existing Conditions



Excel East Boston MS/HS Boston, Massachusetts

Figure 1-4

Proposed Site Plan

The Proponent requests that the BRA issue a Scoping Determination pursuant to Article 80, Section 80B-5.3(d).

1.2.1 Project Need

The Excel East Boston MS/HS is being designed to support Excel Academy's mission, which is to help students succeed in middle school, high school, college, and beyond. Excel Academy's first middle school opened in East Boston in 2003 followed by two others, all three enrolling 224 students each. In early 2013, Excel successfully amended its middle school charters to include high school seats, with the intent to populate those high school seats with a direct feeder program from its three middle schools. The three middle schools are currently located on Saratoga Street in East Boston, on Moore Street in East Boston, and on 2nd Street in Chelsea. This Project will involve relocating the Saratoga Street campus to the middle school portion of the new charter school facility proposed on Bremen Street.

To promote Excel Academy's mission, the Project design will accommodate 224 middle school students (grades 5-8) and 672 high school students (grades 9-12).

1.2.2 Public Benefits

The proposed Excel East Boston MS/HS Project promises several public benefits, some of which are described below:

- **Local Student Support:** The Project will further Excel Academy's mission of helping students succeed in high school, college, and beyond by providing a permanent middle school facility and establishing a high school facility to accommodate students from its network of middle schools. This Project will enable local students to continue their charter school education through high school and prepare them to attend four-year colleges or universities.

- **Neighborhood Ties:** A school frequently becomes a focal point within a community, and Excel Academy is committed to serving local students drawn from Boston and Chelsea. The Proponent estimates that just over 60% of the students will be drawn from Boston, while the balance will be from Chelsea. In addition, the proposed facility itself will provide community benefits such as use of the gymnasium and cafeteria on an at-cost basis for community groups.

- **Smart Growth Principles:** By redeveloping an underutilized site in East Boston, the Project will help focus density into areas supported by existing infrastructure, thereby minimizing adverse impacts and reinforcing community vitality around Day Square, which offers a range of commercial uses within easy walking distance for teachers, staff, and parents who will bring new activity to local restaurants, cafes, and other businesses. This Project will redevelop a vacant, underutilized site and

will extend community-enhancing public uses along Bremen Street by adding a public school to the existing mosaic of the Bremen Street Park, East Boston branch of the Boston Public Library, and East Boston Greenway.

- **Transit-Oriented Design:** The Project area is well-served by existing public transportation. The MBTA's Airport Station on the Blue Line is approximately 0.3 miles southwest of the Project site, and the MBTA's Wood Island Station is approximately 0.3 miles northeast of the site; both stations will be accessible via pedestrian and bike paths upon completion of the East Boston Greenway Extension project. Airport Station is also accessible via public sidewalks, as is the new East Boston branch of the Boston Public Library and the YMCA on its western side. The site is also within a short distance of the MBTA's Route 112, 120, and 121 bus services. As such, the majority of students will arrive at the new school via MBTA service, school bus, or by walking. Excel Academy is committed to promoting alternatives to automobile use to minimize potential impacts on surrounding roadways, including having a no-drive policy for students and providing eligible students with T passes for the MBTA bus and subway system.

- **Balances a Mixed-Use Environment:** The proposed middle school and high school will be a complementary use in a neighborhood that already contains commercial development, residential areas, and a new branch of the Boston Public Library and adjacent park with community gardens, playing fields, and playgrounds.

- **Streetscape and Pedestrian Environment:** The Project will provide a new sidewalk along the length of the property along Bremen Street, continuing the sidewalk added along Bremen Street Park and the East Boston branch of the Boston Public Library. The site design includes several streetscape improvements. Two dedicated pull-outs for school buses will ensure that buses will not block traffic along Bremen Street. Planting areas will be located between and on either end of the bus pull-outs. The proposed sidewalk will provide access to the separate middle school and high school entrances. A densely planted area will screen the parking lot on the west side of the school from the sidewalk, and an opaque fence will provide a screen from the adjacent library parking lot. South of the site, the East Boston Greenway is already densely screened from the site. The Project design includes a gated access point from the proposed school site to the pedestrian and bike paths on the Greenway. This gate will only be open during school hours, and will serve as an entry and egress point for students and staff using the MBTA stations.

- **Enhances Open Space:** Under existing conditions, the Project site is almost entirely impervious, covered by existing (vacant) buildings and asphalt pavement. Under proposed conditions, approximately 24,100 square feet of the site will be open space, consisting of both paved gathering spaces near the entrances as well as planted spaces. A south-facing courtyard will sit behind the classroom wing between the proposed gym and cafeteria; this courtyard, facing the Greenway, will

be visible from a glass-enclosed hallway on the classroom wing as well as from the gym and cafeteria spaces. Planted beds will sit between the building and courtyard pavement. The Project will also add a new sidewalk behind the proposed bus pull-out.

- **Stormwater Management:** The existing Project site is dominated by paved parking and building roofs, totaling nearly 100% impervious cover. Project development will significantly improve stormwater management relative to existing conditions by reducing impervious surfaces on site by approximately 27%. Relative to existing conditions, the Project will reduce peak rates and volumes of stormwater runoff from the site. The Project will comply with the Boston Water and Sewer Commission (BWSC) requirement to recharge one inch over the impervious area on site by directing stormwater from impervious areas to recharge systems on site. The Project will not affect water quality in water bodies or wetlands, and erosion and sediment control measures will be implemented during construction to minimize impacts. The proposed Project will comply with the Massachusetts Department of Environmental Project (MassDEP) Stormwater Management Policy Standards. Stormwater from roof areas will be directed to surface infiltration basins and underground infiltration systems to achieve the required groundwater recharge volume. Stormwater from parking areas will be collected by deep sump, hooded catch basins and directed through stormwater quality structures before being directed to an underground recharge system.

- **Sustainable Design/Green Building Goals:** The Project is being designed to be Silver-certifiable under the U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) system. This will exceed requirements of Article 37 of the Boston Zoning Code (Green Buildings), which requires that projects subject to Article 80B of the Code meet, at minimum, the Certifiable level of the LEED system applicable to the project. A draft LEED checklist demonstrating the proposed sustainable design goals is provided in Attachment E.

- **Increases Employment Opportunities:** The Project will create approximately 70 full-time construction jobs and approximately 105 permanent jobs for teachers, administrators, and support staff.

1.2.3 Project Site and Development Context

Under existing conditions, the two-acre Project site is almost entirely impervious and contains three vacant buildings, all of which will be demolished to accommodate the proposed charter school development. An existing conditions plan is provided as Figure 1-3. The existing buildings were constructed on concrete slabs with a mixture of concrete and brick walls with flat asphalt roofs. Other than the building footprints, remaining portions of the Project site are covered with asphalt-paved parking areas, driveways, and minimal landscaped areas. Although existing buildings are vacant, they are serviced by

municipal water and sewer services; natural gas is provided by National Grid and electricity is provided by NSTAR Electric Company. Most recent uses of the existing buildings were a hardware store/warehouse, storage, and Paul's Airport Parking. Nearby properties include a mixture of commercial and residential properties. Table 1-1 summarizes the historical use of the Project site.

Table 1-1 Historical Use of the Project Site

Years	*Property Use and Observed Details*
1888-1927	Railroad tracks associated with the Boston & Maine Railroad (1900 Sanborn Map depicts up to 18 tracks at the site, mostly ending on the property to the north at what is now 419 Bremen Street and 355 Bennington Street)
1927-1947	Railroad tracks associated with the Boston & Maine Railroad (labeled on Sanborn maps as full of tracks)
1947-1960	Railroad tracks associated with the Boston & Maine Railroad (labeled on Sanborn Maps as full of tracks) Building close to Bremen Street labeled as Builders' Supplies
1960-1989	Large building along southwest side of Project site labeled as warehouse Building close to Bremen Street labeled as Builders' Supplies Railroad tracks
1989-presentday	Three existing buildings shown on Sanborn maps; no mention of occupants

The Project site is well-suited to a school, and is within a few hundred feet of Day Square, a small commercial node. More importantly, it is adjacent to several newly-developed public amenities. The three-mile East Boston Greenway passes adjacent to the site and connects the East Boston Piers to Belle Isle Marsh and Wood Island Bay Marsh while also passing the MBTA's Airport Station and Wood Island Station. Also adjacent to the Project site is the new East Boston branch of the Boston Public Library, which opened in early November 2013. Immediately west of the library is Bremen Street Park, featuring playgrounds, a fountain and wading pool, large open lawns, a community garden, and a performance amphitheatre.

The new Excel East Boston MS/HS will add to the public amenities already available to the local East Boston community and surrounding neighborhoods. Section 3.3 describes urban design in greater detail.

1.2.4 Project Schedule

The Proponent plans to begin site demolition, remediation, and excavation in Spring 2014, followed closely by Project construction. Construction is expected to be completed in Summer 2015, with occupancy of the Excel East Boston MS/HS facility expected in August 2015.

1.3 Zoning

The Project site is situated in the East Boston Neighborhood District governed by Article 53 of the Boston Zoning Code. It is the Central Corridor CE (Corridor Enhancement) District and a Special Study Overlay Area.

Because the proposed Project includes new construction of greater than 50,000 square feet, the Project is subject to Article 80 Large Project Review.

The Project will require zoning relief in the form of a variance for dimension and use. Elementary and secondary schools are not an allowed use in the CE subdistrict. Current zoning for the site allows a maximum 35-foot building height, while the proposed height is approximately 43 feet (excluding mechanicals). As the Project design advances during the course of Large Project Review, additional matters requiring zoning relief may be identified, including rear and side yard setbacks.

1.4 Legal Information

1.4.1 Legal Judgments Adverse to the Proposed Project

The Proponent is not aware of any legal judgments in effect or legal actions pending that are adverse to the Project.

1.4.2 History of Tax Arrears on Property

The Proponent does not have a history of tax arrears on any property owned within the City of Boston.

1.4.3 Evidence of Site Control

Friends of Excel Academy Charter Schools, Inc., a nonprofit organization ("Foundation") formed to support Excel Academy, is under contract to purchase the Project site from the current owner, 413-419 Bremen Street, LLC. The Proponent, or another special purpose entity formed for the purpose of constructing the school and leasing it to Excel Academy, will acquire the Project site by assignment of the purchase contract or by deed from the Foundation.

1.5 Permitting and Approvals

Table 1-2 identifies permits, reviews, and approvals expected to be required for this Project.

Table 1-2 Anticipated Permits, Reviews, and Approvals

Agency Name	*Permit / Review / Approval*
FEDERAL	
Federal Aviation Administration	Determination of No Hazard to Air Navigation
STATE	
Massachusetts Historical Commission	State Register Review
Department of Environmental Protection, Division of Water Pollution Control	Sewer Connection and Extension Permit
Department of Environmental Protection, Division of Air Quality Control	Air Plan Approval (if boilers >40,000 MMBTU)
LOCAL	
Boston Redevelopment Authority	Article 80 Large Project Review
Boston Landmarks Commission	Article 85 (Demolition Delay) review
Boston Parks Commission	Approval of construction within 100 feet of a park
Boston Transportation Department	Construction Management Plan Transportation Access Plan Agreement
Boston Water and Sewer Commission	Sewer Use Discharge Permit Site Plan Approval Construction Dewatering Permit Sewer Extension/ Connection Permit Stormwater Connection Groundwater Trust Certification
Boston Zoning Board of Appeal	Variance
Boston Inspectional Services Department	Building and Occupancy Permits
Boston Public Improvement Commission	Street and Sidewalk Occupation Permits
Boston Public Works Department	Curb Cut Permit; Street Occupancy Permit
Boston Fire Department	Plan Review
Boston Committee on Licensing	Fuel Storage

1.6 Community Outreach

The Proponent has engaged in public outreach by contacting various elected officials and community groups to present the Project and discuss its elements. To date, meetings have been held with State Senator Anthony Petruccelli, State Representative Carlo Basile, City Councilor Sal LaMattina, and Corinne Petraglia from Mayor Menino's Office.

The Proponent also presented to the Eagle Hill Civic Association and plans to meet with the Orient Heights Neighborhood Association and Project abutters in December. Institutional abutters, including Massport, the East Boston branch of Boston Public Library, and the YMCA, are also being engaged in discussions.

Section 2.0

Project Description

2.0 PROJECT DESCRIPTION

2.1 Existing Site

The Project site is located on Bremen Street between Prescott Street and Bennington Street in East Boston. It is bounded to the northwest by Bremen Street, to the northeast by an unused developed parcel followed by Bennington Street, to the southeast by the Martin A. Coughlin Bypass Road and the East Boston Greenway, and to the southwest by the East Boston branch of the Boston Public Library followed by Bremen Street Park. The site is immediately adjacent to civic and commercial uses, and has excellent access to a variety of public transit and vehicular transportation systems.

Figures 1-1 and 1-2 depict the Project site location, and Figure 1-3 illustrates existing conditions; photographs of the Project site are provided in Attachment A. Three vacant buildings exist on the property, and the Project site is almost entirely impervious, consisting of asphalt-paved parking areas and driveways, with only minor landscaped areas. Attachment A contains photographs of existing conditions on the site.

2.2 Proposed Development Program

2.2.1 Building Program

The proposed Project includes development of a 70,000-square-foot building to accommodate one-third of Excel Academy's middle school program and its entire high school program. The building program consists of the following elements:

- 32 core classrooms (eight Middle School, 24 High School);
- 3 specialized classrooms (two High School labs, one shared computer lab);
- Community spaces;
- A cafeteria with a mezzanine that doubles as a meeting space;
- A gymnasium which doubles as an auditorium;
- Administrative and support staff offices; and
- Other support spaces for the schools.

Key site design elements for the Project include:

- A pick-up/drop-off area with 30 vehicle queuing spaces;
- A 50-car parking lot;

- A dedicated bus drop-off area adjacent to Bremen Street;
- A new Bremen Street sidewalk behind the bus drop-off which will extend pedestrian accessibility from Bremen Street Park and the library;
- Gathering spaces outside the school entryways;
- An improved streetscape with plantings between the school and the street;
- A south-facing courtyard located between the classroom, gymnasium, and cafeteria wings; and
- A new gate to provide controlled access between the Project site and the East Boston Greenway.

A proposed site plan is provided as Figure 1-4, and a rendering is provided as Figure 2-1.

Urban design is described in further detail in Section 3.3.

2.2.2 Site Design

The proposed site design reflects the different conditions on various parts of the Project site and how these conditions relate to the proposed school building. The site landscape is shown on Figure 2-1.

By emphasizing continuity of streetscape and providing connections to the neighborhood and adjacent East Boston Greenway, the Project is intended to be a good neighbor within its urban setting. Along Bremen Street, the school will complete the street wall initiated by the neighboring public library. Parking for the proposed school will abut the new library parking, and the new concrete sidewalks, planters, and parking bays will extend from the new public library down Bremen Street through the school site. Planters similar to those along the public library street frontage will extend the streetscape and screen the proposed parking lot from the sidewalk.

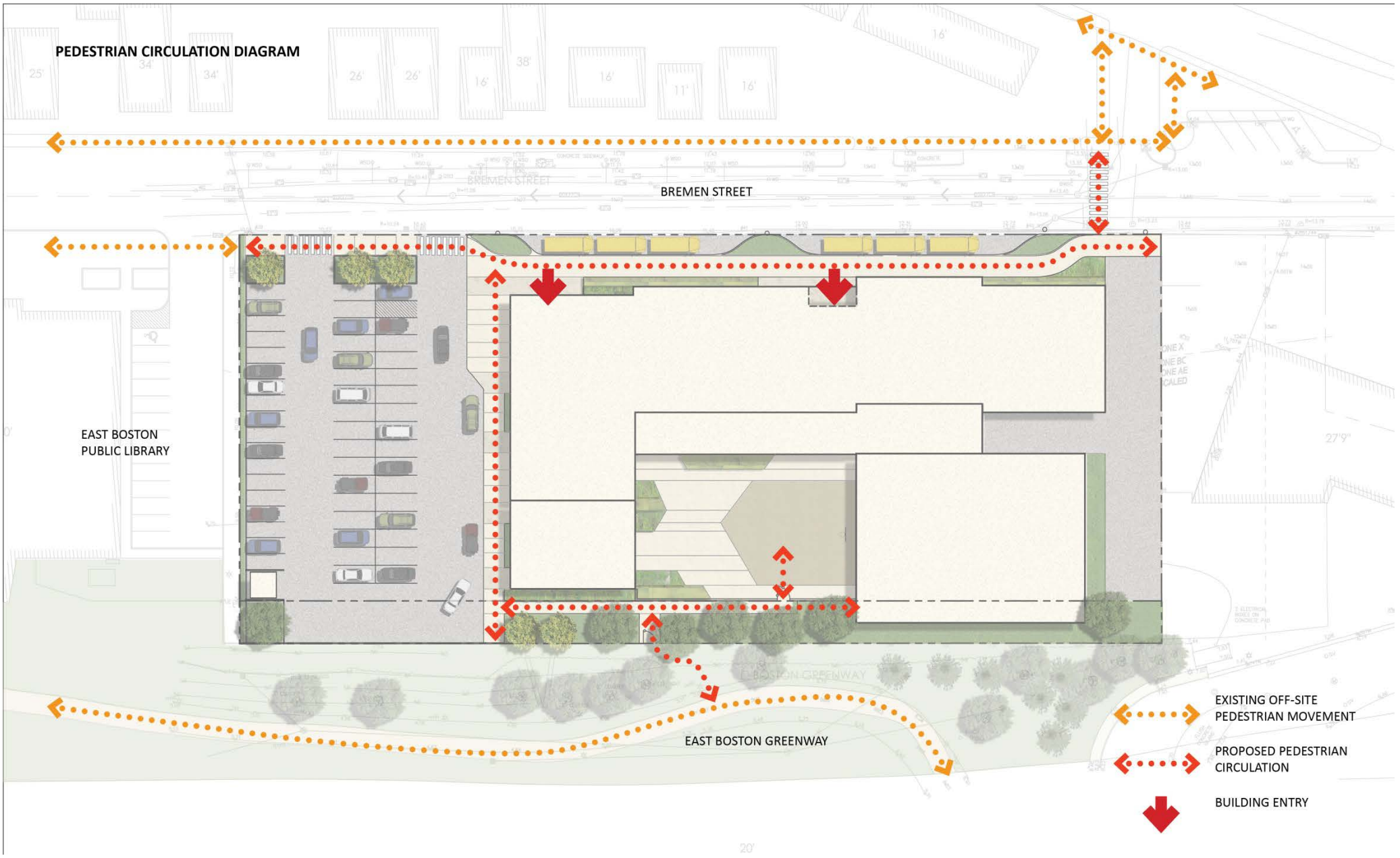
Relative to the East Boston Greenway and elevated highway, the proposed building will step back around a south-facing courtyard with plantings to supplement the Greenway plantings and to screen students' views of the elevated highway. Along the south edge of the courtyard, a naturalized planting of trees in lawn will extend the greenway landscape into the Project site while shading the building and proposed courtyard in summer. A secure, gated access point is proposed to connect the school site with the adjacent Greenway. Pedestrian circulation is shown on Figure 2-2. Access from the school building to the courtyard will be through a loggia from the middle school and high school lobbies; direct access to the courtyard will also be provided from the gymnasium and cafeteria. The courtyard will be open to the south sun during the winter, and will be fenced and gated along its southern edge to maintain security.

Excel East Boston MS/HS Boston, Massachusetts

Epsilon ASSOCIATES INC.

Figure 2-1

Project Rendering and Landscape Plan



Excel East Boston MS/HS Boston, Massachusetts

Epsilon ASSOCIATES INC.

Figure 2-2

Pedestrian Circulation

The Middle School and High School drop-off areas will be paved in high-quality, architectural-grade concrete with entries emphasized in exposed aggregate concrete pavement. Plantings in these areas will consist of low bands of ornamental grass that will allow clear views from inside the school.

The courtyard interior will consist of high-quality, architectural-grade concrete and a play area with a basketball hoop. Plantings throughout the site will be simple and low-maintenance, with key plantings consisting of strong bands of ornamental grasses that will reflect banding of the architecture and anchor the buildings. Existing and proposed trees along the site's southeast edge will provide shade. The Project design will use native, drought-tolerant vegetation.

2.2.3 Approximate Dimensions

Table 2-1 presents approximate Project dimensions. Attachment B contains proposed floor plans and elevations.

Table 2-1 Approximate Project Dimensions and Table of Uses

Project Element	*Approximate Dimension*
Existing Conditions	
Project Site	2.0 acres (87,120 square feet)
Existing Buildings (3)	24,000 square feet *(to be demolished)*
Open Space	0 square feet (all parking, driveway, and buildings)
Proposed Conditions	
New Construction	70,270 square feet
Classroom space	*24,420 sf*
Cafeteria	*4,260 sf*
Gymnasium	*8,500 sf*
Other	*33,089 sf*
Maximum Building Height	43 feet (excluding mechanicals)
Floor Area Ratio	0.81
Parking Spaces	50 (2 accessible)
Open Space	24,100 square feet

2.3 Schedule

Site demolition, remediation, and excavation activities, followed quickly by Project construction, are expected to commence during the first quarter of 2014. The Project is expected to be complete in Summer 2015, with occupancy of the Excel East Boston MS/HS in August 2015.

Typical construction hours will comply with the City's Construction Ordinance: Monday through Friday from 7:00 a.m. to 6:00 p.m., with no work anticipated on the weekends. In the event that weekend work is necessary, the Proponent will obtain required City approvals.

Section 3.0

Assessment of Development Review Components

3.0 ASSESSMENT OF DEVELOPMENT REVIEW COMPONENTS

Article 80 of the Boston Zoning Code specifies that the BRA may require in its Scoping Determination that the applicant conduct studies to determine the direct or indirect impact to the environment reasonably attributable to a proposed project. The development review components include transportation, environmental protection, urban design, historic resources, and infrastructure systems. Where potential for direct or indirect impacts exist, design measures may be required to mitigate the impacts, to the extent economically feasible. This Expanded PNF contains discussions and studies for the development review components as well as proposed mitigation.

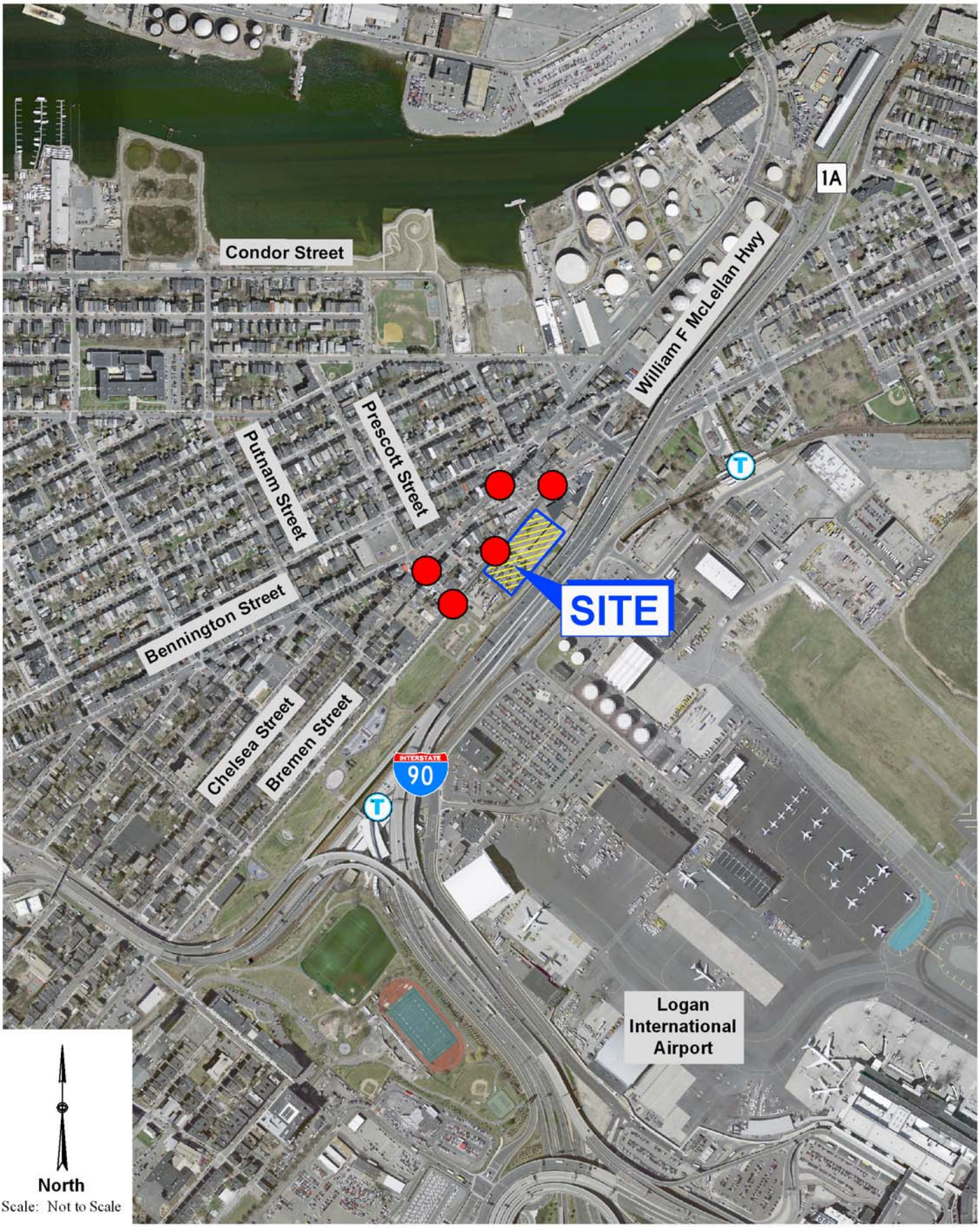
3.1 Transportation

MDM Transportation Consultants, Inc. (MDM) has prepared this traffic and circulation assessment for the proposed Excel East Boston MS/HS Project located at 413 Bremen Street in East Boston, Massachusetts. This evaluation documents anticipated traffic generation characteristics, traffic impacts, and pick-up/drop-off operations for the proposed school and identifies recommended site access and circulation features to accommodate school traffic operations. Study area intersections around the Project site are shown on Figure 3-1. Key findings of the study are as follows:

- *Proposed Site Programming:* Excel Academy proposes to construct a new school building and occupy the site at 413 Bremen Street with enrollment of up to 224 middle school students and 672 high school students for a total enrollment capacity of 896 students. Site programming information for the existing Excel Academy schools in East Boston indicates a high reliance on public transportation/walking mode share (75%). Remaining students will arrive and depart via parent vehicle (approximately 17%) and school bus (8%). Proposed site access and circulation will accommodate peak student pick-up/drop-off operations entirely within the site.

- *Projected Trip Generation:* Trip generation for the proposed school is based on anticipated operating characteristics provided by Excel Academy. The proposed Excel East Boston MS/HS will operate with two staggered arrival periods and three staggered dismissal periods, and is estimated to generate approximately 366 trips (203 entering and 163 exiting) during the weekday morning peak hour and approximately 280 trips (125 entering and 155 exiting) during the weekday evening peak hour. On a daily weekday basis, the Project is estimated to generate approximately 732 vehicle trips.

- *Adequate Roadway Capacity:* The change in site use to accommodate the Excel East Boston MS/HS is expected to moderately increase traffic activity on area roads during the peak hours. Increases in peak hourly site traffic at the study intersections (identified below) are generally not expected to materially impact operations at the intersections, with delay increases of six seconds or less. The signalized Chelsea Street/Prescott Street intersection operates at overall Level of Service (LOS) D or



Excel East Boston MS/HS Boston, Massachusetts

Study Locations

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

Figure 3-1
Study Area Intersections

better, and the unsignalized study intersections generally operate at LOS C or better. The exception is the westbound Bennington Street Extension approach to Chelsea Street, which operates with long delays at LOS E/F during peak hours. However, overall intersection traffic increases due to the proposed school development amount to 7 percent or less.

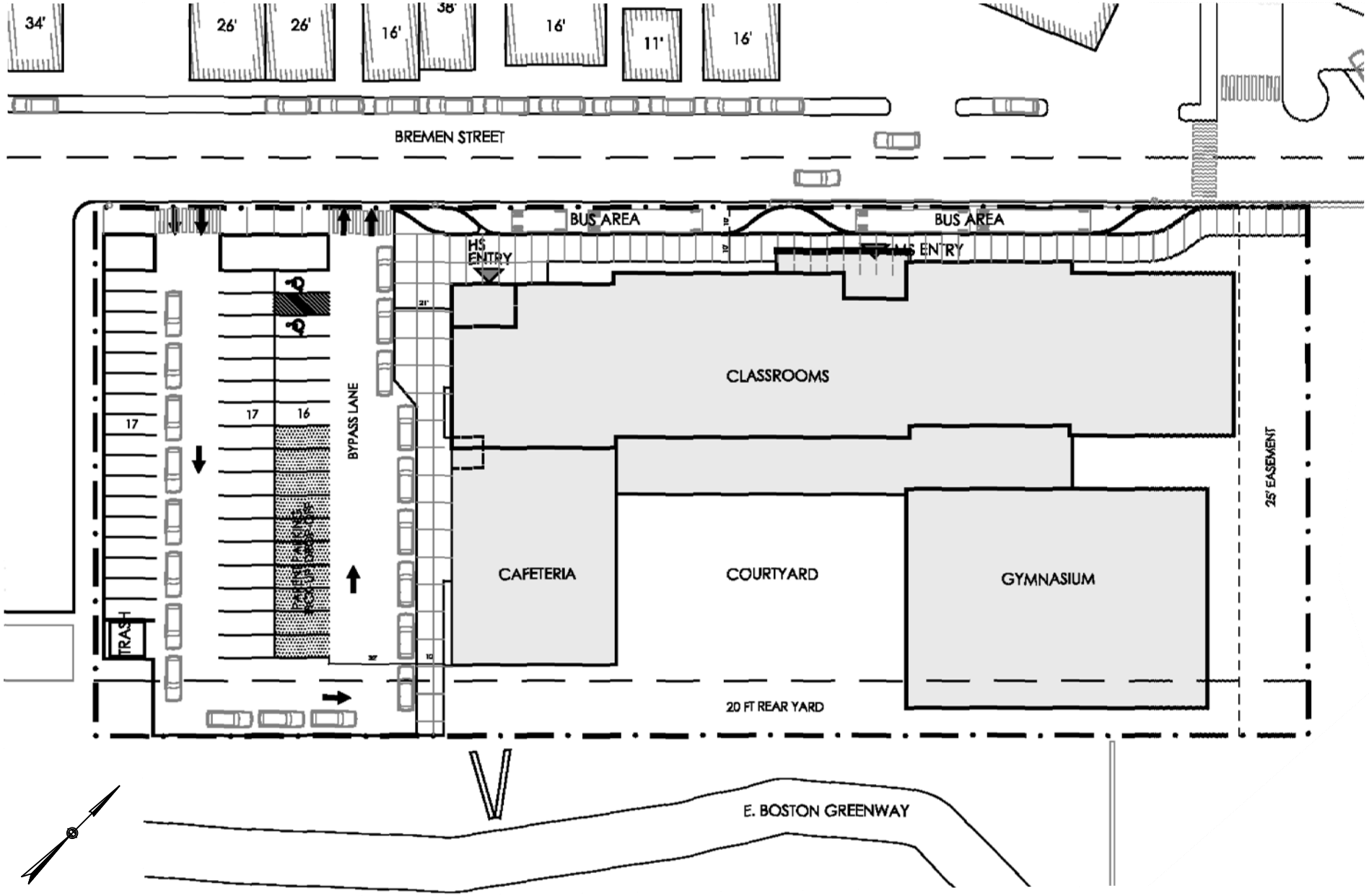
- *Site Access and Circulation:* The proposed site access and circulation plan provides 50 parking spaces with a dedicated parent vehicle pick-up/drop-off area along the south side of the school building and a dedicated school bus pick-up/drop-off area along the east side of Bremen Street. On-site vehicle queue capacity of approximately 30 passenger cars will accommodate peak pick-up/drop-off periods without impeding traffic flow on Bremen Street. A direct connection to the East Boston Greenway is proposed to encourage and facilitate walking and bicycling trips as well as use of the MBTA Wood Island and Airport transit stations located within a third of a mile of the site (i.e., a 10-minute or less walk).

In summary, Excel Academy is expected to take advantage of the various public transportation opportunities in the area to reduce vehicle trips to the site (accounting for 75 percent of the student travel mode and more than 60 percent of the staff travel mode). The analysis provided herein concludes that the proposed school use will not materially impact operations at the proposed site driveway or at nearby study intersections. Implementation of the recommended traffic management plan (TMP) will facilitate peak school drop-off/pick-up operations with no impact to or reliance upon public streets for vehicle queuing.

3.1.1 Proposed Excel Academy Operations

Excel Academy plans to relocate its Orient Heights middle school operations from 1150 Saratoga Street in East Boston to 413 Bremen Street with an enrollment of approximately 224 students in grades 5 through 8. In addition, the new Excel Academy facility will include a high school (grades 9 through 12) with enrollment of up to 672 students for a total school enrollment of 896 students. The current development plan proposes one academic building consisting of classrooms, educational spaces, gymnasium, and support services (i.e., administration offices, cafeteria, and storage) to be shared by the middle school and high school (see Section 2.0 for a more detailed Project description).

Access to the facility is proposed via an entrance-only driveway and an exit-only driveway along Bremen Street that will be separated by a distance of approximately 60 feet; site access currently includes two driveways along Bremen Street. The proposed access driveways will be provided in the southern portion of the site. A dedicated school bus drop-off/pick-up area is proposed along Bremen Street just north of the proposed site driveways. A 50-space parking lot is also included in the site design. The proposed site layout is shown in Figure 3-2.



North

Scale: Not to Scale

Excel East Boston MS/HS Boston, Massachusetts

Site Plan Source: Studio G Architects

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

Figure 3-2
Proposed Site Layout

Proposed operations on the site are described below:

- General hours of operation for Excel Academy will be 7:30 AM to 5:00 PM, with morning drop-off periods of 7:30 AM for high school students and 8:00 AM for middle school students. Evening pick-up periods for middle school and high school students will be staggered among three different dismissal periods: 3:40 PM, 4:30 PM, and 5:00 PM.

- Staff will include approximately 105 on-site staff members which will include 86 full-time teachers (29 middle school teachers and 57 high school teachers), 7 part-time teachers (6 middle school teachers and 1 high school teacher), and 12 administration staff (10 full-time and 2 part-time).

- The Proponent expects that the majority of the staff will arrive and depart within 30 minutes of student arrival and departure, consistent with operations at other Excel Academy schools in Boston. During the staggered dismissals, it is estimated that approximately 25% of students and staff will depart at 3:40 PM, 50% will depart at 4:30 PM, and 25% will depart at 5:00 PM.

- A TMP will be implemented at Excel Academy to manage pick-up/drop-off activities at the site and the vehicle queue. These TMP practices are described in more detail under Site Access and Circulation in Section 3.1.4.3.

3.1.2 Baseline Traffic Characteristics

An overview of existing (Baseline) roadway conditions, traffic volume characteristics, and public transit characteristics is provided below.

3.1.2.1 Bremen Street

Bremen Street is classified by the Massachusetts Department of Transportation (MassDOT) as an Urban Minor Arterial roadway under local (City) jurisdiction. In the Project area, Bremen Street is generally a northeast-southwest roadway which runs parallel to the East Boston Greenway and connects Bennington Street with Saratoga Street and to the waterfront in East Boston. In the study area, Bremen Street provides two-way traffic flow and generally provides sidewalks along both sides of the roadway; on-street parking is provided along both sides of Bremen Street south of Prescott Street and along the western side of Bremen Street north of Prescott Street. Land use along Bremen Street within the Project area primarily consists of the East Boston Greenway, residential uses, and some commercial uses. A new branch of the Boston Public Library just opened in early November 2013 immediately south of the site along Bremen Street.

3.1.2.2 Baseline Traffic Data

Traffic volume data were collected at study area intersections during the weekday morning (7:00 AM - 9:00 AM) and weekday evening (3:00 PM – 6:00 PM) periods to coincide with peak traffic activity from the proposed Excel Academy and adjacent streets. Traffic data used in this evaluation were collected in October 2013 and are included in Attachment C. Existing weekday morning and weekday evening peak hour traffic volumes for the primary study intersections are shown in Figures 3-3 and 3-4.

Weekday morning and weekday evening peak hour pedestrian crossing volumes were also collected at each study area intersection and are presented in Figures 3-5 and 3-6. It should be noted that construction staging associated with the new East Boston Public Library located at the Bremen Street/Prescott Street intersection restricted access to the northerly Bremen Street leg during the pedestrian count. However, it should also be noted that a new crosswalk with wheelchair ramps will be constructed on this leg as part of the library project. There were no restrictions to the southerly Bremen Street crossing, which was one of the heavier crossing locations observed in the study area.

3.1.2.3 Public Transportation Facilities

The MBTA operates the following bus and subway lines in the site vicinity (specific route and schedule information is provided in Attachment C and specific local bus and subway routes are shown in Figure 3-7):

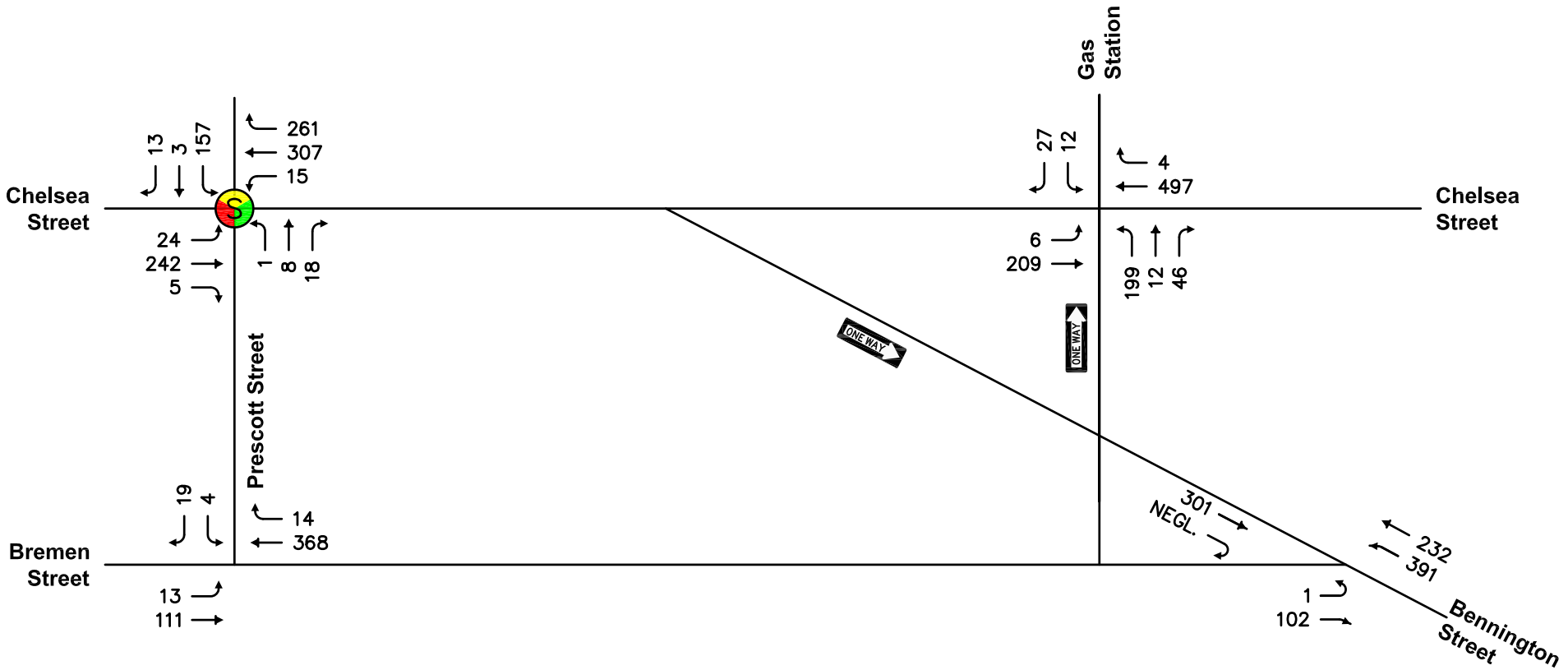
- **Route 112 – Wellington Station – Wood Island Station:** This line provides service between Wellington Subway Station (Orange Line) and Wood Island Station (Blue Line) via Day Square. This bus service generally operates approximately every 40 minutes on weekdays.

- **Route 120 – Orient Heights – Maverick Station:** This line provides service between Orient Heights Subway Station (Blue Line) and Maverick Station (Blue Line) via Day Square. This bus service generally operates approximately every 15 to 20 minutes on weekdays.

- **Blue Line:** This subway line provides service between Wonderland Station and Bowdoin Station with stops at nearby Wood Island Station and Airport Station, which are each less than a 10-minute walk from the Project site. This subway service generally operates every 5 to 15 minutes on weekdays.

3.1.3 Projected Future Traffic Conditions

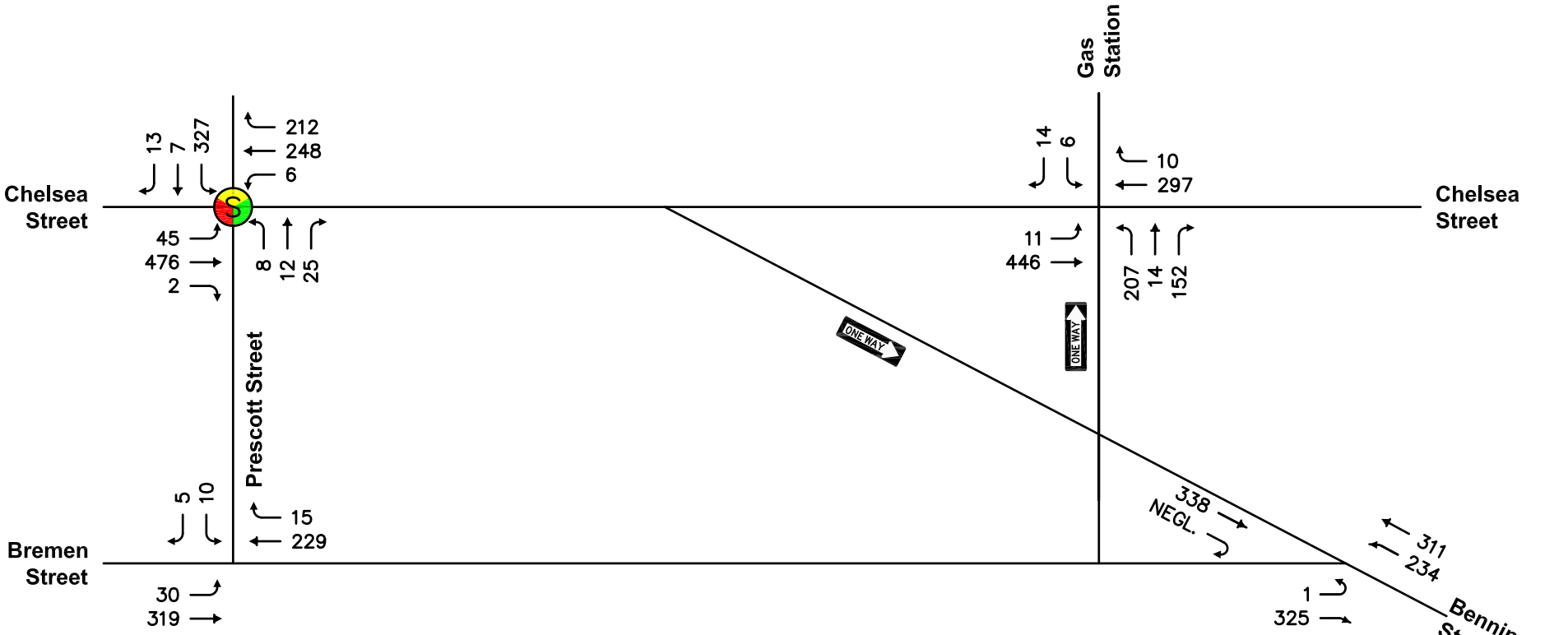
Evaluating the proposed development's transportation impacts requires establishing a future baseline analysis condition. This section estimates future roadway and traffic conditions with and without the proposed Project. Consistent with Boston Transportation Department (BTD) guidelines, a five-year planning horizon (year 2018) was selected for this evaluation.



Excel East Boston MS/HS Boston, Massachusetts

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

Figure 3-3
2013 Existing Conditions Weekday Morning Peak Hour Traffic Volumes



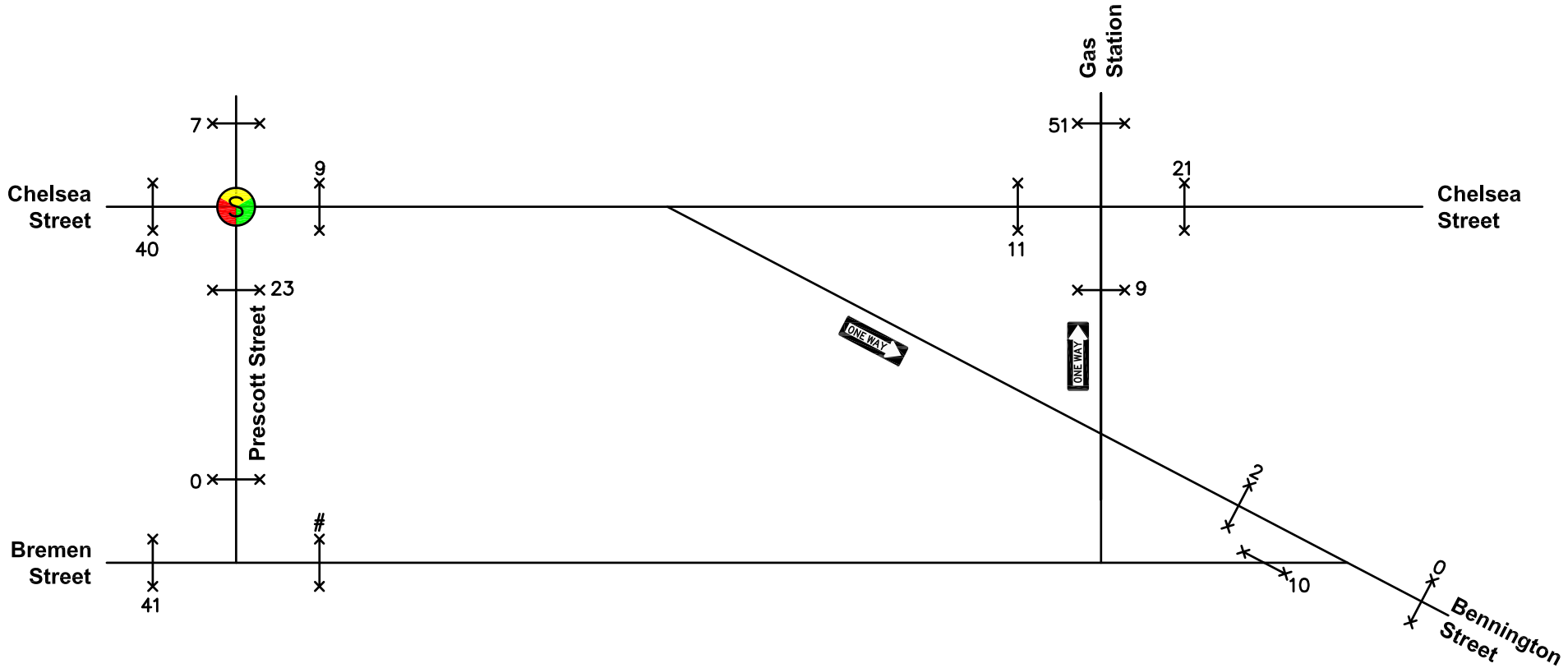
SITE

North
Scale: Not to Scale

NOTES:
NEGL. = Negligible
S = Signalized Intersection

Excel East Boston MS/HS Boston, Massachusetts

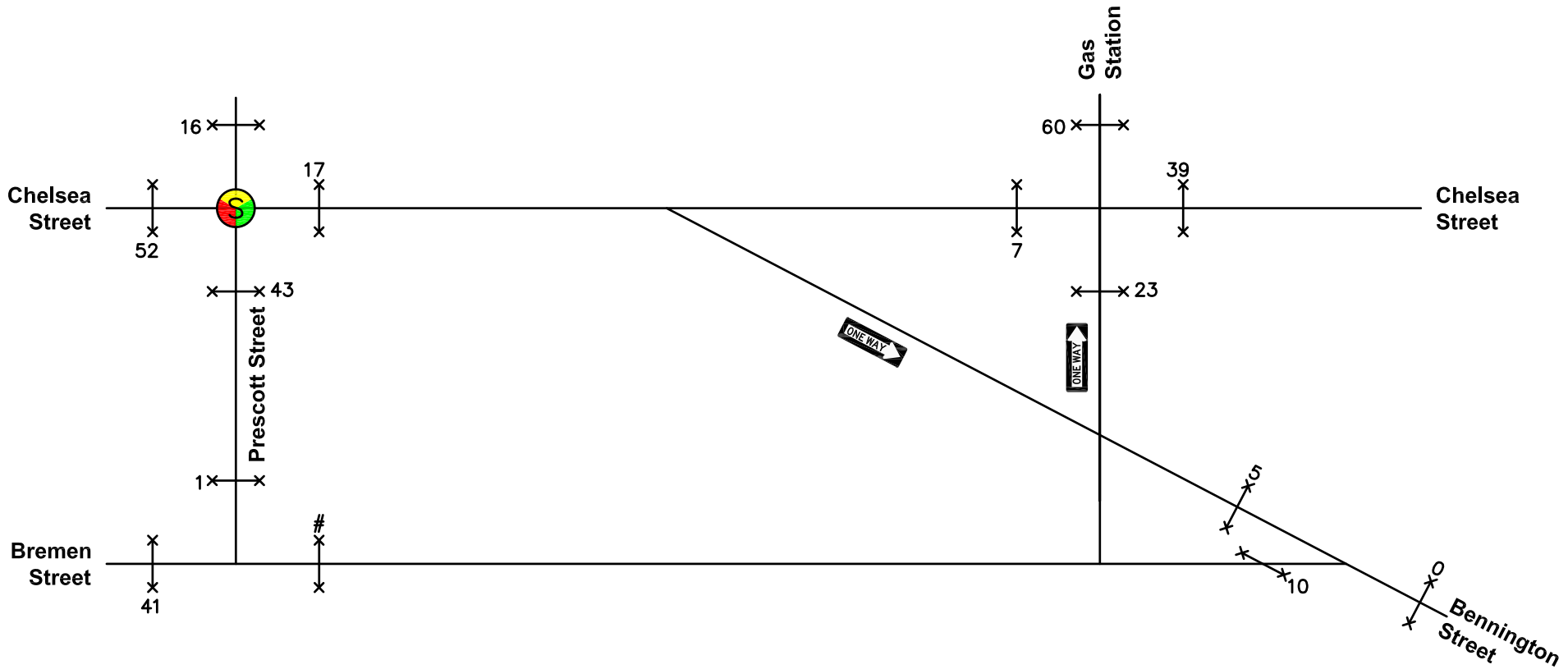
Figure 3-4
2013 Existing Conditions Weekday Evening Peak Hour Traffic Volumes



Excel East Boston MS/HS Boston, Massachusetts

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

Figure 3-5
2013 Existing Conditions Weekday Morning Peak Hour Pedestrian Volumes



Excel East Boston MS/HS Boston, Massachusetts

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

Figure 3-6
2013 Existing Conditions Weekday Evening Peak Hour Pedestrian Volumes

To determine the potential impacts of site-generated traffic volumes on the roadway network under future conditions, baseline traffic volumes in the study area were projected to a 2018 condition. Traffic volumes on the roadway network at that time in the absence of the Project (i.e., the No-Build condition) include existing traffic, new traffic due to general background traffic growth, and traffic related to specific developments by others that are currently under review at the local and/or state level. Consideration of these factors resulted in the development of future No-Build traffic volumes. Anticipated site-generated traffic volumes were then superimposed on the No-Build traffic-flow networks to develop future Build conditions.

The following sections provide an overview of the future traffic volumes.

3.1.3.1 Background Growth

Background traffic includes demand generated by other developments planned in the area as well as demand increases caused by external factors. External factors are general increases in traffic not attributable to a specific development and are determined based on growth rates provided by BTD. For purposes of this evaluation, a 0.25 percent growth rate was used (i.e., a 1.3 percent increase over the five-year horizon).

There are also currently several site-specific development projects in East Boston that may increase traffic at the study intersections:

- **Southwest Service Area Redevelopment Program at Boston-Logan International Airport**: This development is a 1.3 million-square-foot parking garage facility proposed at Boston-Logan International Airport to consolidate rental car services and upgrade and replace existing ground transportation services at the airport. The rental car center opened in late September 2013; therefore, it is assumed that new traffic associated with this development is accounted for in the October 2013 traffic counts presented in this evaluation.

- **Suffolk Downs Casino**: This development is a proposed 1.8 million-square-foot resort casino to be located at the existing Suffolk Downs property in East Boston. The casino could include two hotels with a combined 450 rooms, 15 restaurants, 5,000 slot machines, 200 table games, and 30,000 square feet of retail space with approximately 2,550 parking spaces. Based on the Draft Environmental Impact Report/Expanded Project Notification Form (DEIR/Expanded PNF)[1], that project would generate a negligible amount of traffic through the study intersections for this proposed Project. Therefore, traffic associated with the potential Suffolk Downs casino development is assumed to be accounted for in the 0.25 percent growth rate.

[1] *Draft Environmental Impact Report, Expanded Project Notification Form, Caesars Resort at Suffolk Downs, Boston and Revere, Massachusetts,* prepared by Epsilon Associates, dated October 9, 2013.

- **Boston East Redevelopment**: This development is a proposed 196-unit residential development with approximately 20,000 square feet of marine industrial space and approximately 141 parking spaces. Traffic associated with this development was based on the DEIR/Draft Project Impact Report (DPIR)[2], which indicated that a negligible amount of traffic will be generated through study area intersections. Therefore, traffic associated with this development is assumed to be accounted for in the 0.25 percent growth rate.

- **New Street Development**: This development is a proposed mixed-use development consisting of residential apartments, a restaurant, and marina. An alternative build program would also include an extended stay hotel. Traffic associated with this development was based on the DEIR/DPIR[3] which indicated that a negligible amount of traffic will be generated through the study area intersections. Therefore, traffic associated with this development is assumed to be accounted for in the 0.25 percent growth rate.

- **Boston Public Library East Boston Branch**: This development is an approximately 15,000-square-foot public library located at the intersection of Bremen Street and Prescott Street and adjacent to the Project site. The library opened in early November 2013 and was not accounted for in the traffic volume data collected in October 2013 for the area roadways. Given the limited amount of on-site parking and the fact that the library use is intended to serve the surrounding neighborhood, it is anticipated that traffic generated by the proposed library can be adequately accounted for in the 0.25 percent background growth rate.

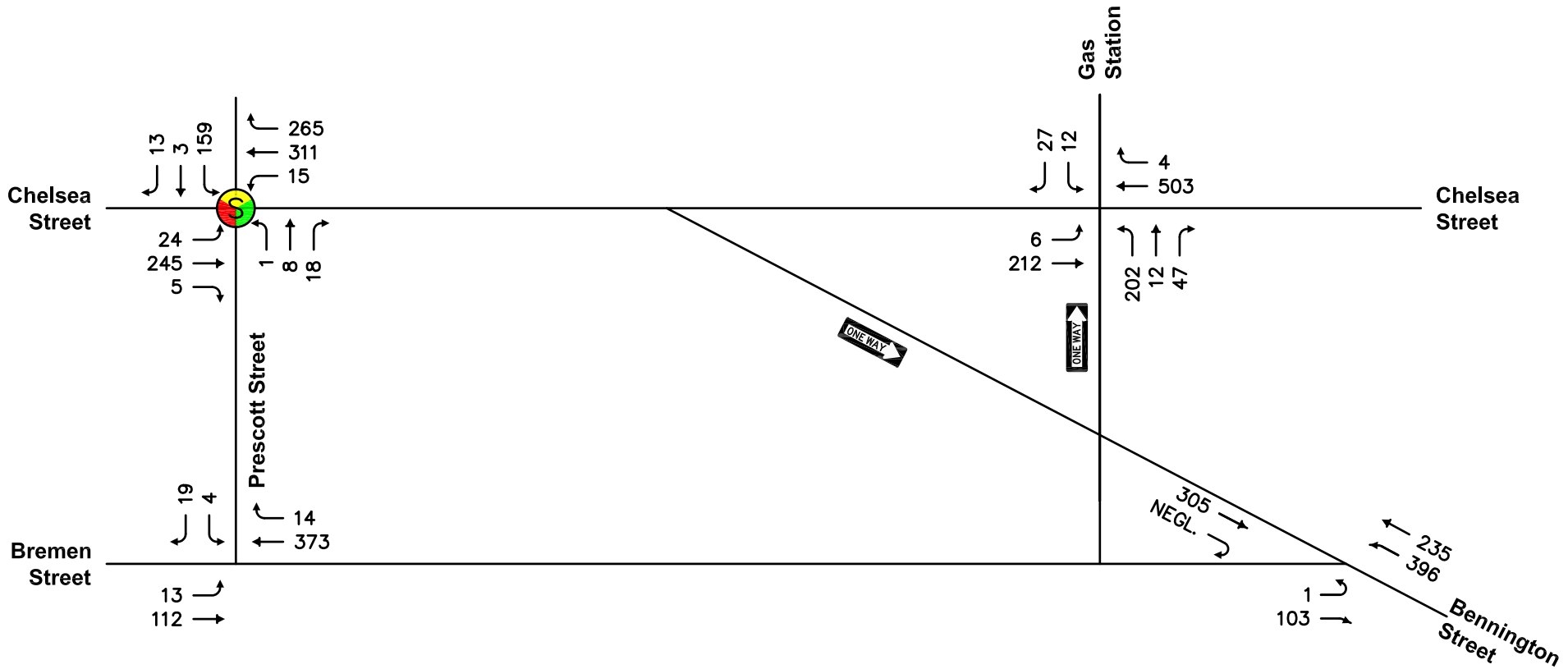
3.1.3.2 2018 No-Build Traffic Volume Networks

In summary, to account for future traffic growth in the study area future No-Build traffic volumes are developed by increasing the existing (2013) volumes by approximately 1.3 percent (0.25 percent compounded annually over five years). Resulting 2018 No-Build traffic volumes are displayed in Figures 3-8 and 3-9 for the morning and afternoon peak hours, respectively. To provide a conservative evaluation, no re-occupancy of the site has been accounted for in the No-Build condition analysis.

---

2 *Draft Environmental Impact Report, Draft Project Impact Report, Boston East, East Boston, Massachusetts,* prepared by Trinity Border Street, LLC, dated June 2, 2008.

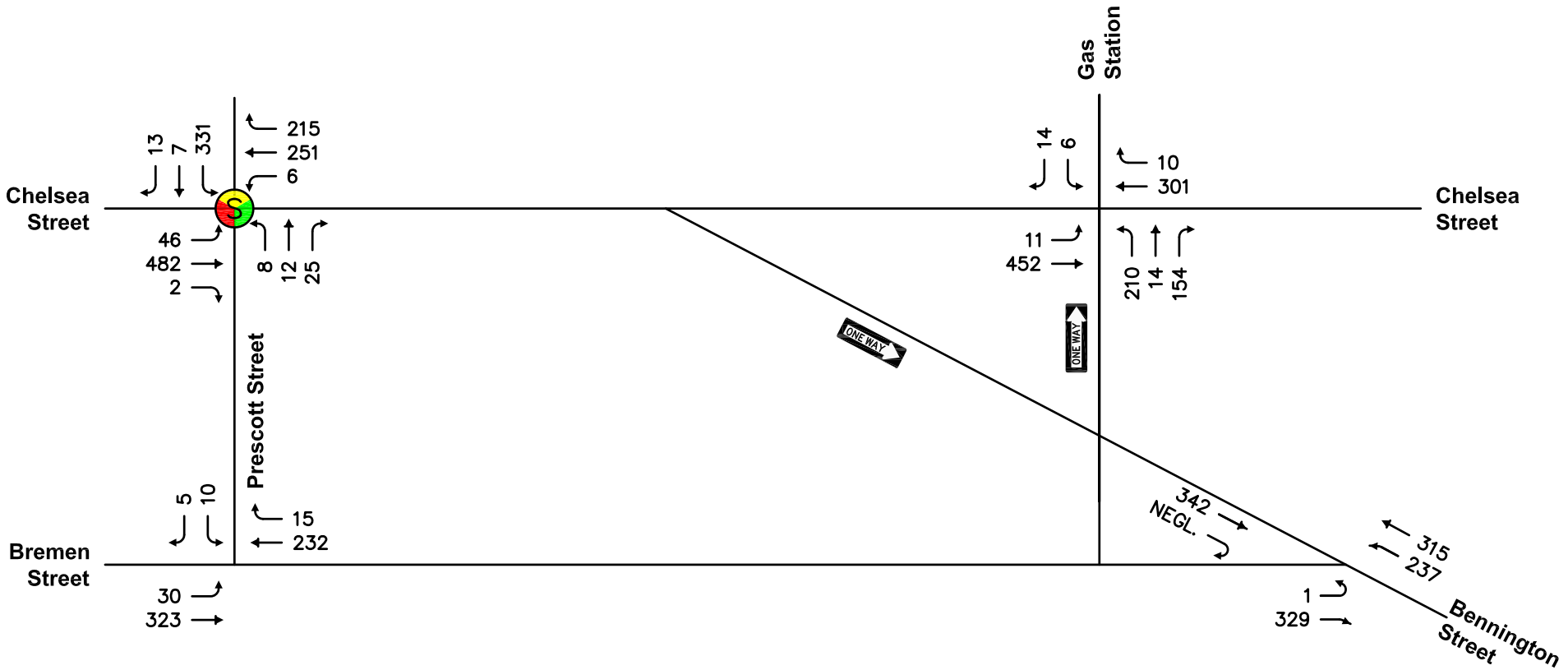
3 *Draft Environmental Impact Report, Draft Project Impact Report, Boston East, East Boston, Massachusetts,* prepared by Trinity Border Street, LLC, dated June 2, 2008.



Excel East Boston MS/HS Boston, Massachusetts

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

Figure 3-8
2018 No-Build Conditions Weekday Morning Peak Hour Traffic Volumes



Excel East Boston MS/HS Boston, Massachusetts

Figure 3-9
2018 No-Build Conditions Weekday Evening Peak Hour Traffic Volumes

3.1.3.3 Trip Generation – Excel East Boston MS/HS

Trip generation estimates are derived for the critical school activity periods, including morning and evening pick-up/drop-off periods, based on projected site programming characteristics for the proposed Excel Academy middle school/high school. A detailed trip generation summary for the site, based on a projected maximum student enrollment of 224 middle school students and 672 high school students as well as approximately 105 staff members is presented in Table 3-1 and is described below. This trip generation summary includes a breakdown of vehicular trips by staff member, pick-up/drop off (student), and school bus trips. Trip generation methodology is presented in Attachment C.

Table 3-1 Detailed Trip Generation Summary for the Project

	Vehicle Trips[1]				
Period[2]	*Staff Auto*[3]	*Middle School Student Auto*	*High School Student Auto*	*Bus*	*Total*
Weekday Morning Peak Hour					
Enter	40	50	105	8	**203**
Exit	0	50	105	8	**163**
Total	40	100	210	16	**366**
Weekday Evening Peak Hour					
Enter	0	38	79	8	**125**
Exit	30	38	79	8	**155**
Total	30	76	158	16	**280**
Weekday Daily	80	200	420	32	**732**

[1] Peak hour trip estimates based on anticipated operating characteristics at the proposed Excel Academy including credit taken for walkers, school bus use, and public transportation use.

[2]Based on anticipated school operations, it is estimated that all students and staff will arrive during the weekday morning peak hour and that 75% of students and staff will depart during the weekday evening peak hour.

[3]Due to limited on-site parking, it estimated that only approximately 40 staff vehicles will be allowed to park on-site. The remainder of the staff is expected to carpool, walk, or use public transportation.

As presented in Table 3-1, trip generation during the morning peak hour is approximately 366 vehicle-trips (203 entering and 163 exiting), including 310 parent/guardian drop-off vehicles, 8 school buses, and 40 staff vehicles. The actual number of concurrently queued school buses is expected to be four or less.

Trip generation during the afternoon peak hour is approximately 280 vehicle-trips (125 entering and 155 exiting), including 234 parent/guardian drop-off vehicles, 8 school buses, and 30 staff vehicles. The actual number of concurrently queued school buses is expected to be four or less.

On a daily basis, the Excel Academy MS/HS is estimated to generate approximately 732 trips (366 entering and 366 exiting) over a 24-hour period.

In summary, the projected peak design volume for school pick-up/drop-off activity (i.e., trips that must be actively managed by staff within the site) is 310 autos and 8 school buses during the weekday morning drop-off period. As described previously, the morning drop-off period will be staggered, with the high school beginning at 7:30 AM and the middle school beginning at 8:00 AM. The school is projected to utilize the public school bus system and public transportation for over 80% of its students during the morning drop-off period and the evening pick-up period.

3.1.3.4 Trip Distribution

Distribution for the facility's projected traffic is based on student enrollment information for Excel Academy's Orient Heights and Moore Street facilities as well as conditions within Excel Academy's charter with the Commonwealth of Massachusetts. For analysis purposes, the school bus regional trip distribution patterns are assumed to be equivalent to the student private vehicle trip distribution patterns. Staff trip distribution patterns are estimated based on staff characteristics at the existing Orient Heights and Moore Street facilities. The resulting trip distribution for new trips is presented in Figures 3-10, 3-11, and 3-12 for student automobile trips, school buses and staff trips, respectively. Trip distribution methodology is provided in Attachment C.

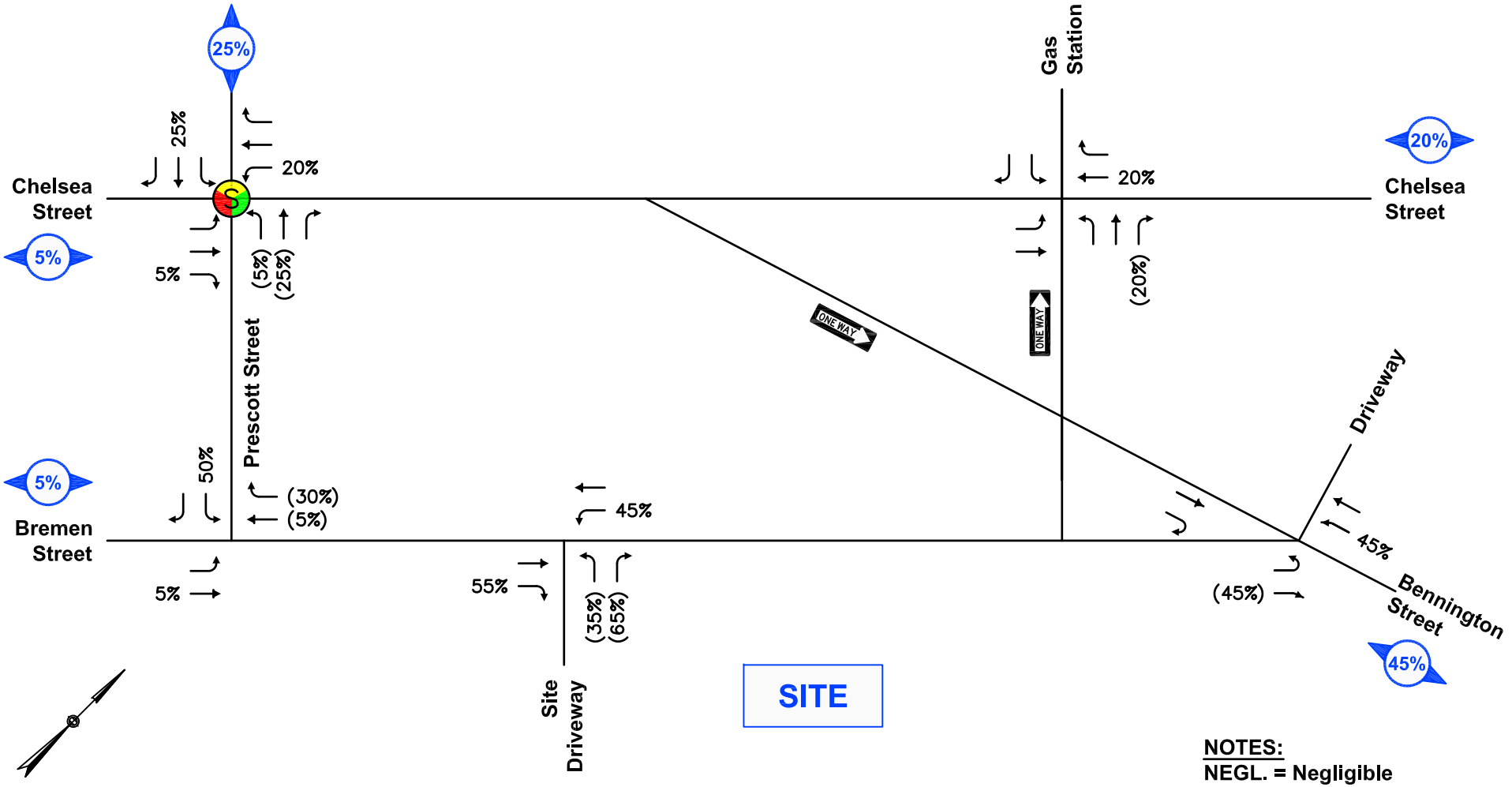
Development-related trips for the proposed school are assigned to the roadway network using the ITE trip generation estimates shown in Table 3-1 and the distribution patterns presented in Figures 3-10 through 3-12. Project-related trips at each intersection approach for the weekday morning and weekday evening peak hours are quantified in Figures 3-13 and 3-14, respectively.

3.1.3.5 2018 Build Traffic Conditions

The 2018 Build condition traffic volumes are derived by adding the incremental traffic increases for a school use at the site to the 2018 No-Build conditions. Figures 3-15 and 3-16 present the 2018 Build condition traffic-volume networks for the weekday morning and weekday evening peak hours, respectively.

3.1.3.6 Student Pick-Up/Drop-Off and Bus Loading

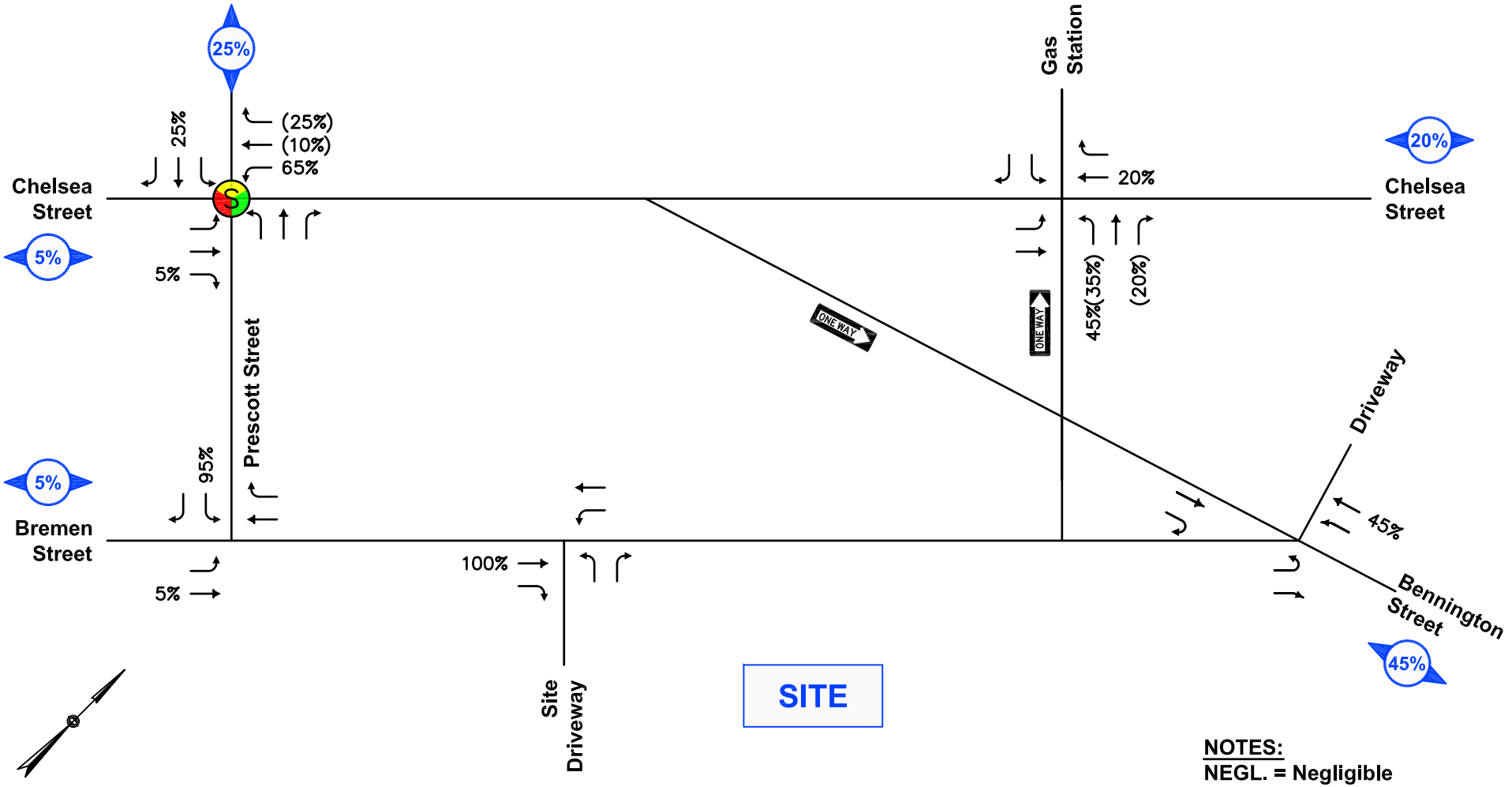
The proposed Project site design will provide designated areas for pick-up and drop-off by parents as well as school buses. Specifically, a 30-car queue storage area will be designated within the site and a one-way counter-clockwise circulation pattern will be established via separate entrance and exit driveways to accommodate the school's peak arrival and dismissal periods. Excel Academy expects that approximately one-quarter of the parents picking up during each dismissal period could be queued on-site prior to the dismissal time, which can be accommodated within this designated area.



Excel East Boston MS/HS Boston, Massachusetts

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

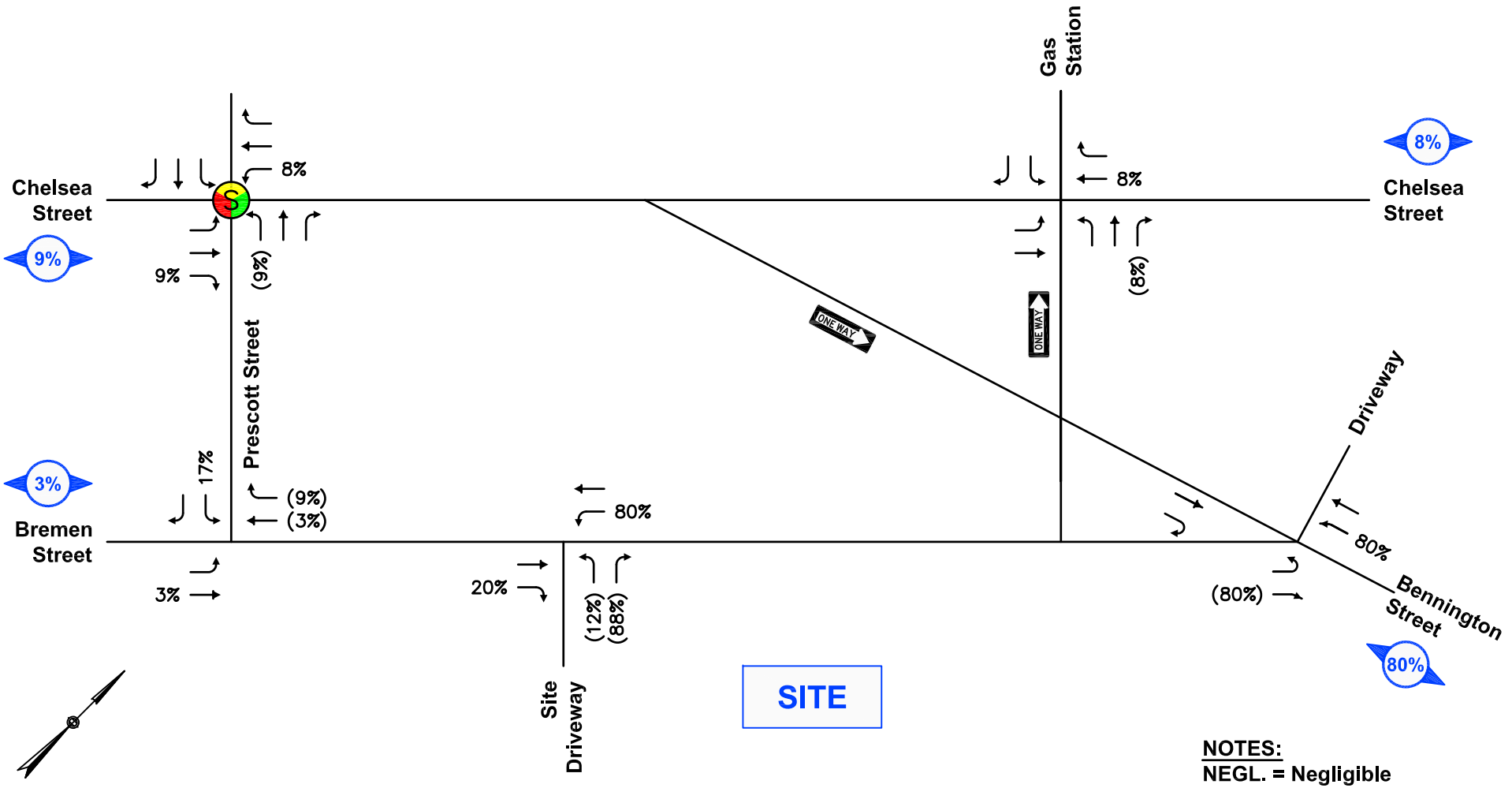
Figure 3-10
Student Drop-Off/Pick-Up
Auto Trip Distribution



Excel East Boston MS/HS Boston, Massachusetts

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

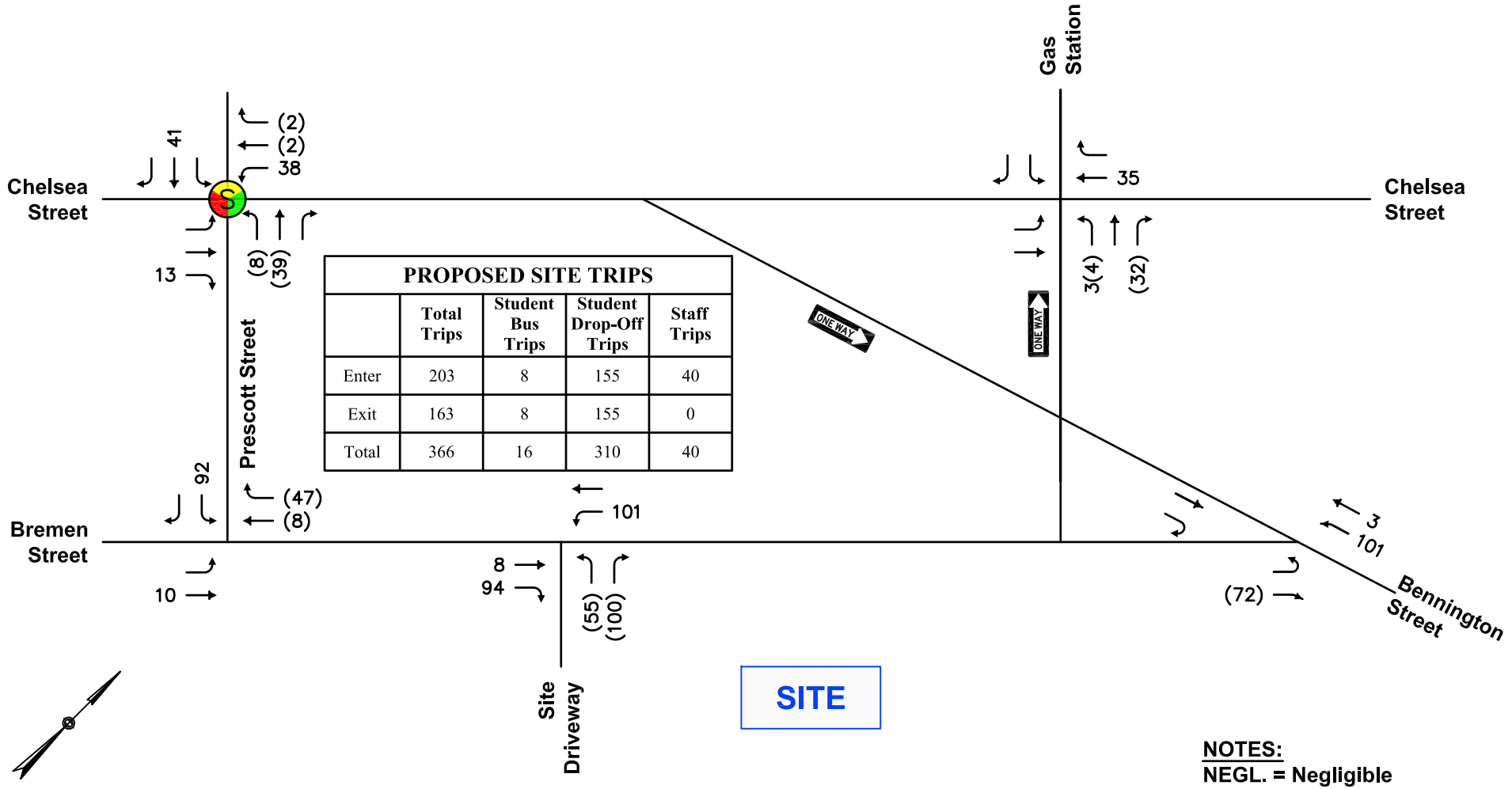
Figure 3-11
School Bus Trip Distribution



Excel East Boston MS/HS Boston, Massachusetts

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

Figure 3-12
Staff Trip Distribution



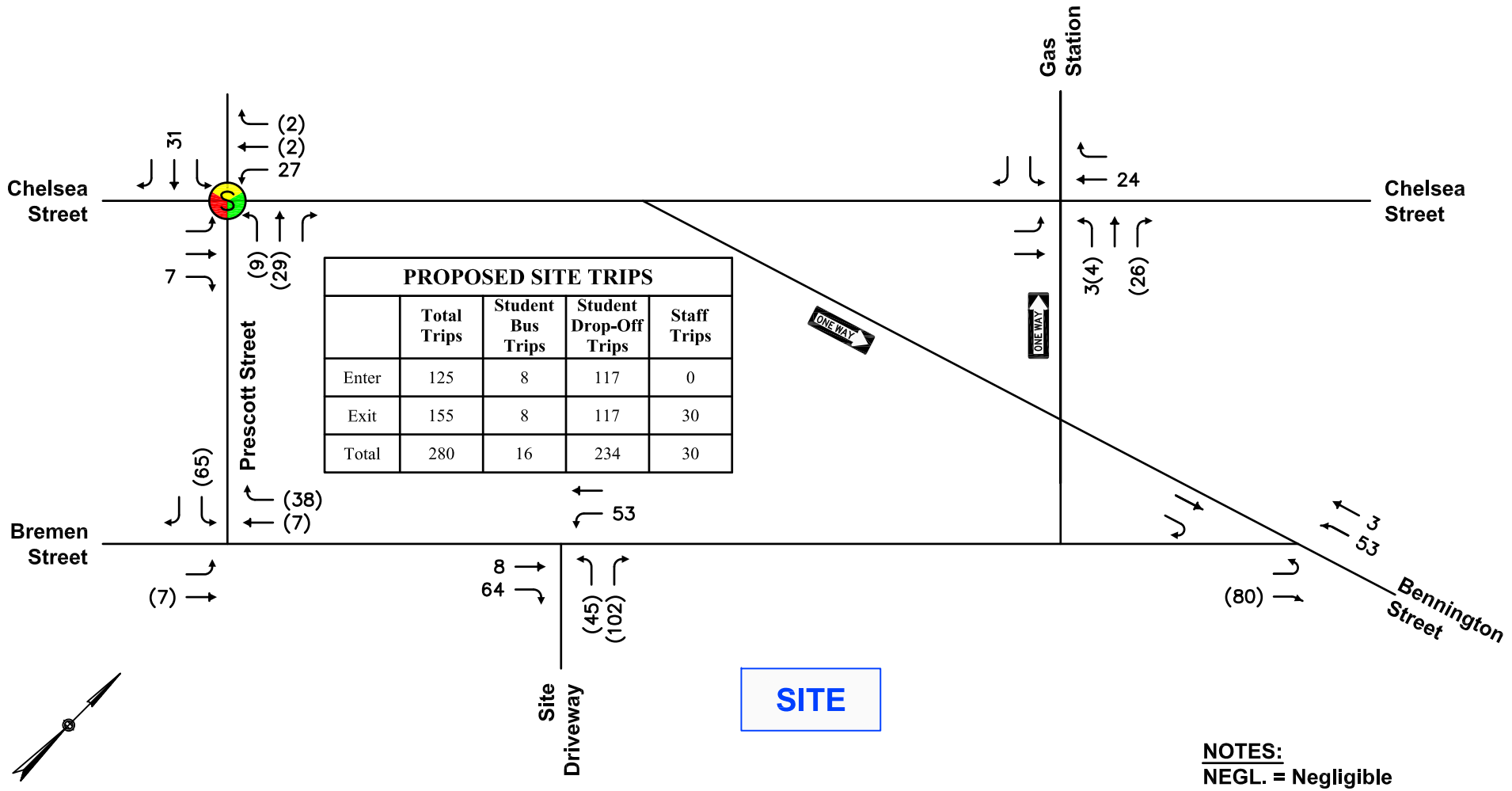
PROPOSED SITE TRIPS

	Total Trips	Student Bus Trips	Student Drop-Off Trips	Staff Trips
Enter	203	8	155	40
Exit	163	8	155	0
Total	366	16	310	40

NOTES:
NEGL. = Negligible
= Signalized Intersection
 # (#) = Entering (Exiting)

Excel East Boston MS/HS Boston, Massachusetts

Figure 3-13
Site Generated Trips Weekday Morning Peak Hour Traffic Volumes



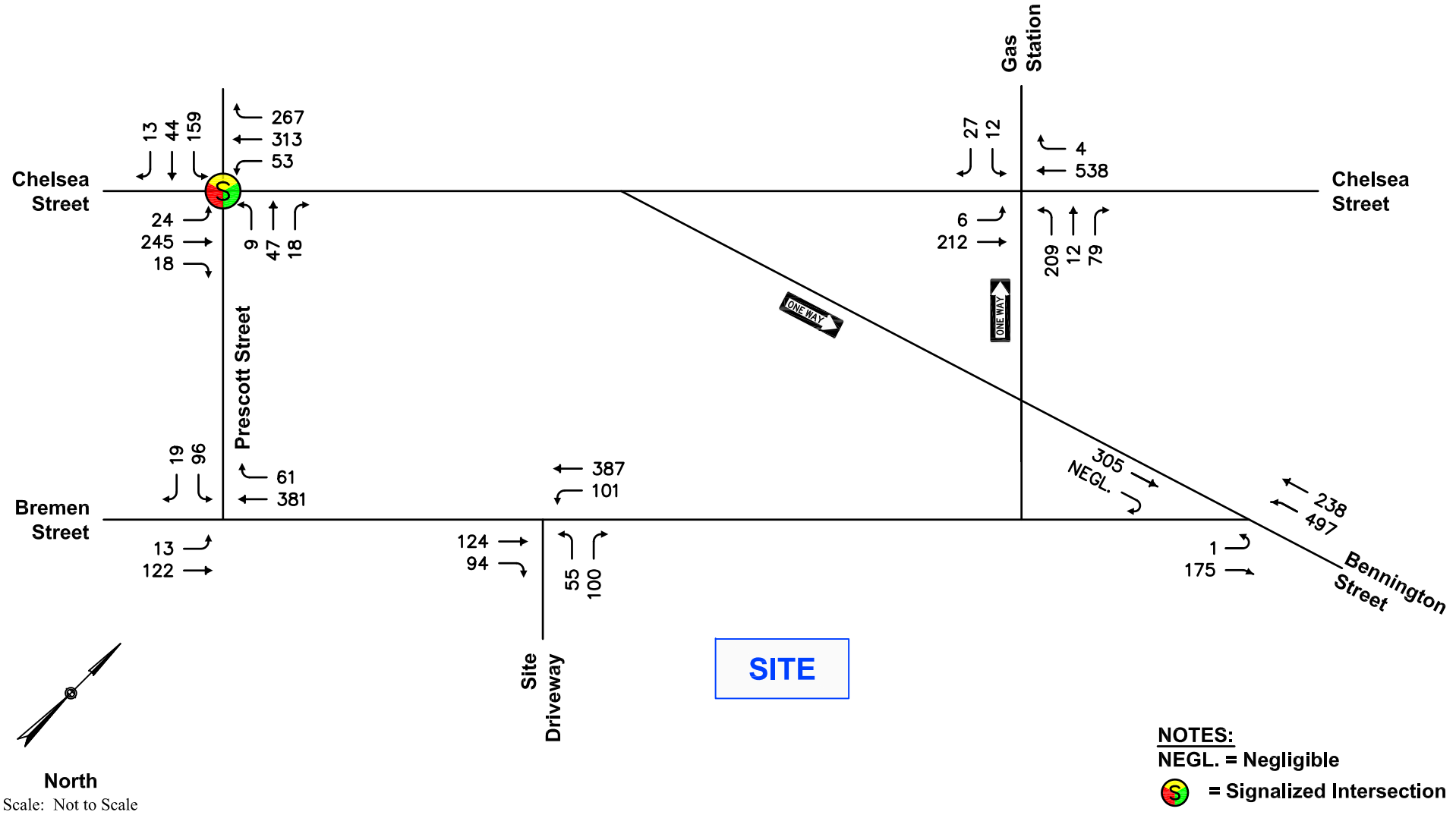
PROPOSED SITE TRIPS

	Total Trips	Student Bus Trips	Student Drop-Off Trips	Staff Trips
Enter	125	8	117	0
Exit	155	8	117	30
Total	280	16	234	30

NOTES:
NEGL. = Negligible
= Signalized Intersection
 # (#) = Entering (Exiting)

Excel East Boston MS/HS Boston, Massachusetts

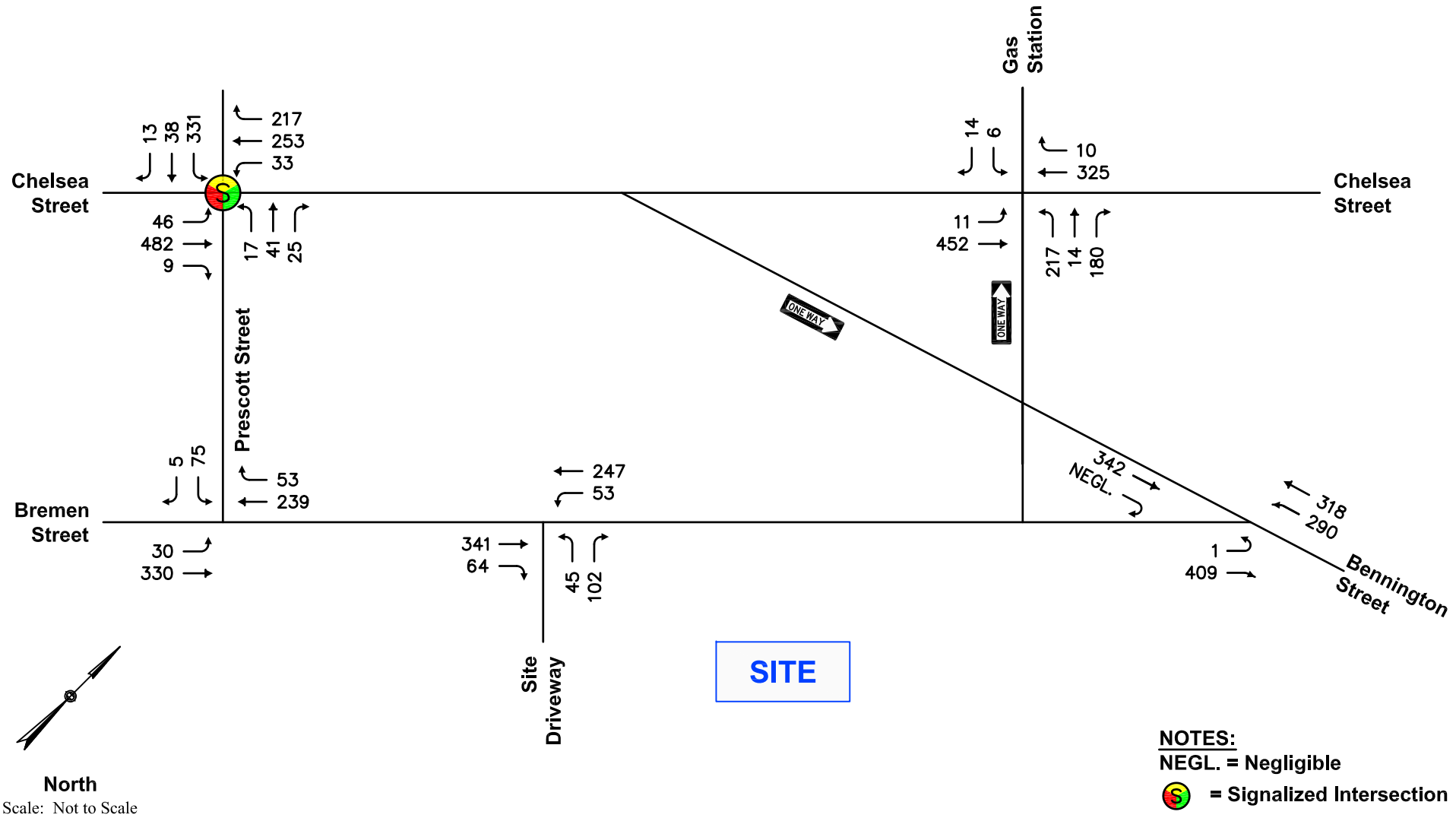
Figure 3-14
Site Generated Trips Weekday Evening Peak Hour Traffic Volumes



Excel East Boston MS/HS Boston, Massachusetts

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

Figure 3-15
2018 Build Conditions Weekday Morning Peak Hour Traffic Volumes



Excel East Boston MS/HS Boston, Massachusetts

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

Figure 3-16
2018 Build Conditions Weekday Evening Peak Hour Traffic Volumes

In addition, ten short-term parking spaces will be provided adjacent to the loading area for parents requiring additional time to load or unload. Excel Academy will review operations annually and will modify the parent drop-off/pick-up process and school policies as necessary, including instituting a vehicle-student identification system and pick-up time restrictions, should parent-vehicle volumes change significantly over time.

Based on the current busing program at Excel Academy's Orient Heights campus, two loading areas adjacent to Bremen Street will be designed to store a total of three full-size school buses and one compact school bus to service the middle school portion of the Project. School bus service is not anticipated for high school students.

3.1.4 Operations Analysis

This section provides an overview of operational analysis methodology and a capacity analysis assessment of study intersections under Existing (baseline), No-Build, and Build traffic volume conditions.

3.1.4.1 Intersection Capacity Analysis

Intersection capacity analyses are presented in this section for Existing, No-Build, and Build traffic volume conditions. Capacity analyses, conducted in accordance with City of Boston and MassDOT guidelines, provide an index of how well roadway facilities serve the traffic demands placed upon them. Operational results provide the basis for recommended access and roadway improvements, if required.

Capacity analysis of intersections is developed using the Synchro® computer software, which implements methods of the 2010 Highway Capacity Manual (HCM). The resulting analysis presents an LOS designation for individual intersection movements. LOS is a letter designation that provides a qualitative measure of operating conditions based on several factors including roadway geometry, speeds, ambient traffic volumes, traffic controls, and driver characteristics. Since the LOS of a traffic facility is a function of the traffic flows placed upon it, such a facility may operate at a wide range of levels of service depending on the time of day, day of week, or period of year. A range of six levels of service are defined on the basis of average delay, ranging from LOS A (the least delay) to LOS F (delays greater than 50 seconds for unsignalized movements). The specific control delays and associated LOS designations are presented in Attachment C.

3.1.4.2 Capacity Analysis Results

LOS analyses were conducted for Existing, No-Build, and Build conditions for study intersections. Results of the intersection capacity analyses are summarized in Tables 3-2 and 3-3, and detailed analysis results are presented in Attachment C.

As summarized in Tables 3-2 and 3-3, the study intersections generally operate below capacity at LOS D or better operations under existing (baseline) as well as projected No-Build and Build conditions. Project-related impacts at the study locations are nominal, with delay increases of six seconds or less. Therefore, ample capacity is generally provided along area roadways and intersections serving the site. The exception is the westbound Bennington Street Extension approach to Chelsea Street which operates with long delays at LOS E/F operations during peak hours. However, overall intersection traffic increases due to the proposed school development amount to 7 percent or less.

Table 3-2 Intersection Capacity Analysis Results, weekday AM peak hour

		2013 Existing			*2018 No-Build*			*2018 Build*		
Intersection	*Approach*	*v/c*[1]	*Delay*[2]	*LOS*[3]	*v/c*	*Delay*	*LOS*	*v/c*	*Delay*	*LOS*
Mobil Gas Station at Bennington Street Ext. and Chelsea Street	*Eastbound*	0.11	15	B	0.11	15	B	0.12	16	C
	Westbound	0.66	38	E	0.68	39	E	0.75	45	E
	Northbound	0.01	< 5	A	0.01	< 5	A	0.01	< 5	A
	Southbound	0.00	< 5	A	0.00	< 5	A	0.00	< 5	A
Bennington Street at Bremen Street	*Eastbound*	0.00	< 5	A	0.00	< 5	A	0.00	< 5	A
	Westbound	0.33	6	A	0.34	6	A	0.42	7	A
	Northbound	0.14	11	B	0.14	11	B	0.24	11	B
Prescott Street at Bremen Street	*Eastbound*	0.03	8	A	0.03	8	A	0.19	10	A
	Northbound	0.17	9	A	0.17	9	A	0.21	9	A
	Southbound	0.48	11	B	0.48	11	B	0.59	14	B
Chelsea Street at Prescott Street	*Eastbound*	0.72	43	D	0.72	43	D	0.66	35	C
	Westbound	0.08	14	B	0.08	14	B	0.21	20	B
	Northbound	0.34	16	B	0.35	16	B	0.37	17	B
	Southbound	0.63	20	B	0.64	21	C	0.73	25	C
	Overall	**0.72**	**23**	**C**	**0.72**	**23**	**C**	**0.73**	**25**	**C**
Proposed Site Drive at Bremen Street	*Westbound*	n/a[4]	n/a	n/a	n/a	n/a	n/a	0.32	15	C
	Northbound	n/a	n/a	n/a	n/a	n/a	n/a	0.00	< 5	A
	Southbound	n/a	n/a	n/a	n/a	n/a	n/a	0.08	< 5	A

[1]Volume-to-capacity ratio

[2]Average control delay per vehicle (in seconds)

[3]Level of service

[4] n/a = not applicable

Table 3-3 Intersection Capacity Analysis Results, weekday PM peak hour

Intersection	Approach	2013 Existing v/c[1]	2013 Existing Delay[2]	2013 Existing LOS[3]	2018 No-Build v/c	2018 No-Build Delay	2018 No-Build LOS	2018 Build v/c	2018 Build Delay	2018 Build LOS
Mobil Gas Station at Bennington Street Ext. and Chelsea Street	*Eastbound*	0.07	18	C	0.07	18	C	0.08	20	C
	Westbound	0.81	56	F	0.83	>50	F	0.93	>50	F
	Northbound	0.01	<5	A	0.01	<5	A	0.01	<5	A
	Southbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
Bennington Street at Bremen Street	*Eastbound*	0.00	<5	A	0.00	<5	A	0.00	<5	A
	Westbound	0.21	<5	A	0.21	<5	A	0.26	<5	A
	Northbound	0.44	13	B	0.44	13	B	0.55	15	B
Prescott Street at Bremen Street	*Eastbound*	0.02	8	A	0.02	8	A	0.14	10	A
	Northbound	0.45	11	B	0.45	11	B	0.50	12	B
	Southbound	0.32	9	A	0.32	9	A	0.40	10	A
Chelsea Street at Prescott Street	*Eastbound*	0.93	61	E	0.93	60	E	0.93	57	E
	Westbound	0.09	14	B	0.08	14	B	0.16	18	B
	Northbound	0.81	35	C	0.84	38	D	0.85	38	D
	Southbound	0.63	23	C	0.64	23	C	0.71	26	C
	Overall	**0.93**	**37**	**D**	**0.93**	**38**	**D**	**0.93**	**38**	**D**
Proposed Site Drive at Bremen Street	*Westbound*	n/a[4]	n/a	n/a	n/a	n/a	n/a	0.32	15	B
	Northbound	n/a	n/a	n/a	n/a	n/a	n/a	0.00	<5	A
	Southbound	n/a	n/a	n/a	n/a	n/a	n/a	0.05	<5	A

[1]Volume-to-capacity ratio

[2]Average control delay per vehicle (in seconds)

[3]Level of service

[4] n/a = not applicable

3.1.4.3 Site Access and Circulation

Site access and circulation recommendations are incorporated into the site plan to facilitate safe and efficient pedestrian and vehicle operations at the site. Excel Academy will develop a TMP for the facility aimed at enhancing school pick-up/drop off operations, parking, and site circulation including some of the elements noted in this evaluation.

The preliminary site access and circulation plan allows for 50 parking spaces with dedicated parent vehicle pick-up/drop-off and school bus pick-up/drop-off areas. Vehicle queue capacity for this plan accommodates 30 passenger cars during peak pick-up/drop-off periods without impeding traffic flow on Bremen Street. School bus queue capacity for this plan includes the availability for up to three standard-size school buses and one compact

school bus to be stored along a dedicated bus stop on-site along the Bremen Street frontage during peak pick-up/drop-off periods. To accommodate the parent pick-up/drop-off activity and a by-pass lane, the site driveway will be restricted to one-way counterclockwise travel. A direct connection to the East Boston Greenway is proposed to encourage and facilitate walking and bicycling trips as well as use of the MBTA Wood Island and Airport transit stations located within one-third of a mile from the site.

A TMP will ensure efficient operations of school pick-up/drop-off, parking activity, and student circulation. Key aspects of the TMP include the following:

- Staff members should be available to assist students to and from school building entrances and the drop-off/pick-up areas along the sidewalk system provided on-site.
- Site driveways should be staffed during peak drop-off/pick-up periods to ensure that oncoming vehicles are managed to avoid potential conflicts with pedestrians and or entering/exiting vehicles. These staff members should also discourage loading and unloading away from the designated drop-off/pick-up area.
- Passenger vehicle processing time should be enhanced by concurrent loading/unloading of students by multiple staff as needed. It is recommended that parents not be allowed to exit their vehicles while in the drop-off/pick-up line.
- School bus drop-off/pick-up should occur exclusively at the on-site dedicated bus stop area along the western portion of the building or, for smaller buses, at the head of the parent drop-off/pick-up line.
- Off-site parent drop-off/pick-up activity should be prohibited and enforced by the school.

3.1.4.4 Conceptual Intersection Improvements

As requested by BTD, a conceptual improvement plan has been developed to identify potential traffic improvements for the Bremen Street/Bennington Street intersection, the primary gateway to the Bremen Street corridor. As shown in Figure 3-17, development of a dedicated left-turn lane on the Bennington Street westbound approach would eliminate the existing awkward lane configuration, enhance guidance for motorists, and improve traffic flow through the intersection.

Excel East Boston MS/HS Boston, Massachusetts

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

Figure 3-17
Conceptual Pavement Marking Plan

3.1.5 Conclusions

In summary, Excel Academy is expected to take advantage of the various public transportation opportunities in the area to reduce vehicle trips to the site (accounting for 75 percent of the student travel mode and more than 60 percent of the staff travel mode). The analysis provided in this evaluation concludes that the proposed school use will not materially impact operations at the proposed site driveway or at nearby study intersections. Implementation of the recommended TMP will facilitate peak school drop-off/pick-up operations with no impact to or reliance upon public streets for vehicle queuing.

3.2 Environmental Protection

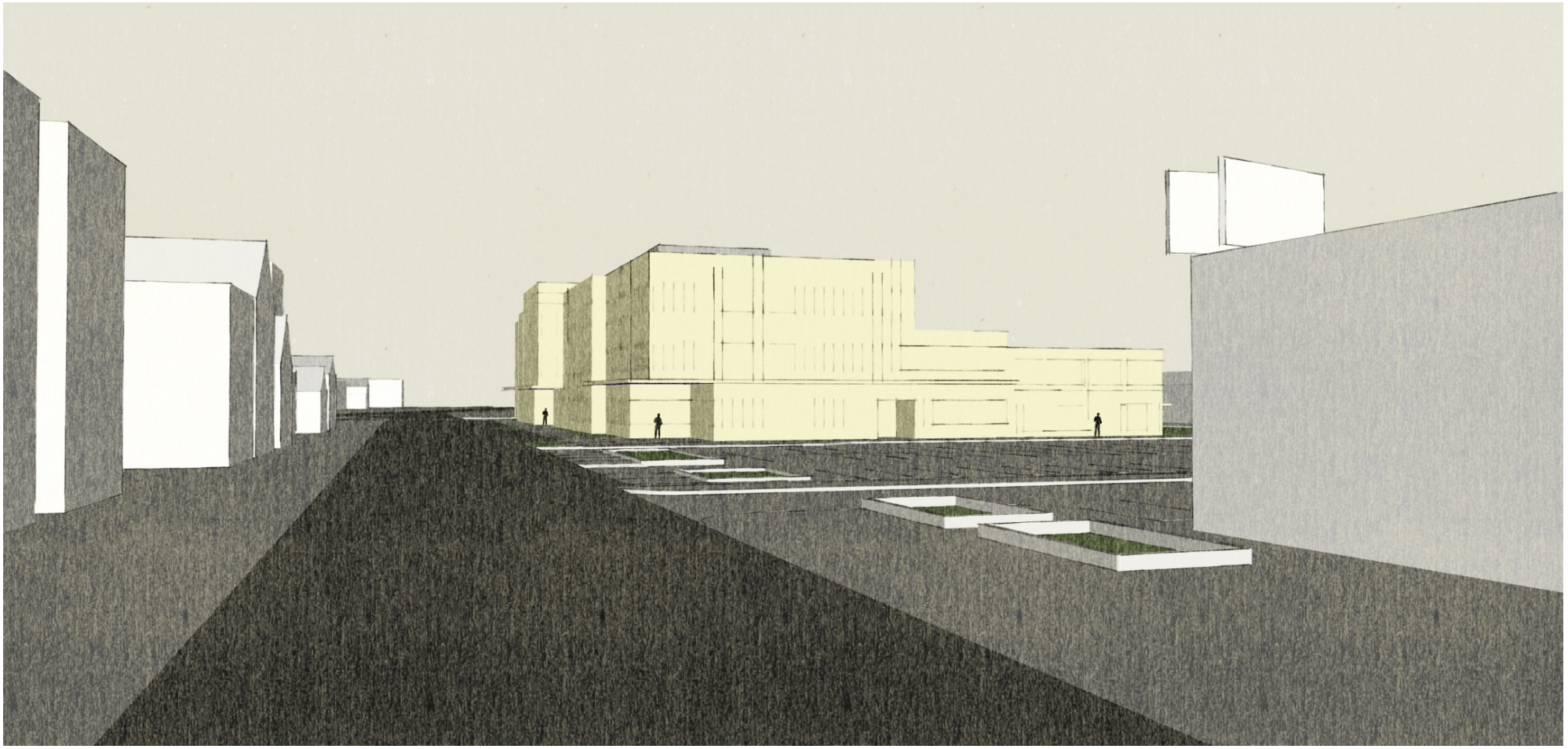
3.2.1 Wind

Major buildings, especially those that protrude above their surroundings, often cause increased local wind speeds at the pedestrian level. Typically, wind speeds increase with elevation above the ground surface, and taller buildings can intercept those faster winds and deflect them down to the pedestrian level. The funneling of wind through gaps between buildings and the acceleration of wind around building corners may also increase wind speeds. Conversely, if a building is surrounded by others of equivalent height, it may be protected from prevailing upper-level winds, resulting in no significant changes to the local pedestrian-level wind environment.

The consideration of wind in planning outdoor activity areas is important since high winds tend to deter pedestrian use. For example, winds should be light or relatively light in areas where people will be sitting, such as outdoor cafes or playgrounds. For bus stops and other locations where people will be standing, somewhat higher winds can be tolerated. For frequently used sidewalks, where people are primarily walking, stronger winds are acceptable. For infrequently used areas, wind comfort criteria can be relaxed even further. The actual effects of wind can range from pedestrian inconvenience (e.g., the blowing of dust and other loose material in a moderate breeze) to severe difficulty with walking.

The BRA design review guidelines generally require that buildings be designed to avoid creating excessive and uncomfortable downdrafts at the street level, and that ground level winds not exceed certain wind speed standards. Typically, the BRA requires a qualitative wind analysis for buildings less than 150 feet and a quantitative analysis for buildings 150 feet and taller. The height of the proposed building is approximately 43 feet, with mechanical and acoustic/visual screening adding approximately 10 feet in height.

Figures 3-18 and 3-19 show Project massing relative to nearby buildings. The adjacent library roof immediately southwest of the Project varies in height, but the high curved roof averages approximately 40 feet in height. Existing buildings to the northeast are unused and will likely be demolished, and therefore are not relevant. Residential buildings across Bremen Street vary from 16 to 38 feet in height, with shorter buildings tending to have

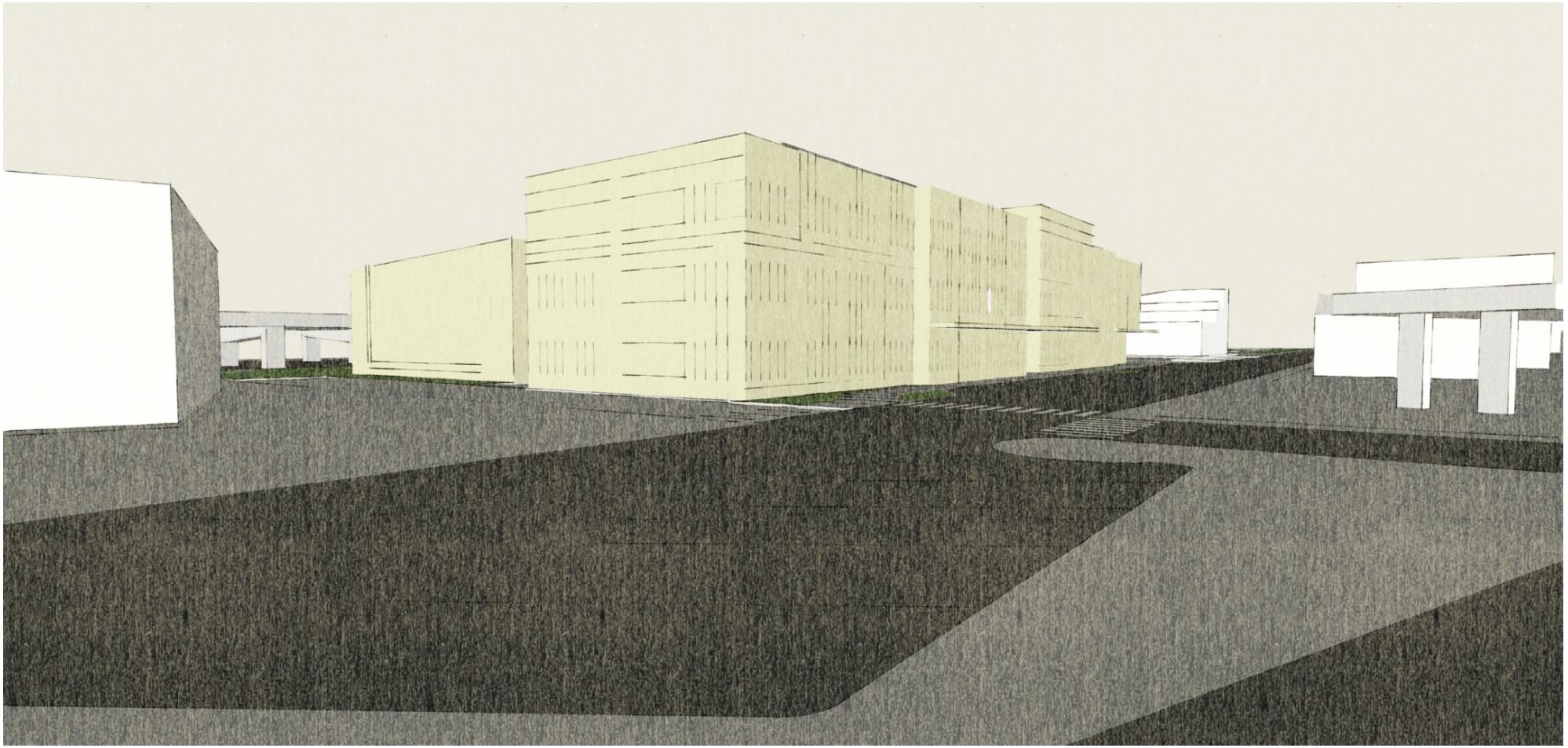


Excel East Boston MS/HS Boston, Massachusetts

Epsilon ASSOCIATES INC.

Figure 3-18

Building Massing – Bremen Street View



Excel East Boston MS/HS Boston, Massachusetts

Epsilon ASSOCIATES INC.

Figure 3-19

Building Massing – Bennington Street View

sloped roofs and taller buildings tending to have flat roofs. The elevated highway running south and east of the Project has a varied height above ground level, averaging approximately 20 feet above-grade; an adjacent billboard rises to a maximum of 75 feet in height. Given that the proposed Project building will not stand significantly higher than other buildings in the surrounding area, no further wind analysis should be necessary.

3.2.2 Shadow

The Proponent conducted a shadow impact analysis to assess potential Project-related impacts by evaluating shadow conditions at four times of day (9:00 a.m., 12:00 noon, 3:00 p.m., and 6:00 p.m.) during the vernal equinox (March 21), summer solstice (June 21), and autumnal equinox (September 21), and at three times of day (9:00 a.m., 12:00 noon, and 3:00 p.m.) during the winter solstice (December 21). Shadows were determined using the appropriate altitude and azimuth data for Boston.

The shadow impact analysis includes net new shadow as well as existing shadow. The incremental impact of new shadow cast by the proposed Project is shown in dark gray in Figures 3-20 through 3-23, while existing shadows are shown in light gray. The shadow analysis focuses on open spaces, residential areas, and major pedestrian areas in the Project vicinity.

3.2.2.1 Vernal Equinox (March 21)

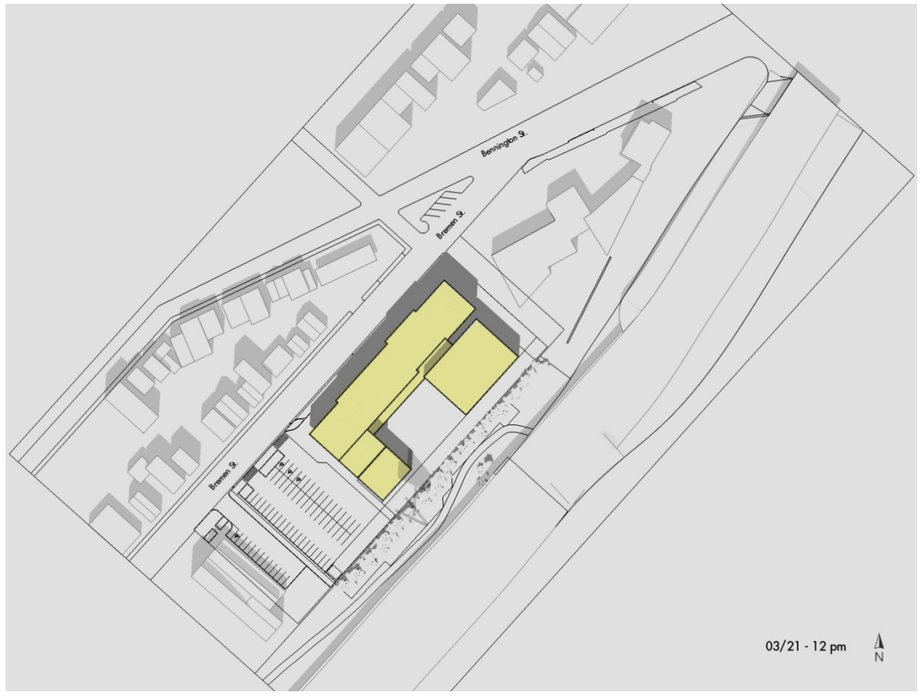
At 9:00 a.m. on the vernal equinox, new shadow from the Project will fall across Bremen Street northwest of the proposed building, but will not reach the buildings on the northwest side of the street (see Figure 3-20). Some of the sidewalk along the northwest side of Bremen Street will be cast in shadow.

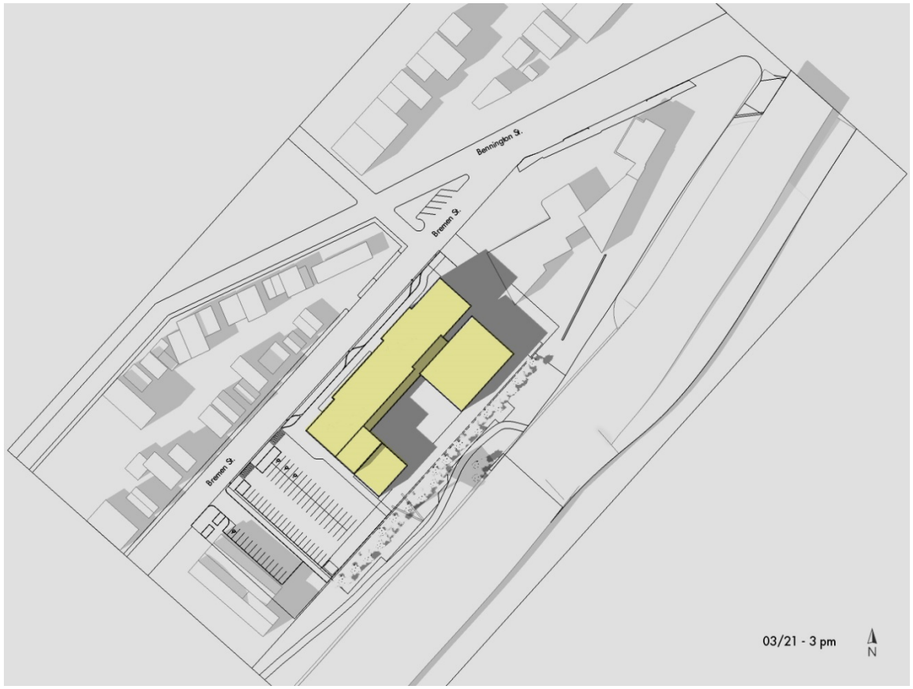
At 12:00 noon, all new shadow from the proposed building will fall within the Project site except for a very small portion of shadow that may reach the vegetation separating the building from the East Boston Greenway to the southeast (see Figure 3-20). The new shadow on-site will predominantly land on the strip of land between the building and Bremen Street, also covering a portion of the proposed sidewalk.

At 3:00 p.m., new shadow from the Project will predominantly fall on-site except for a small area of shadow that will be cast on the parcel located immediately northeast of the site (see Figure 3-20). Shadow will cover approximately half of the proposed school courtyard.

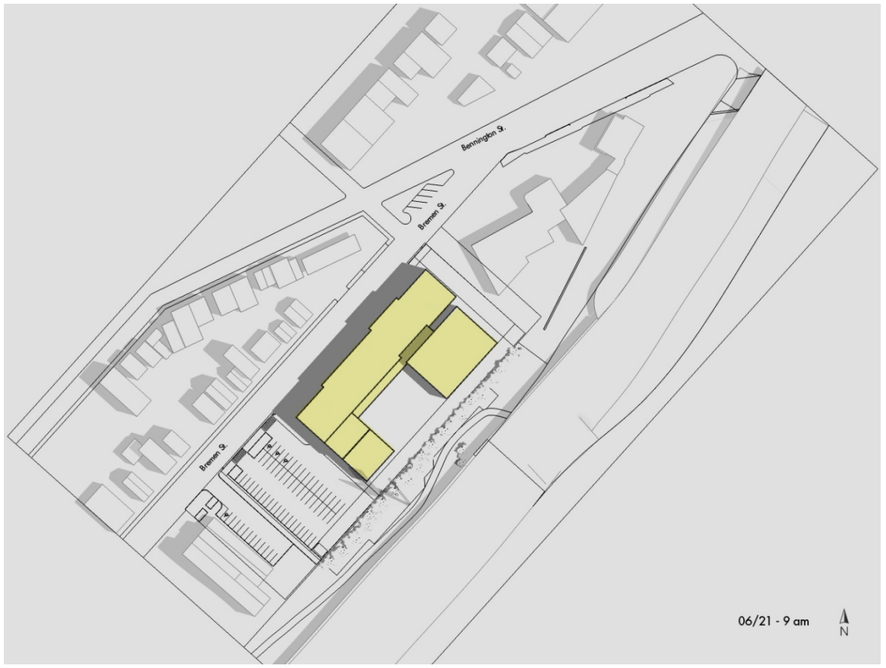
The sun sets at approximately 6:00 p.m. during the vernal equinox, and therefore existing shadows are abundant at this time (see Figure 3-20). As a result, the Project adds negligible new shadow at this time of day; the Project site itself lies almost entirely in shadow.

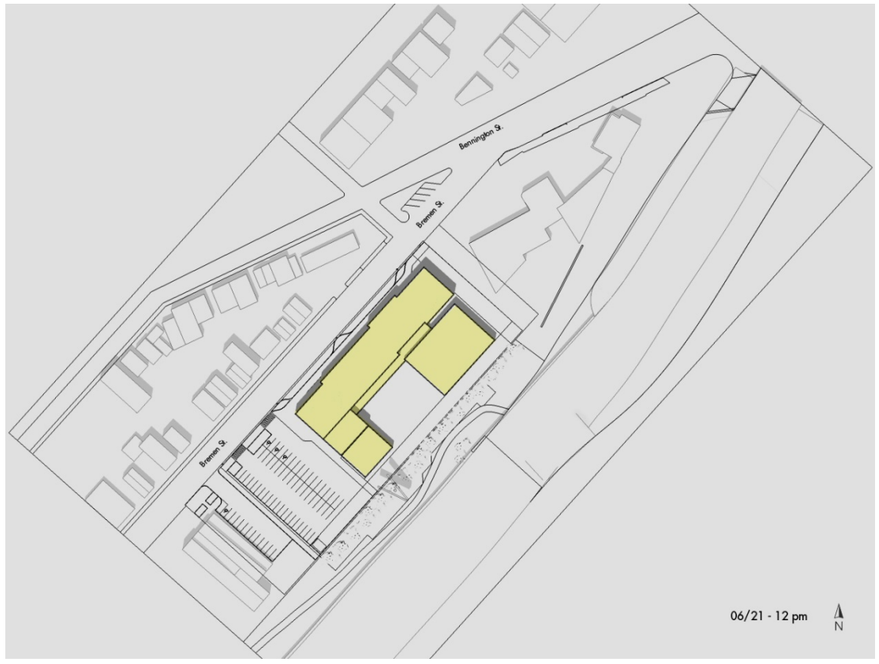

Bennington St.
Bremen St.
Bremen St.
03/21 - 9 am
N

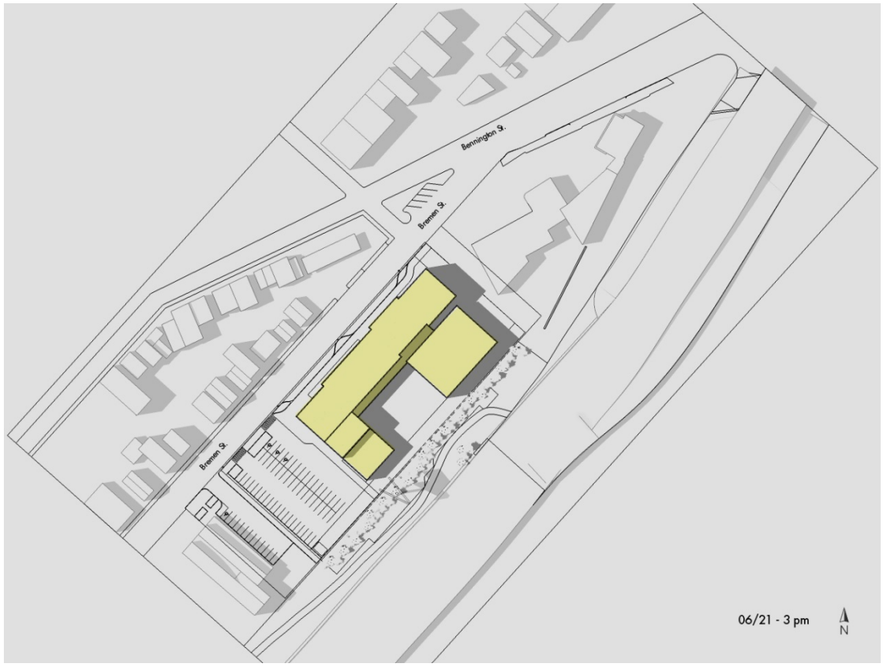

Bennington St.
Bremen St.
Bremen St.
03/21 - 12 pm
N


Bennington St.
Bremen St.
Bremen St.
03/21 - 3 pm
N


Bennington St.
Bremen St.
Bremen St.
03/21 - 6 pm
N

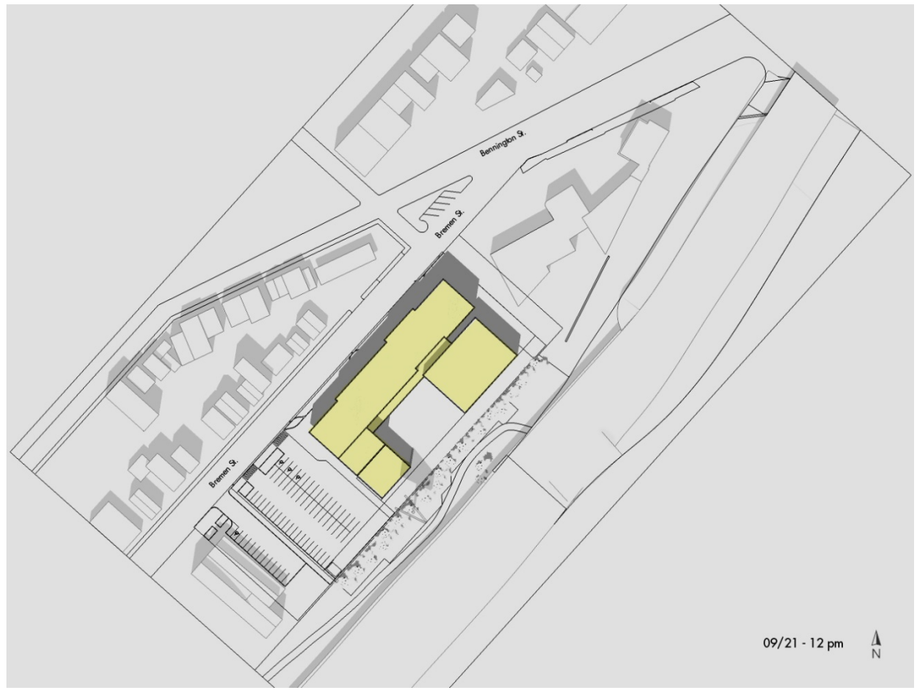

Bennington St.
Bremen St.
Bremen St.
06/21 - 9 am
N

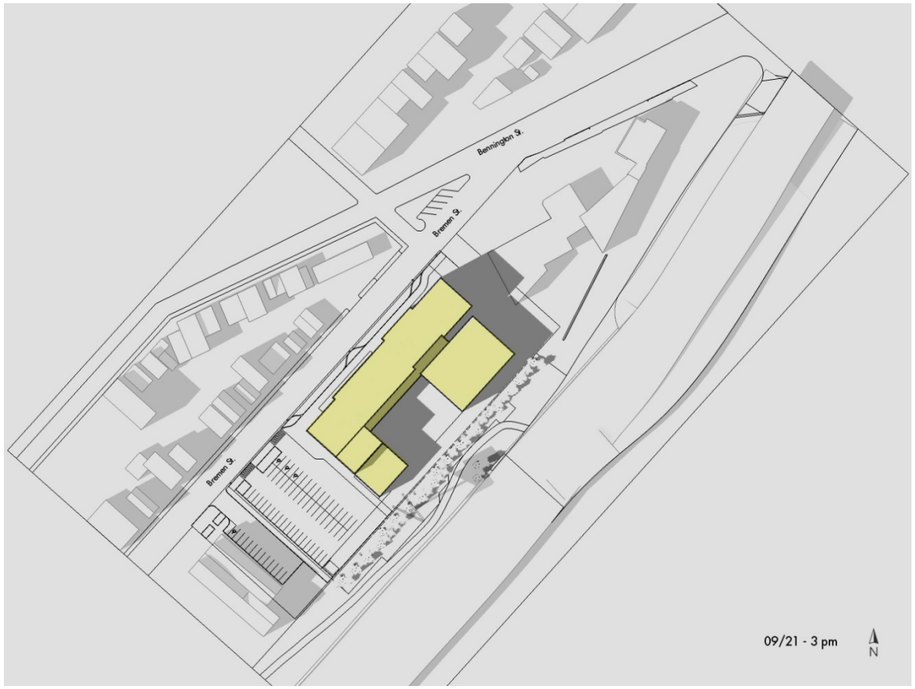

Bennington St.
Bremen St.
Bremen St.
06/21 - 12 pm
N

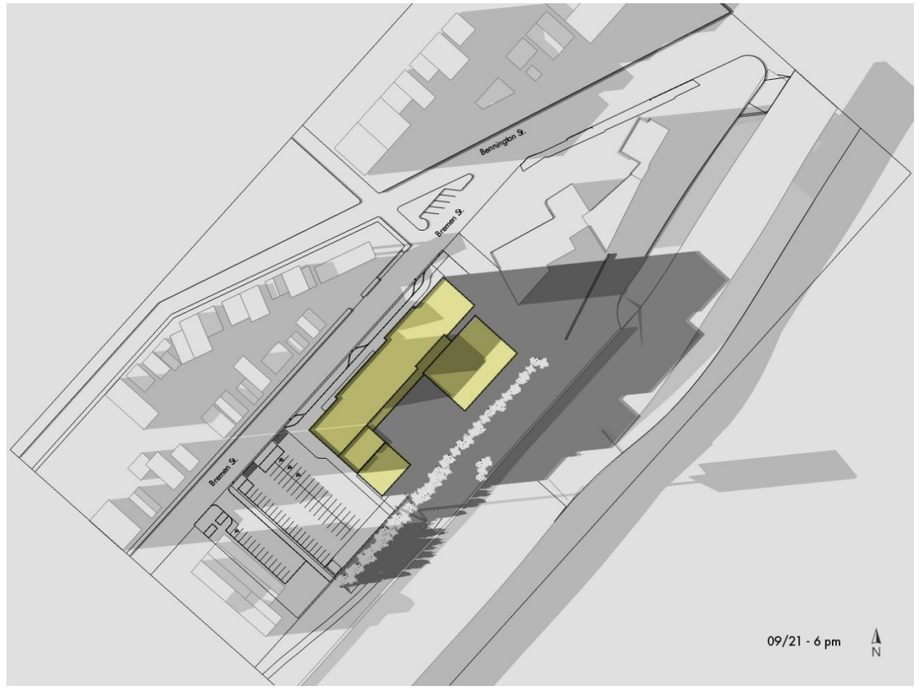

Bennington St.
Bremen St.
Bremen St.
06/21 - 3 pm
N


Bennington St.
Bremen St.
Bremen St.
06/21 - 6 pm
N

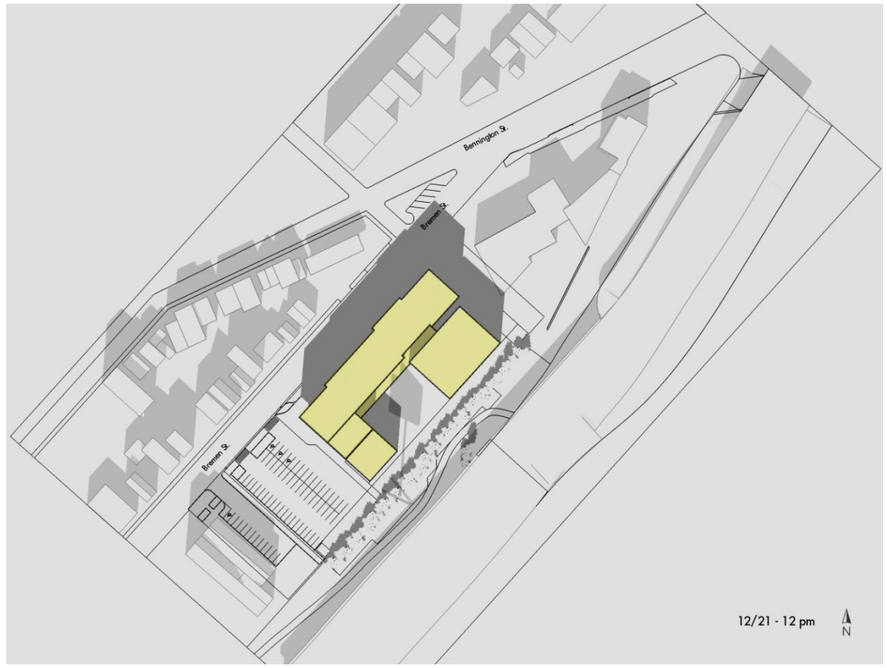

Bennington St.
Bremen St.
Bremen St.
09/21 - 9 am
N

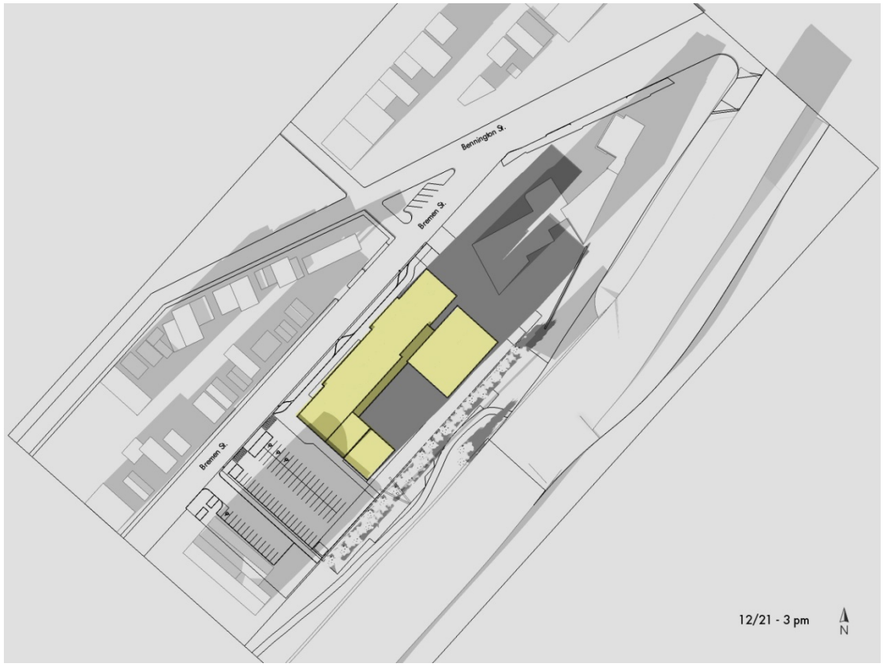

Bennington St.
Bremen St.
Bremen St.
09/21 - 12 pm
N


Bennington St.
Bremen St.
Bremen St.
09/21 - 3 pm
N


Bennington St.
Bremen St.
Bremen St.
09/21 - 6 pm
N


Bennington St.
Bremen St.
Bremen St.
12/21 - 9 am
N


Bennington St.
Bremen St.
Bremen St.
12/21 - 12 pm
N


Bennington St.
Bremen St.
Bremen St.
12/21 - 3 pm
N

3.2.2.2 Summer Solstice (June 21)

At 9:00 a.m. on the summer solstice, shadow from the Project will be entirely contained on-site, predominantly falling on land between the proposed building and Bremen Street (see Figure 3-21). The proposed sidewalk along the Project's Bremen Street frontage will be in shadow, as will the proposed bus drop off/pick-up.

At 12:00 noon, the Project will cast very little shadow, with new shadow limited to narrow strips of the site along the building's northwest and northeast edges (see Figure 3-21).

At 3:00 p.m., all shadow from the proposed building will land on-site, covering approximately the southwestern third of the proposed courtyard as well as the area immediately northeast of the school building (see Figure 3-21). No new shadow will extend over the East Boston Greenway or reach across the easement to the property located northeast of the Project site.

At 6:00 p.m., new shadow from the proposed Project will extend southeast of the proposed building and will reach the line of trees separating the Project from the East Boston Greenway (see Figure 3-21). No new shadow from the school building will fall onto the Greenway path itself. The school courtyard will be entirely in shadow at this time.

3.2.2.3 Autumnal Equinox (September 21)

At 9:00 a.m. on the autumnal equinox, new shadow from the proposed Project will extend northwest across Bremen Street to reach a portion of the sidewalk along the opposite side of the road from the school (see Figure 3-22). The school courtyard will be entirely in the sun at this time, and there will be no impact on the East Boston Greenway.

At 12:00 noon, all new shadow from the proposed building will fall on-site (see Figure 3-22). New shadow will predominantly fall on the strip of land between the building and Bremen Street, covering a portion of the proposed sidewalk, as well as along the land immediately northeast of the proposed building. The most southwestern portion of the proposed courtyard will be cast in shadow.

At 3:00 p.m., most new shadow from the proposed building will be contained on-site except for a small area that will extend to the property immediately to the northeast (see Figure 3-22). The southeastern half of the proposed courtyard will also be cast in shadow, although the East Boston Greenway will remain unaffected.

The sun sets at just after 6:00 p.m. during the autumnal equinox, and therefore existing shadows are abundant at this time (see Figure 3-22). New shadow from the proposed building will extend east of the Project site, covering a portion of the Greenway as well as the southernmost portion of the adjacent property to the north. The Project courtyard will be completely in shadow.

3.2.2.4 Winter Solstice (December 21)

At 9:00 a.m. on the Winter Solstice, new shadow from the proposed building will extend across Bremen Street and over a portion of four existing structures on the northwest side of the street (see Figure 3-23). The existing and proposed sidewalks along this stretch of Bremen Street will be covered in shadow, as will the proposed bus pull-offs. The proposed courtyard will be in full sun, and the East Boston Greenway will remain unaffected by the Project.

At 12:00 noon, new shadow from the proposed building will extend across Bremen Street to the north and northwest, covering the sidewalk adjacent to the school but not the sidewalk on the opposite side of Bremen Street (see Figure 3-23). New shadow will also cover the western corner of the proposed courtyard.

At 3:00 p.m., new shadow from the proposed building will reach northeast over a portion of the adjacent development parcel (see Figure 3-23). The proposed courtyard will also fall entirely in new shadow, although the East Boston Greenway will remain unaffected by the Project.

3.2.2.5 Conclusions

The shadow analysis demonstrates that new shadow impacts from the Project will be contained on-site, although the stretch of Bremen Street northwest of the Project site will be shaded during the morning in winter and during the early morning in other seasons. Impacts from new shadow on the East Boston Greenway will be negligible, limited to late evening hours when existing shadow is already abundant. The proposed school courtyard will remain in sun throughout most of the day in all seasons, with shadow covering approximately half of the courtyard beginning in mid- to late-afternoon.

3.2.3 Daylight

Daylight analysis estimates the extent to which a proposed project will affect the amount of daylight reaching streets and sidewalks in the immediate vicinity of a project site. For this Project, the daylight analysis considers the existing and proposed conditions as well as typical daylight obstruction values in the surrounding area.

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

3.2.3.1 Methodology

The daylight analysis was performed using the Boston Redevelopment Authority Daylight Analysis (BRADA) computer program[4], which measures the percentage of "sky dome" obstructed by a project. The program is a useful tool to evaluate the net change in obstruction from existing to build conditions at a specific site.

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

The analysis compares three conditions: existing, proposed, and the area context. Two viewpoints were chosen to evaluate daylight obstruction for existing and proposed conditions, and two area context points were considered to provide a basis of comparison to existing conditions in the surrounding area. Viewpoint and area context viewpoint locations were positioned as follows and are shown on Figure 3-24:

- **Viewpoint 1:** View from Bremen Street facing southeast toward the Project site;
- **Viewpoint 2:** View from the East Boston Greenway facing northwest toward the Project site;
- **Area Context (AC) Viewpoint 1:** View from Bremen Street facing northwest toward the existing building at 400 Bremen Street; and
- **Area Context (AC) Viewpoint 2:** View from Chelsea Street facing northwest toward the existing building at 378 Chelsea Street.

3.2.3.2 Results

Daylight analysis results for the four viewpoints are described in Table 3-4. Figures 3-25 and 3-26 illustrate BRADA results for existing and proposed conditions as well as area context.

---

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

Table 3-4 Daylight Analysis Results

Viewpoint Locations		*Existing*	*Proposed*
Viewpoint 1	Bremen Street facing SE toward Project site	7.6%	54.3%
Viewpoint 2	East Boston Greenway facing NW toward site	8.7%	17.4%
Area Context Points			
AC1	Bremen St. facing NW toward 400 Bremen St.	61.8%	N/A
AC2	Chelsea St. facing NW toward 378 Chelsea St.	54.6%	N/A

Bremen Street – Viewpoint 1

Bremen Street runs along the northwestern edge of the Project site. Viewpoint 1 was taken from the center of Bremen Street looking southeast toward the site, which is currently occupied by low-rise buildings and surface parking lots. Due to these existing conditions, the existing daylight obstruction value is only 7.6%.

Proposed Project development on the site will increase the daylight obstruction value to 54.3%. Although this represents an increase over existing conditions, the daylight obstruction value is consistent with other buildings in the area, including the buildings used for the area context analysis.

East Boston Greenway – Viewpoint 2

The East Boston Greenway runs between the southeast edge of the Project site and I-90. Viewpoint 2 was taken from the center of the East Boston Greenway looking northwest toward the site. Since surface parking lots currently cover a large portion of the Project site, the existing daylight obstruction value from this viewpoint is only 8.7%.

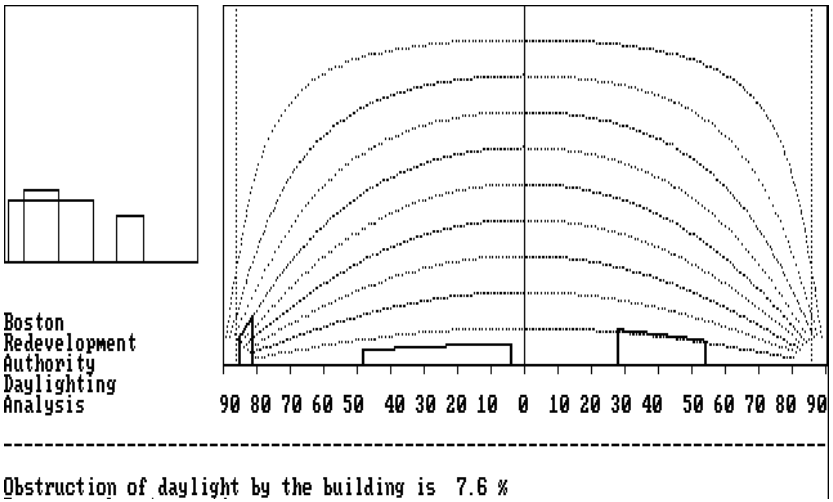
Proposed Project development will increase the daylight obstruction value to 17.4%. Although this represents an increase over existing conditions, the proposed daylight obstruction value from this viewpoint is low compared to the other buildings in the area, including the buildings used for the area context analysis, since the proposed development will not occupy the entire site.

Excel East Boston MS/HS Boston, Massachusetts

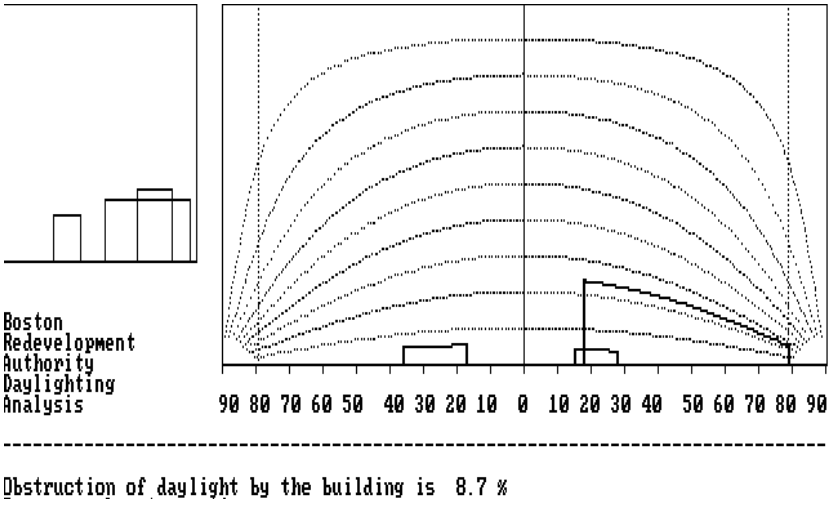
Epsilon Associates Inc.

Figure 3-24
Viewpoint Locations

EXISTING CONDITIONS

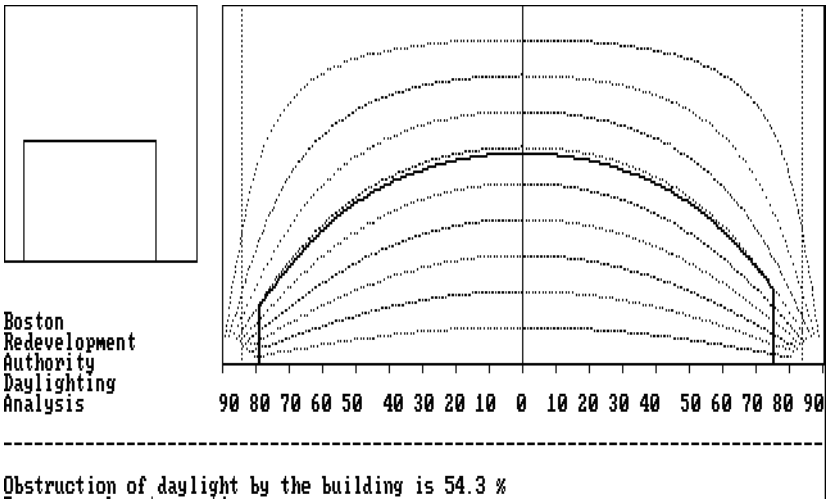


View 1: View from Bremen Street facing southeast toward the Project site

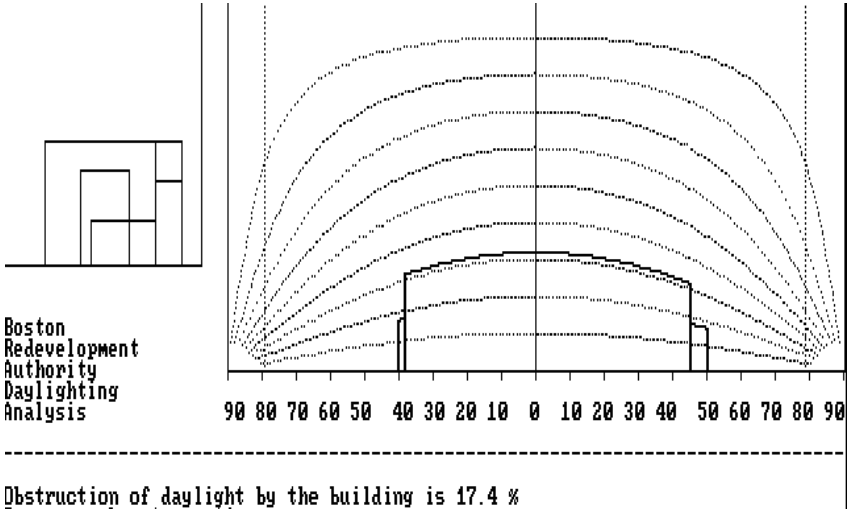


View 2: View from East Boston Greenway facing northwest toward the Project site

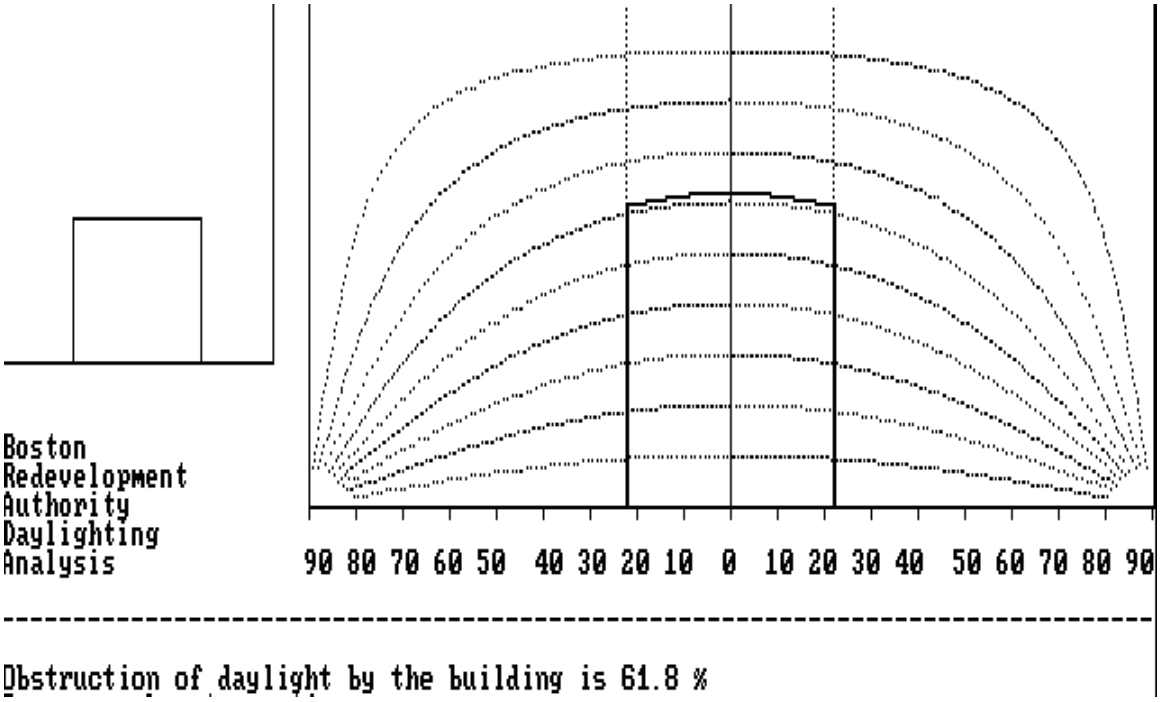
PROPOSED CONDITIONS



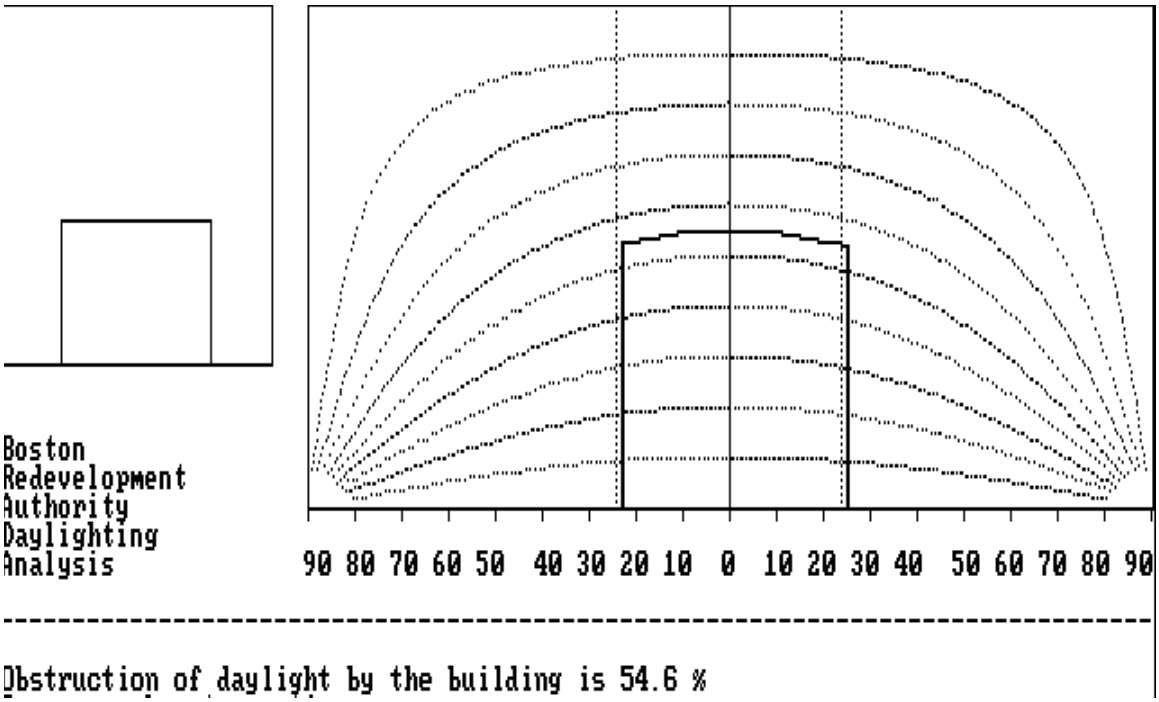
View 1: View from Bremen Street facing southeast toward the Project site



View 2: View from East Boston Greenway facing northwest toward the Project site



AC1: View from Bremen Street facing northwest toward the existing building at 400 Bremen Street



AC2: View from Chelsea Street facing northwest toward the existing building at 378 Chelsea Street

Area Context Views

The Project area currently consists of low-rise commercial and residential buildings. To provide a larger context for comparison of daylight conditions, obstruction values were calculated for the two area context viewpoints as described above and shown on Figure 3-24. In the area context analysis, daylight obstruction values ranged from a low of 54.6% (AC2) to a high of 61.8% (AC1). Proposed daylight obstruction values for the Project are consistent with or lower than the area context values.

3.2.3.3 Conclusions

Results of the BRADA analysis indicate that while Project development will increase daylight obstruction over existing conditions, the resulting conditions will be similar to daylight obstruction values within the surrounding area and will be typical of densely built urban areas. The increased daylight obstruction value will primarily be due to the increase in density on the Project site relative to existing conditions.

3.2.4 Solar Glare

The Proponent does not anticipate the use of highly reflective glass or other highly reflective materials on the proposed building façades that would result in solar glare on area roadways or sidewalks or heat loading on neighboring buildings. Therefore, a solar glare analysis is not necessary.

3.2.5 Air Quality

An air quality analysis was conducted to determine the impact of pollutant emissions from mobile sources generated by the Excel East Boston MS/HS Project. A microscale analysis was performed to evaluate the potential air quality impacts of carbon monoxide (CO) due to traffic flow around the Project area.

3.2.5.1 National Ambient Air Quality Standards

The 1970 Clean Air Act was enacted by the U.S. Congress to protect the health and welfare of the public from the adverse effects of air pollution. As required by the Clean Air Act, the U.S. Environmental Protection Agency (EPA) promulgated National Ambient Air Quality Standards (NAAQS) to protect human health against adverse effects, with a margin of safety, for these criteria pollutants: nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM) (PM10 and PM2.5), carbon monoxide (CO), ozone (O_3), and lead (Pb) (see Table 3-5). Massachusetts Ambient Air Quality Standards (MAAQS) are typically identical to NAAQS.

NAAQS specify concentration levels for various averaging times and include both "primary" and "secondary" standards. Primary standards are intended to protect human health, whereas secondary standards are intended to protect public welfare from any known or

anticipated adverse effects associated with the presence of air pollutants, such as damage to vegetation. The more stringent of the primary or secondary standards are applied when comparing to the modeling results for a Project.

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

Table 3-5 National Ambient Air Quality Standards

Pollutant	*Averaging Period*	*National Ambient Air Quality Standards and Massachusetts Ambient Air Quality Standards (micrograms per cubic meter)*	
		Primary	*Secondary*
NO_2	Annual [1]	100	Same
	1-hour [7]	188	None
SO_2	Annual [1,8]	80	None
	24-hour [2,8]	365	None
	3-hour [2]	None	1,300
	1-hour [7]	195	None
PM10 [6]	Annual	50	Same
	24-hour [3]	150	Same
PM2.5	Annual [4]	12	15
	24-hour [5]	35	Same
CO	8-hour [2]	10,000	Same
	1-hour [2]	40,000	Same
Ozone	8-hour [3]	148 (235 MAAQS)	Same
Pb	3-month [1]	1.5	Same

Notes:

[1] Not to be exceeded

[2] Not to be exceeded more than once per year.

[3] Not to be exceeded more than an average of one day per year over three years.

[4] Not to be exceeded by the arithmetic average of the annual arithmetic averages from 3 successive years.

[5] Not to be exceeded based on the 98th percentile of data collection.

[6] Due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution, EPA revoked the annual PM10 standard in 2006 (effective December 17, 2006). However, the annual standard remains codified in 310 CMR 6.00

[7] Not to be exceeded. Based on the 3-yr average of the 98th (NO_2) or 99th (SO_2) percentile of the daily maximum 1-hour concentrations.

[8]The Annual and 24-hour SO2 standards were revoked on June 2, 2010. However, these standards remain in effect until one year after an area is designated for the 1-hour standard, unless currently in nonattainment.

Source: 40 CFR 50 and 310 CMR 6.00

3.2.5.2 Background Concentrations

To estimate background pollutant levels representative of the area, the most recent air quality monitoring data reported by MassDEP in Annual Air Quality Reports was obtained for 2007 to 2012. MassDEP guidance specifies use of the latest three years of available monitoring data from within 10 kilometers of a project site.

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

Background concentrations were determined from the available monitoring stations closest to the proposed Project. The closest monitors are located at Kenmore Square in Boston, One City Square in Charlestown, and at 174 North Street in Boston's North End. A summary of background air quality concentrations is presented in Table 3-6.

Table 3-6 Observed Ambient Air Quality Concentrations and Selected Background Levels

Pollutant	*Averaging Time*	*2010*	*2011*	*2012*	*Background Concentration ($\mu g/m^3$)*	*Location*
SO_2 (1)(7)(8)	1-Hour	69.9	127.4	41.1	127.4	Kenmore Sq., Boston
	3-Hour	88.4	62.4	49.4	88.4	Kenmore Sq., Boston
	24-Hour	21.8	31.5	15.6	31.5	Kenmore Sq., Boston
	Annual	5.8	6.1	4.9	6.1	Kenmore Sq., Boston
PM-10	24-Hour	32.0	39.0	41.0	41.0	One City Sq., Boston
	Annual	15.1	15.9	16.8	16.8	One City Sq., Boston
PM-2.5	24-Hour (4)	24.8	23.9	20.9	23.2	174 North St., Boston
	Annual (5)	10.0	10.3	9.5	9.9	174 North St., Boston
NO_2 (3)	1-Hour (6)	119.4	140.8	114.7	140.8	Kenmore Sq., Boston
	Annual	35.9	38.3	35.9	38.3	Kenmore Sq., Boston
CO (2)	1-Hour	2166	1710	1596	2166.0	Kenmore Sq., Boston
	8-Hour	1710	1482	1254	1710.0	Kenmore Sq., Boston

Table 3-6 Observed Ambient Air Quality Concentrations and Selected Background Levels (Continued)

Pollutant	*Averaging Time*	*2010*	*2011*	*2012*	*Background Concentration ($\mu g/m^3$)*	*Location*

Notes: From 2007-2012 MA DEP Annual Data Summaries

[1] SO_2 reported in ppm or ppb. Converted to $\mu g/m^3$ using factor of 1 ppb = 2.600 $\mu g/m^3$.

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

[3] NO_2 reported in ppb. Converted to $\mu g/m^3$ using factor of 1 ppb = 1.880 $\mu g/m^3$.

[4] Background level for 24-hour PM-2.5 is the average concentration of the 98th percentile for three years.

[5] Background level for annual PM-2.5 is the average for three years.

[6] Maximum annual 1-hour concentrations.

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

[8] The 2010 - 2012 SO_2 3-hour value is not reported. Years 2007-2009 used instead.

Air quality is generally good in the area, with all of the ambient concentrations well below their respective NAAQS. For use in the microscale analysis, background concentrations of CO in ppm were required. The corresponding maximum background concentrations in ppm were 1.9 ppm (2166 $\mu g/m^3$) for one-hour and 1.5 ppm (1710 $\mu g/m^3$) for eight-hour CO.

3.2.5.3 Methodology

Microscale Analysis

The BRA requires an analysis of the air quality impact from an increase in traffic generated by a project. This "microscale" analysis is required for any intersection (including garage entrances/exits) where the LOS is expected to deteriorate to D and where the project causes a 10 percent increase in traffic or where the LOS is E or F and the proposed project contributes to a reduction in LOS. The microscale analysis involves modeling CO emissions from vehicles idling at and traveling through both signalized and unsignalized intersections. Predicted ambient concentrations of CO for Build and No-Build cases are compared with federal (and state) ambient air quality standards for CO.

The microscale analysis typically examines ground-level CO impacts due to traffic queues in the immediate vicinity of a project. CO is used in microscale studies to indicate roadway pollutant levels since it is the most abundant pollutant emitted by motor vehicles and can result in so-called "hot spot" (high concentration) locations around congested intersections. NAAQS standards do not allow ambient CO concentrations to exceed 35 parts per million (ppm) for a one-hour averaging period, and 9 ppm for an eight-hour averaging period, more than once per year at any location. Widespread use of CO catalysts on current vehicles has reduced the occurrence 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 analyses for this Project follow the procedure outlined in EPA's intersection modeling guidance.[5]

The microscale analysis has been conducted using the latest versions of EPA's MOBILE6.2 and CAL3QHC programs to estimate CO concentrations at sidewalk receptor locations.

Baseline (2013) and future year (2018) emission factor 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 selected intersections.

Existing background values of CO at the nearest monitor location at Kenmore Square were obtained from MassDEP. CAL3QHC results were then added to background CO values of 1.9 ppm (one-hour) and 1.5 ppm (eight-hour), as provided by MassDEP, to determine total air quality impacts due to the Project. These values were compared to NAAQS for CO of 35 ppm (one-hour) and 9 ppm (eight-hour).

The modeling methodology was developed in accordance with the latest MassDEP modeling policies and Federal modeling guidelines.[6]

Modeling assumptions and backup data for results presented in this section are provided in Attachment D.

Intersection Selection

As stated previously, a "microscale" analysis is required for the Project at intersections where (1) Project traffic would impact intersections or roadway links currently operating at LOS D, E, or F or would cause LOS to decline to D, E, or F; (2) Project traffic would increase traffic volumes on nearby roadways by 10% or more (unless the increase in traffic volume is less than 100 vehicles per hour); or (3) the Project will generate 3,000 or more new average daily trips on roadways providing access to a single location.

Of the five intersections included in the traffic study, only one is signalized, and thus only one meets the above conditions (see Section 3.1 for the transportation analysis). Traffic volumes and LOS calculations provided in Section 3.1 form the basis for evaluating the traffic data versus microscale thresholds. The only intersection found to meet the criteria for inclusion in the microscale analysis is the intersection of Chelsea Street and Prescott Street.

---

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

6 40 CFR 51 Appendix W, Guideline on Air Quality Models, 70 FR 68228, Nov. 9, 2005

Microscale modeling was performed for the intersection based on the aforementioned methodology. The 2013 existing conditions and the 2018 No-Build and Build conditions were each evaluated at morning and afternoon peaks.

Emissions Calculations (MOBILE6.2)

The EPA MOBILE6.2 computer program was used to estimate motor vehicle emission factors on the roadway network based on motor vehicle operations typical of daily periods. The Commonwealth's statewide annual Inspection and Maintenance (I&M) program was included as well as the state-specific vehicle age registration distribution. Input files for MOBILE6.2 for the existing (2013) and build year (2018) were provided by MassDEP; as is typical, minor edits to the files were necessary to allow the program to output emission factors for the various speeds used in the analyses.

Idle emission factors are obtained from factors for a vehicle speed of 2.5 mph. The resulting emission rate given in grams/mile is then multiplied by 2.5 mph to estimate idle emissions in grams/hour. Moving emissions are calculated based on actual speeds at which free-flowing vehicles travel through the intersections. A speed of 30 mph is used for all free-flow traffic. Speeds of 10 and 15 mph were used for right (and U-turns, if necessary) and left turns, respectively.

Winter CO emission factors are typically higher than summer CO emission factors. Therefore, winter vehicular emission factors were conservatively used in the microscale analyses.

Receptors and Meteorological Inputs

A set of 156 receptors was placed in the vicinity of the modeled intersection. Receptors extended approximately 300 feet on the sidewalks along the roadways approaching the intersection. Roadway links and receptor locations for the modeled intersection are presented in Figure 3-27.

For the CAL3QHC model, limited meteorological inputs are required. Following EPA guidance[7], a wind speed of one meter/second, stability class D (4), and a mixing height of 1,000 meters was used. To account for the intersection geometry, wind directions from 0° to 350° were selected at ten-degree increments. A surface roughness length of 370 cm was selected.[8]

---

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

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

Excel East Boston MS/HS **Boston, Massachusetts**

Epsilon ASSOCIATES INC.

Figure 3-27

Link and Receptor Locations for CAL3QHC Modeling of Intersection of Chelsea St. & Prescott St.

Impact Calculations (CAL3QHC)

The CAL3QHC model predicts one-hour concentrations using queue-links at intersections, worst-case meteorological conditions, and traffic input data. The one-hour concentrations were scaled by a factor of 0.7 to estimate eight-hour concentrations.[9] The CAL3QHC methodology was based on EPA CO modeling guidance. Signal timings were provided directly from the traffic modeling outputs. The CAL3QHC input parameters are also described in Attachment D.

3.2.5.4 Air Quality Results

Microscale Analysis

Results of the maximum one-hour predicted CO concentrations from CAL3QHC are provided in Tables 3-7 through 3-9 for the 2013 and 2018 scenarios. Eight-hour average concentrations are calculated by multiplying the maximum one-hour concentrations by a factor of 0.7.[10]

Results of the one-hour and eight-hour maximum modeled CO ground-level concentrations from CAL3QHC were added to EPA-supplied background levels for comparison to NAAQS. These values represent the highest potential concentrations at the intersection as they are predicted during the simultaneous occurrence of "defined" worst case meteorology. The highest one-hour traffic-related concentration predicted in the Project area for the modeled conditions (0.8 ppm) plus background (1.9 ppm) is 2.7 ppm. The highest eight-hour traffic-related concentration predicted in the Project area for the modeled conditions (0.6 ppm) plus background (1.5 ppm) is 2.1 ppm. All concentrations are well below the one-hour NAAQS of 35 ppm and the eight-hour NAAQS of 9 ppm.

It would be expected that any future mitigation measures implemented to improve traffic flow at the modeled intersection would result in further improvements in air quality impacts.

---

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

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

Table 3-7 Summary of Microscale Modeling Analysis (Existing 2013)

Intersection	*Peak*	*CAL3QHC Modeled CO Impacts (ppm)*	*Monitored Background Concentration (ppm)*	*Total CO Impacts (ppm)*	*NAAQS (ppm)*
1-Hour					
Chelsea Street & Prescott Street	AM	0.8	1.9	2.7	35
	PM	0.8	1.9	2.7	35
8-Hour					
Chelsea Street & Prescott Street	AM	0.6	1.5	2.1	9
	PM	0.6	1.5	2.1	9
Notes: CAL3QHC eight-hour impacts were conservatively obtained by multiplying one-hour impacts by a screening factor of 0.7.					

Table 3-8 Summary of Microscale Modeling Analysis (No-Build 2018)

Intersection	*Peak*	*CAL3QHC Modeled CO Impacts (ppm)*	*Monitored Background Concentration (ppm)*	*Total CO Impacts (ppm)*	*NAAQS (ppm)*
1-Hour					
Chelsea Street & Prescott Street	AM	0.7	1.9	2.6	35
	PM	0.8	1.9	2.7	35
8-Hour					
Chelsea Street & Prescott Street	AM	0.5	1.5	2.0	9
	PM	0.6	1.5	2.1	9
Notes: CAL3QHC eight-hour impacts were conservatively obtained by multiplying one-hour impacts by a screening factor of 0.7.					

Table 3-9 Summary of Microscale Modeling Analysis (Build 2018)

Intersection	*Peak*	*CAL3QHC Modeled CO Impacts (ppm)*	*Monitored Background Concentration (ppm)*	*Total CO Impacts (ppm)*	*NAAQS (ppm)*
1-Hour					
Chelsea Street & Prescott Street	AM	0.8	1.9	2.7	35
	PM	0.8	1.9	2.7	35
8-Hour					
Chelsea Street & Prescott Street	AM	0.6	1.5	2.1	9
	PM	0.6	1.5	2.1	9

Notes: CAL3QHC eight-hour impacts were conservatively obtained by multiplying one-hour impacts by a screening factor of 0.7.

3.2.5.5 Conclusions of Microscale Analysis

Results of the microscale analysis show that all predicted CO concentrations are well below one-hour and eight-hour NAAQS. Differences in predicted concentrations between No-Build and Build conditions are insignificant. Therefore, it can be concluded that there are no adverse air quality impacts resulting from increased traffic in the area due to the proposed Project.

3.2.6 Stormwater and Water Quality

The Project will not affect water quality in any water bodies or wetlands. During construction, erosion and sediment control measures will be implemented to minimize transport of site soils to off-site areas and BWSC storm drain systems. During construction, existing catch basins will be protected with filter fabric, hay bales, and/or crushed stone to remove sediment from stormwater runoff. These controls will be inspected and maintained throughout the construction phase until all disturbed areas have been stabilized with structure, vegetative cover, or pavement.

Stormwater from proposed building roof areas will be directed to surface infiltration basins and underground infiltration systems to achieve the required groundwater recharge volume. Stormwater from parking areas will be collected by deep sump, hooded catch basins and directed through stormwater quality structures before being directed to an underground recharge system. Overflow from the recharge systems will be directed to the BWSC storm drain system.

All necessary dewatering associated with the new construction components will be conducted in accordance with Massachusetts Water Resource Authority (MWRA) and BWSC discharge permits. Once construction is complete, the Project will comply with all local and state stormwater management policies.

3.2.6.1 MassDEP Stormwater Management Policy Standards

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

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

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

Compliance: The proposed Project design will comply with this Standard. The Project site is not located near any wetlands or water bodies, and therefore no new untreated stormwater will be directly discharged to, nor will erosion be caused to, wetlands or waters of the Commonwealth as a result of stormwater discharges related to the proposed Project.

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

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

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

Compliance: The proposed Project will comply with this standard to the maximum extent practicable. The Project will comply with the BWSC requirement to recharge one-inch over the impervious area on-site by using stormwater quality structures to capture stormwater from impervious areas and by directing stormwater captured on roof areas to a recharge system proposed on-site.

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

> *a. Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained;*
>
> *b. Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and*
>
> *c. Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.*

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

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

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

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

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

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

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

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

Compliance: The proposed Project will comply with this standard. Sedimentation and erosion controls will be incorporated into the Project design and will be employed during construction.

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

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

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

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

3.2.6.2 Mitigation Measures

Stormwater runoff from the Project site and roof of the proposed building will drain to the stormwater system in adjacent streets and ultimately to the Chelsea River. Although the existing site is nearly 100% impervious, the proposed Project will decrease impervious area on-site by approximately 27%, thereby reducing the peak rate and volume of stormwater runoff relative to existing conditions. The Project design will also include an underground stormwater infiltration system with deep sump hooded catch basins and water quality structures. Within the Project's limit of work, ground cover will primarily consist of roof area, parking, paved walkways, and landscaping.

3.2.6.3 Coordination with the Boston Water and Sewer Commission

Proposed connections to the BWSC water, sanitary sewer, and storm drain systems will be designed in conformance with BWSC design standards, Sewer Use and Water Distribution System Regulations, and Requirements for Site Plans. The Proponent will submit a General Service Application and a site plan for review and approval prior to construction. The site plan will indicate the existing and proposed infrastructure related to water mains, sanitary sewers, storm sewers, telephone, gas, electric, steam, and cable television. In addition, the plan will identify the disconnections of existing services as well as the proposed connections.

3.2.7 Flood Hazard Zones / Wetlands

The Project site is developed and does not contain wetlands.

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for the site located in the City of Boston - Community Panel Number 25025C0019G (effective September 25, 2009) indicates the FEMA Flood Zone Designations for the Project site vicinity. The map shows that a Zone AE flood zone extends over the southeastern portion of the site, indicating a 100-year base flood (i.e., a flood having a 1% annual chance of occurring) (see Figure 3-28). The base flood elevation indicated on the FEMA FIRM for this Zone AE is 9 feet (NAVD88).

3.2.7.1 Climate Change Resiliency and Adaptability

Bremen Street slopes down from northeast to southwest, and the Project parcel slopes down from front to rear (i.e., northwest to southeast). The building's first-floor slab will be designed to respond both to the floodplain and to meet accessibility requirements at the entry points. Due to the presence of the floodplain and the intention to minimize the need to remove on-site soils, the proposed building will not have a basement and all mechanical equipment will be located on the roof or will be placed at-grade.

Excel East Boston MS/HS Boston, Massachusetts

Figure 3-28
FEMA Flood Zones

At the street front of the Project property (i.e., on its northwest side), the grade slopes from approximately 13 feet to 10.5 feet in elevation. The first-floor slab elevation will be set at approximately 12 feet, and the rear courtyard will be set at nearly the same height with an approximately 3.5-foot drop to the natural grade at the rear (i.e., southeast side) of the property. Site design and landscaping will address this elevation change and provide an accessible route.

The Boston Zoning Code requires the floor elevation to be no less than the base flood elevation, in this case 9 feet (NAVD88). The three-foot elevation difference between the base flood elevation and the first floor elevation will minimize potential building flooding and will provide for resilience in the future while ensuring accessibility from front and side entrances.

3.2.8 Geotechnical / Groundwater

Subsurface conditions below the proposed building footprint consist of glaciomarine clay overlying glacial till (encountered at a depth of 55 feet below-grade) and bedrock (encountered at a depth of 64 feet below-grade). Test borings at the south end of the proposed building footprint encountered approximately six feet of fill materials and two feet of organic soils (which may be original topsoil buried beneath the fill) overlying the glaciomarine clay. The groundwater table was encountered at a depth of approximately 8 to 10 feet below existing grades.

Field testing indicated that the clay soils exhibited a medium stiff to hard consistency. The clays are likely over-consolidated and are not in a sensitive or "quick" condition. Samples of the soils were submitted for laboratory testing to determine the consolidation properties.

Elevations on the Project site range from approximately 6 to 10 feet above mean sea level, based on City of Boston GIS mapping. To match existing grades along Bremen Street, an engineered raise-in-grade fill approximately four to five feet high will be needed below the east side of the proposed building footprint. Engineering analysis of the loading effects on the clay soils from the proposed building and fill were evaluated, and results indicate the potential post-construction settlement due to consolidation of the clay soils should be within tolerable limits.

The fill materials and underlying organic silt soils are considered unsuitable for supporting the foundation elements, and should be removed from below the building footprint. The glaciomarine soils are considered the uppermost suitable bearing stratum for the foundation system and/or raise-in-grade fills. The proposed building could be founded on a shallow, conventional foundation system following proper preparation of the subgrade soils and construction of the engineered fill.

At this time, the Proponent's geotechnical engineers do not anticipate adverse impacts on adjacent buildings, utilities, or other infrastructure as a result of the proposed Project.

The Project is not located within a Groundwater Conservation Overlay District.

3.2.9 Solid and Hazardous Wastes

The Project will generate solid waste typical of other school facilities. Solid waste generated by the Project will be collected, picked up, and disposed of at a suitable off-site location. Excel Academy has a recycling program for paper, cardboard, plastic, and aluminum. Bins will be distributed throughout the school building, and recycled materials will be picked up and emptied twice per week.

The high school portion of the proposed charter school will be equipped with lab spaces typical of high schools which may involve storage and use of chemicals for performing experiments. Each chemistry lab will have a designated area with a laboratory fume hood and an adjacent eye wash station and deluge shower. Chemicals in laboratory spaces will be stored in secure locations, use will be monitored, they will be regularly inspected, and the chemical inventory will be updated annually. Any leaking, damaged, empty, or unlabeled containers will be discarded after consulting the label and Material Safety Data Sheet (MSDS) for disposal information; disposal will always follow appropriate chemical disposal regulations. Any necessary disposal of chemicals will be in properly labeled waste containers, and they will never be poured into sinks or wastebaskets. Other than these lab uses, the charter school will not generate hazardous waste. Separate containers will be provided for the disposal of materials such as paints.

During site reconnaissance, abandoned cleaning and construction products stored in containers up to five gallons in capacity were observed; no evidence of release from these containers was observed. A 275-gallon above-ground fuel oil storage tank (AST) is located in one of the existing buildings on-site. Oil staining is visible at the top of the tank near its fill port, and the staining extends down the east side of the tank. *De minimis* oil staining is visible on the concrete floor beneath the AST.

Results of a limited subsurface investigation have confirmed that the urban fill present at the Project site will require management in accordance with the Massachusetts Contingency Plan (MCP). Soil management activities will need to be completed in accordance with the MCP and at the direction of a Licensed Site Professional (LSP).

3.2.10 Noise

Epsilon Associates, Inc. conducted a sound level assessment for the Project which included a baseline sound monitoring program to measure existing sound levels in the vicinity of the Project site, computer modeling to predict operational sound levels from mechanical equipment associated with the Project, and a comparison of future Project sound levels to applicable noise regulations including the City of Boston Zoning District Noise Standards and the MassDEP Noise Policy.

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

3.2.10.1 Noise Terminology

There are several ways in which sound (noise) levels are measured and quantified, all of which use the logarithmic decibel (dB) scale. This section defines the noise terminology used in this analysis.

The decibel scale is logarithmic to accommodate the wide range of sound intensities observed in the environment. A property of the decibel scale is that the sound pressure levels of two distinct sounds are not purely 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 (53 dB), not a doubling (100 dB). Thus, every three-decibel change in sound level represents a doubling or halving of sound energy. Related to this is the fact that a change in sound level of less than three dB is generally imperceptible to the human ear.

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

The sound level meter used to measure noise is a standardized instrument.[11] It contains "weighting networks" to adjust the frequency response of the instrument to approximate that of the human ear under various conditions. One network is the A-weighting network (there are also B- and C-weighting networks), which most closely approximates how the human ear responds to sound as a function of frequency, and is the accepted scale used for community sound level measurements. Sounds are frequently reported as detected with the A-weighting network of the sound level meter, in dBA. A-weighted sound levels emphasize the middle frequencies (i.e., middle pitched—around 1,000 Hertz sounds), and de-emphasize lower and higher frequencies.

Because sounds in our environment vary with time, they cannot simply be represented with a single number. In fact, there are several methods used for quantifying variable sounds which are commonly reported in community noise assessments, as defined below.

- L_{eq}, the equivalent level, in dBA, 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.

---

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

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

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

- L_{10} is the sound level, in dBA, exceeded only 10 percent of the time in a given measurement period. The L_{10}, or intrusive sound level, is close to the maximum sound level observed due to occasional louder intermittent noises, like those from passing motor vehicles.

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

By employing various noise metrics, it is possible to separate prevailing, steady sounds (the L_{90}) from occasional louder sounds (L_{10}) in the noise environment. This analysis treats all noise sources from the Project as though the emissions will be steady and continuous, described most accurately by the L_{90} exceedance level.

In the design of noise controls, which do not function quite like the human ear, it is important to understand the frequency spectrum of the noise source of interest. The spectra of noises are usually stated in terms of octave-band sound pressure levels, in dB, with the 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.

3.2.10.2 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 sound level survey and modeled Project sound levels were compared to City of Boston Zoning District Noise Standards. Separate regulations within the Standards provide criteria to control different types of noise. Regulation 2 is applicable to effects of the Project, as completed, and is considered in this noise study. Table 3-10 includes the Zoning District Standards.

Table 3-10 City of Boston Zoning District Noise Standards, Maximum Allowable Sound Pressure Levels

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

Notes:
1. Noise standards 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.
2. All standards apply at the property line of the receiving property.
3. dB and dBA based on a reference sound pressure of 20 micropascals.
4. 'Daytime' refers to the period between 7:00 a.m. and 6:00 p.m. daily, excluding Sunday.

In addition, MassDEP has the authority to regulate noise under 310 CMR 7.10, which is part of the Commonwealth's air pollution control regulations. According to MassDEP, "unnecessary" noise is considered an air contaminant and thus prohibited by 310 CMR 7.10. MassDEP administers this regulation through Noise Policy DAQC 90-001 which limits a source to a 10-dBA increase above the L_{90} ambient sound level measured at the Project property line and at the nearest residences. The MassDEP policy further prohibits "pure tone" conditions where the sound pressure level in one octave-band is three or more dB greater than the sound levels in each of two adjacent bands.

3.2.10.3 Existing Conditions

A background noise level survey was conducted to characterize the existing "baseline" acoustical environment in the vicinity of the Project within the East Boston neighborhood. Existing noise sources in the vicinity of the Project site currently include: vehicular traffic

along local roadways, birds, light leaf rustle, pedestrian conversation and foot traffic, mechanical equipment located on surrounding buildings, mild building construction, aircraft flyovers, and the general noises of the City.

Noise Monitoring Methodology

Sound level measurements were made on Thursday, October 3, 2013 during the daytime (12:00 p.m. to 2:30 p.m.) and on Friday, October 4, 2013 during nighttime hours (12:00 a.m. to 2:00 a.m.). Since noise impacts from the Project on the community will be highest when background noise levels are the lowest, the study was designed to measure community noise levels under conditions typical of a "quiet period" for the area. Daytime measurements were scheduled to avoid peak traffic conditions. All measurements were 20 minutes in duration.

Sound levels were measured at publicly accessible locations at a height of five feet (1.5 meters) above ground level under low wind conditions and with dry roadway surfaces. Wind speed measurements were made with a Davis Instruments TurboMeter electronic wind speed indicator, and temperature and humidity measurements were made using a General Tools digital psychrometer. Unofficial observations about meteorology or land use in the community were made solely to characterize the existing sound levels in the area and to estimate the noise sensitivity at properties near the Project site.

Noise Monitoring Locations

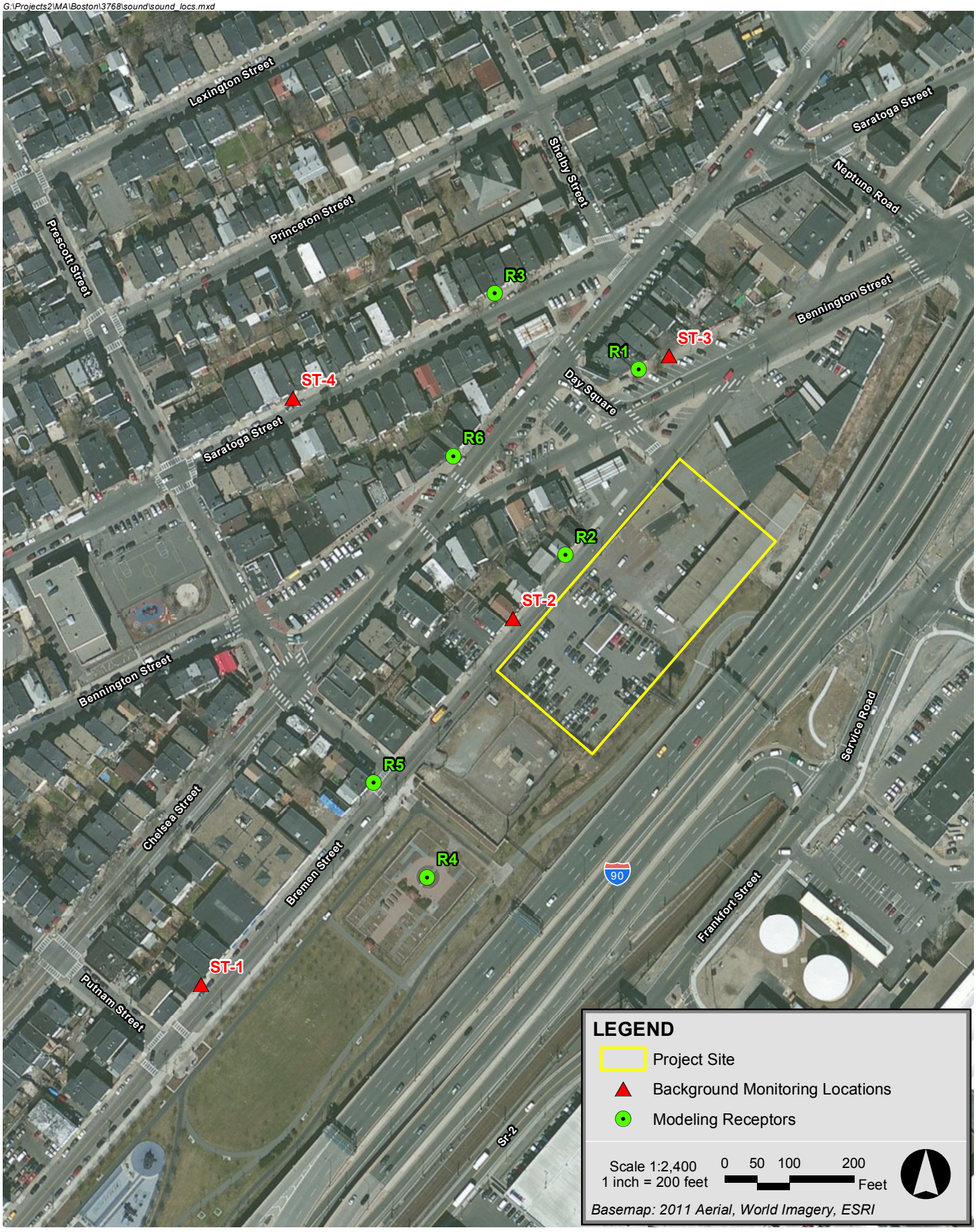
The selection of noise monitoring locations was based on a review of zoning and land use in the Project area. Four noise monitoring locations were selected as representative sites to obtain a sampling of the ambient baseline noise environment. These measurement locations are depicted on Figure 3-29 and are described below.

- **Location ST-1** was located in front of the apartment building southwest of 326 Bremen Street. This location was selected to represent sound levels at residential receptors along Bremen Street in the neighborhood south of the Project.

- **Location ST-2** was located on the sidewalk in front of 376 Bremen Street. This location was selected to represent sound levels at residential receptors immediately west of the Project. These are the closest residential receptors to the Project.

- **Location ST-3** was located on the northwest side of Bennington Street to the northeast of Day Square at the approximate address of 333 Bennington Street. This location was selected to represent sound levels at residential receptors north of the Project.

- **Location ST-4** was located on the sidewalk in front of 420 Saratoga Street. This location was selected to represent sound levels at receptors located in the residential neighborhood northwest of the Project.



Excel East Boston MS/HS Boston, Massachusetts

Figure 3-29

Noise Monitoring and Modeling Locations

Noise Monitoring Equipment

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

Measured Background Noise Levels

Baseline noise monitoring results are presented in Table 3-11 and are summarized below:

- Daytime residual background (L_{90} dBA) measurements ranged from 47 to 59 dBA;
- Nighttime residual background (L_{90} dBA) measurements ranged from 46 to 51 dBA;
- Daytime equivalent level (L_{eq} dBA) measurements ranged from 59 to 68 dBA; and
- Nighttime equivalent level (L_{eq} dBA) measurements ranged from 53 to 65 dBA.

Table 3-11 Summary of Measured Background Noise Levels

Location	*Period*	*Start Time*	L_{eq}	L_{max}	L_{10}	L_{50}	L_{90}	*L_{90} Sound Pressure Levels by Octave-Band*								
								31.5 Hz	*63 Hz*	*125 Hz*	*250 Hz*	*500 Hz*	*1k Hz*	*2k Hz*	*4k Hz*	*8k Hz*
			dBA	dBA	dBA	dBA	dBA	dB	dB	dB	dB	dB	dB	dB	dB	dB
ST-1	Day	12:42 PM	64	84	66	61	58	66	64	57	52	53	56	48	34	22
ST-2	Day	1:10 PM	68	89	71	64	59	64	65	60	57	55	56	50	39	26
ST-3	Day	1:36 PM	64	85	66	62	59	65	65	66	57	54	54	49	40	29
ST-4	Day	2:03 PM	59	76	63	50	47	56	55	50	46	44	43	38	30	22
ST-1	Night	11:57 PM	65	90	60	54	51	57	56	52	46	45	48	41	28	19
ST-2	Night	12:23 AM	57	76	58	51	48	57	54	49	45	42	44	39	32	23
ST-3	Night	12:49 AM	56	72	59	52	48	56	56	53	47	44	44	39	29	21
ST-4	Night	1:20 AM	53	72	51	48	46	49	52	48	45	43	42	38	32	25

Weather Conditions:

	Date	Temp	RH	Sky	Wind
Daytime	Thursday, October 03, 2013	90.5 °F	18%	Partly Cloudy	0-1 mph East
Nighttime	Friday, October 04, 2013	64.9 °F	53%	Partly Cloudy	0 mph

Monitoring Equipment Used:

	Manufacturer	Model	S/N
Sound Level Meter	Larson Davis	LD831	3044
Microphone	Larson Davis	377B20	130593
Preamp	Larson Davis	PRM831	23824
Calibrator	Larson Davis	Cal200	2853

3.2.10.4 Future Conditions

Overview of Potential Project Noise Sources

The primary sources of continuous sound exterior to the Project will include ventilation and cooling equipment located on the roofs of the classroom, café, and gymnasium wings.

The classroom wing is expected to have 28 rooftop units (RTUs) and five rooftop exhaust fans. The gymnasium is expected to have three RTUs, and the cafeteria is expected to have five RTUs and one rooftop exhaust fan. Other secondary noise sources such as hot water heaters, boilers, and pumps will either be enclosed within the building or are assumed to have sound levels 10 dBA lower than the primary sources of noise, and were not considered in this analysis to contribute significantly to the overall sound level. There are no emergency diesel generators proposed for this Project.

Mitigation will be applied to sources as needed to ensure compliance with applicable noise regulations. Noise control features assumed in this analysis consisted of a 10-foot-high noise barrier wall along the western and southern perimeter of the classroom building roof.

A tabular summary of the modeled mechanical equipment proposed for the Project is presented in Table 3-12. Sound power level data for each unit, as provided by the manufacturer or calculated from provided sound pressure level data, is presented in Table 3-13. Sound power levels of those units for which data were not provided were assumed based on data for similar or representative equipment. Approximate locations for the mechanical equipment were provided by the Project team in a preliminary roof plan.

Table 3-12 Modeled Noise Sources

Noise Source	*Quantity*	*Anticipated Location*	*Size/Capacity per Unit*
Roof Top Unit	36	Classroom Building Roof (x28), Gymnasium Roof (x3), Cafe Roof (x5)	5-ton & 10-ton
Exhaust Fan	6	Classroom Building Roof (x5), Cafe Roof (x1)	930 CFM

Table 3-13 Modeled Sound Power Levels per Unit

Noise Source	*Broadband*	*32 Hz*	*63 Hz*	*125 Hz*	*250 Hz*	*500 Hz*	*1000 Hz*	*2000 Hz*	*4000 Hz*	*8000 Hz*
	dBA	dB	dB	dB	dB	dB	dB	dB	dB	dB
Roof Top Unit (RTU) - 5 Ton[1]	87	80	80	86	84	85	83	79	73	67
Roof Top Unit (RTU) - 10 Ton[2]	87	89	89	87	91	85	80	77	73	66
Exhaust Fan[3]	82	81	81	85	82	81	76	74	67	63

Notes:

1. Trane Model T/YHC060F Roof Top Unit, 5 –Ton
2. Trane Model T/YHC120E Roof Top Unit, 10 -Ton
3. Greenheck Model CUBE-360XP-30 Belt Drive Upblast Centrifugal Roof Exhaust Fan, 5,000 CFM (No sound data provided for proposed Greenheck Model CUBE-101)

Noise Modeling Methodology

Noise impacts from mechanical equipment associated with the Project were predicted using Cadna/A noise calculation software (DataKustik Corporation, 2005). This software, which uses the ISO 9613-2 international standard for sound propagation (Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation), offers a refined set of computations accounting for local topography, ground attenuation, drop-off with distance, barrier shielding, diffraction around building edges, reflection off building facades, and atmospheric absorption of sound from multiple noise sources. The analysis considered all of the mechanical equipment operating during the quietest nighttime hours at the nearest residential receptors.

Noise Modeling Results

Six modeling locations with a height 1.5 meters above-grade were included in the analysis representing the nearest noise-sensitive residential receptors. Figure 3-29 shows the locations of each modeled receptor as well as the monitoring locations selected for background measurements.

The predicted future sound levels (Project plus background), presented in Table 3-14, are well below the MassDEP criteria of 10 dBA over the measured background L_{90} sound levels at all sensitive receptor locations. The Project's mechanical equipment is not expected to create or exacerbate any "pure-tone" conditions as defined by MassDEP when combined with existing background sound levels at these locations. Predicted sound levels combining Project and background sources are shown in Table 3-15. In addition, modeled sound levels from Project equipment are within the most stringent broadband and octave-band residential zoning limits for the City of Boston at the closest residential receptors. This evaluation is presented in Table 3-16.

Table 3-14 MassDEP Compliance Evaluation

Receptor ID	*Land Use*	*Representative Background ID*	*Evaluation Period*	*Measured Background Noise Level*	*Modeled Project-Only Noise Level*	*Combined Project + Background Noise Level*	*Project Impact*[1]	*Meets MassDEP Noise Policy?*
				dBA	dBA	dBA	dBA	
R1	Residential	ST-3	Night	48	44	50	2	YES
R2	Residential	ST-2	Night	48	43	49	1	YES
R3	Residential	ST-4	Night	46	34	46	0	YES
R4	Residential	ST-1	Night	51	32	51	0	YES
R5	Residential	ST-1	Night	51	35	51	0	YES
R6	Residential	ST-3	Night	48	38	48	0	YES

1. Calculation of increase over background performed using data rounded to nearest whole decibel

Table 3-15 MassDEP "Pure Tone" Evaluation: Combined Project + Background Levels

Receptor ID	Land Use	Period	dBA	32 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
				dB	dB	dB	dB	dB	dB	dB	dB	dB
R1	Residential	Night	50	56	56	54	50	46	45	40	31	22
R2	Residential	Night	49	58	55	51	48	45	45	40	33	24
R3	Residential	Night	46	49	52	48	46	43	42	38	32	25
R4	Residential	Night	51	57	56	52	46	45	48	41	28	19
R5	Residential	Night	51	57	56	52	47	45	48	41	28	19
R6	Residential	Night	48	56	56	53	48	45	44	39	29	21

Table 3-16 City of Boston Compliance Evaluation: Project-Only Modeling Results

Receptor ID		*Land Use*	*Period*	*dBA*	*32 Hz*	*63 Hz*	*125 Hz*	*250 Hz*	*500 Hz*	*1000 Hz*	*2000 Hz*	*4000 Hz*	*8000 Hz*
					dB	dB	dB	dB	dB	dB	dB	dB	dB
R1		Residential	Night	44	47	46	47	47	43	38	33	25	12
R2		Residential	Night	43	49	47	47	45	41	37	33	25	16
R3		Residential	Night	34	39	37	38	37	33	27	22	10	0
R4		Residential	Night	32	39	37	37	34	30	25	18	5	0
R5		Residential	Night	35	39	38	40	38	34	29	22	10	0
R6		Residential	Night	38	42	41	43	40	37	32	25	14	0
City of Boston Noise Limits	**Residential**		Day	60	76	75	69	62	56	50	45	40	38
			Night	50	68	67	61	52	46	40	33	28	26
	Residential/Industrial		Day	65	79	78	73	68	62	56	51	47	44
			Night	55	72	71	65	57	51	45	39	34	32
	Business		Day	65	79	78	73	68	62	56	51	47	44
			Night	65	79	78	73	68	62	56	51	47	44
	Industrial		Day	70	83	82	77	73	67	61	57	53	50
			Night	70	83	82	77	73	67	61	57	53	50

3.2.10.5 Conclusions

Baseline noise levels measured in the vicinity of the Project site were compared to predicted noise levels based on information provided by manufacturers of representative mechanical equipment or estimated from the equipment's capacity. With appropriate mitigation (as described in Section 3.2.10.4), the Project is not expected to introduce significant outdoor mechanical equipment noise into the surrounding community.

Results of the analysis indicate that noise levels from the Project at the nearest receptors will be well below the City of Boston Noise Zoning requirements based on land use, and will comply with MassDEP A-weighted and tonal noise limits. Results presented in Section 3.2.10.4 indicate that the Project is not expected to impact the existing acoustical environment.

At this time, the mechanical equipment and noise controls are conceptual in nature and, during the final design phase of the Project, will be specified to meet applicable City of Boston and MassDEP noise limits. Additional mitigation may include the selection of quieter units, screening walls, mufflers, or equipment enclosures, as needed.

3.2.11 Construction-Period Considerations

Proximity to the Project site of city streets and abutting commercial properties will require careful scheduling of material removal and delivery. Planning with the City and surrounding neighborhood will be essential to the successful development of the Project.

A Construction Management Plan (CMP) will be submitted to the BTD for review and approval prior to issuance of a building permit. The CMP will provide a detailed evaluation of potential short-term construction-related transportation impacts during the course of Project construction. The CMP will define truck routing and on-site construction staging to minimize impacts on local streets, and a police detail will be provided as needed to maintain access to adjacent properties and to direct pedestrian and vehicle flows. Pedestrian circulation around the campus will also be defined in the CMP.

Construction methodologies will be employed to ensure public safety and protect nearby businesses. Throughout Project construction, a secure perimeter will protect the public from construction activities. 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.

3.2.11.1 Construction-Period Controls

Appropriate erosion and sediment control practices will remain in place and be maintained until stabilization of the area affected by the control measure(s) occurs.

The following structural measures will be taken to minimize on-site erosion and sedimentation of off-site resource areas during construction:

- Disturbed areas shall be protected from stormwater runoff, with runoff diverted from flowing over disturbed slopes through use of temporary drainage swales with haybale check dams.

- Silt fences/haybales or equivalent sediment control barriers shall be installed along all edges and down slope boundaries of the construction area.

- Temporary and permanent sediment traps shall be constructed as part of the drainage system. Sediment traps shall be located at all inlets to the storm drainage system during construction and shall remain in place and be maintained until disturbed areas are stabilized. Permanent sediment traps consisting of four-foot deep sumps shall be constructed in the catch basins.

- Sediment shall be retained on-site within the limit of work areas.

- Bioretention basins shall be used as temporary sedimentation basins during construction and shall be cleaned of sediments after construction.

- Rip rap splash pads shall be constructed at all drain outlets.

Construction shall conform to all specifications as designated on the site plan, and in any other documents or permits issued in association with this Project. Additional measures will include the following:

- Anti-tracking pads (wheel washes) or other means shall be used to minimize off-site movement of soil with vehicles.

- Sanitary wastes generated on-site shall be treated and/or disposed of in accordance with applicable state and local requirements.

- Construction site waste materials shall be properly contained on-site and disposed of at an off-site location in accordance with local and state regulations.

A spill contingency plan including the following provisions will be implemented during construction:

- Equipment necessary to quickly attend to inadvertent spills or leaks shall be stored on-site in a secure but accessible location. Such equipment shall include but not be limited to the following: safety goggles, chemical-resistant gloves and overshoe boots, water and chemical fire extinguisher, sand and shovels, suitable absorbent materials, storage containers, and first aid equipment.

- Spills or leaks shall be treated properly according to material type, volume of spillage, and location of the spill. Mitigation shall include preventing further spillage, containing the spilled material in the smallest practical area, removing spilled material in a safe and environmentally sound manner, and remediating any damage to the environment.

- For spills of less than five (5) gallons of material, mitigation shall include source control and containment and clean-up with absorbent materials or other applicable means, unless an imminent hazard or other circumstances dictate that the spill should be treated by a professional emergency response contractor.

- For spills greater than five (5) gallons of material, contact shall be initiated immediately with the MassDEP Hazardous Waste Incident Response Group and an approved emergency response contractor. Information shall be collected and relayed to the emergency response contractor or coordinator as to the type of material spilled, the location of the spill, the quantity spilled, and the time of the spill. The contractor shall proceed with the prevention of further spillage, containment and/or clean-up.

If there is a Reportable Quantity release during the construction period, the National Response Center shall be notified immediately at (800) 424-8802. Within 14 days a report shall be submitted to the EPA regional office describing the release, the date and circumstances of the release, and the steps taken to prevent another release.

3.2.11.2 Construction Air Quality

Short-term air quality impacts from fugitive dust may be expected during the early phases of construction and during demolition. Plans for controlling fugitive dust during construction and demolition include mechanical street sweeping, wetting portions of the Project 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 area 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.

3.2.11.3 Construction Noise

The Proponent is committed to mitigate noise impacts from construction of the Project. Increased community sound levels, however, are an inherent consequence of construction activities. Construction work will comply with requirements of the City of Boston Noise Ordinance. Reasonable efforts 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 equipment and ongoing maintenance of intake and exhaust mufflers;
- Installing 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 equipment alternatives 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 to protect sensitive receptors by shielding or distance.

3.2.11.4 Construction Waste Management

The Proponent will reuse or recycle demolition and construction materials to the greatest extent feasible. On-site construction procedures will allow for the segregation, reuse, and recycling of materials. The construction contractor will be required to implement a waste management plan on-site to divert at least 75% of construction and demolition material to recycling and salvage facilities if not usable on-site. It is expected that as much as 95% of construction waste could be diverted. Materials that cannot be reused or recycled will be transported in covered trucks by a contract hauler to a licensed facility.

3.2.11.5 Traffic Control and Construction Management Plan

The construction period will generate truck traffic and construction employee traffic. Project construction will involve the use of designated routes, defined in coordination with the BTD, prior to the start of construction. The use of local residential streets will be prohibited. The contractor will establish site trailers and staging areas to minimize impacts on traffic. Trucks will be required to wait in on-site staging areas.

The Proponent is committed to working with the City of Boston to ensure appropriate maintenance and protection measures are in place during Project construction. It is anticipated that traffic patterns will be maintained on affected roadways and that there will be no need for a full road closure or detours during the construction period.

The Proponent will prepare a detailed CMP to be filed with the City of Boston once Project plans are finalized and the construction schedule is fixed. The CMP will include detailed information on construction activities, specific construction mitigation measures, and construction material access and staging plans to minimize impacts to abutters and the local community. The Proponent will also coordinate with the adjacent library to ensure its operations are not adversely affected. The construction contractor will be expected to comply with details and conditions of the approved CMP.

Summarized below are several measures which the Proponent and construction contractor will undertake during the construction phase:

- Designated truck routes will be established to govern truck access to the Project site.
- Secure fencing and sidewalk staging will be installed to protect pedestrian and vehicular traffic from construction activities.
- Secure on-site storage will be provided for tools and equipment to minimize construction-related vehicle trips to the site.
- Full or partial street closures will be avoided to the extent possible. Should a partial street closure be necessary to off-load construction materials and/or complete construction-related activities, the closure will be limited to off-peak periods as defined by the City of Boston. This will minimize impacts to vehicular and pedestrian flows. Police details will be utilized as required by the City of Boston.
- During certain construction activities, a police detail will be on-site to manage pedestrian and construction vehicle traffic.
- The Proponent will coordinate with the BTD regarding all transportation-related construction impacts.

- Construction workers will be provided with on-site parking as available and at nearby sites where parking agreements have been negotiated with property owners and construction workers. Construction workers will not be permitted to park along adjacent roadways.

- Project contractors will be encouraged to subsidize the purchase of MBTA Charlie Cards for qualified employees to the extent allowable under Internal Revenue Service regulations to encourage the use of public transportation and reduce traffic and parking demands.

- The contractor will be encouraged to implement a carpool/vanpool program with inducements such as subsidized parking for employees who participate.

- Noise considerations are detailed in Section 3.2.11.3.

By implementing these recommendations, the Proponent will provide safe and efficient access to the Project site, and construction will be able to proceed with minimal impacts on the transportation system.

3.2.12 Rodent Control

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

3.2.13 Wildlife Habitat

The site is within a fully developed urban area and, as such, the proposed Project will not impact wildlife habitats as shown in the National Heritage Atlas.

3.2.14 Sustainable Design

Article 80B-6 of the Boston Zoning Code stipulates that new development projects larger than 50,000 square feet must comply with green building standards and sustainable design features as described in Article 37 of the Code. The Proponent is committed to incorporating numerous sustainable design elements into the proposed building which will reduce energy consumption, minimize potable water use, and maximize recycling by students and staff.

A LEED for Schools checklist is defined in the USGBC's LEED building rating system. The Proponent has engaged LEED-accredited professional Tamar Warburg, AIA, LEED AP BD+C to lead the Project design team in an effort to maximize the green design elements incorporated into the building and site. These elements are summarized below.

3.2.14.1 Sustainable Sites

The following sustainable site measures are associated with the Project:

- The Project will redevelop a previously-developed site in an urban neighborhood that is served by two MBTA Blue Line stations, a bus depot, and a bicycle path. The Project will also be served by a school bus system.
- Changing rooms and showers will be provided for bicycle commuters.
- In addition to vanpool space, 5% of the parking spaces will be preferred parking for Low-Emitting & Fuel-Efficient Vehicles.
- The stormwater management plan will utilize BMPs to treat post-development runoff and remove at least 80% of TSS.
- The proposed building will feature white TPO or EPDM roofs that are highly reflective and minimize solar radiation.
- The Proponent intends to make the proposed gymnasium available for use by other Excel Academy facilities as well as for the community during off-hours. As such, the proposed layout of the facility will allow for gymnasium use by the public while keeping the school secure.

3.2.14.2 Water Efficiency

Plant materials used in proposed landscaping will be native and drought-resistant such that no irrigation will be required.

Dual flush/low-flow toilets, low-flow faucets, and low-flow shower heads will be employed to reduce potential water usage in the proposed facility. Using infrared sensors for faucet operation will also improve hygiene while reducing water consumption.

3.2.14.3 Energy and Atmosphere

The Project is expected to achieve a 20% reduction over the ASHRAE 90.1-2004, thus meeting minimum energy performance requirements, and will comply with the Massachusetts Energy Stretch Code. Energy efficiency will be achieved through a highly-insulated building envelope, including increased insulation at walls and the roof, improved windows at all locations, high-efficiency lighting for all spaces, daylight harvesting to reduce lighting energy need, and a heating, ventilation, and air conditioning (HVAC) system that will meet the Stretch Code. Occupancy sensors and time clocks will further reduce energy consumption by minimizing HVAC and lighting demand.

The HVAC system will not utilize chlorofluorocarbon (CFC) refrigerants. No ozone-depleting refrigerants will be used in the new cooling system.

A commissioning agent will be hired as part of the design team.

3.2.14.4 Materials and Resources

Recycling bins will be provided in each classroom and office, and recycling collection/storage area will be located near the service entrance.

The general contractor will be required to implement a waste management plan to divert at least 75% of construction and demolition material to recycling and salvage facilities. It is expected that as much as 95% of the construction waste could be diverted.

3.2.14.5 Indoor Environmental Quality

The following measures will be used to maximize indoor environmental quality:

- The Project will be energy-efficient due to a highly-insulated building envelope and high-efficiency lighting and HVAC systems for all spaces. Daylight harvesting will reduce lighting needs.
- The Project will meet the minimum requirements of the Massachusetts Building Code and ASHRAE 62.1 2007 for ventilation and indoor air quality. Smoking will be prohibited on school grounds per Massachusetts General Law.
- Construction specifications will require the contractor to submit an Indoor Air Quality plan for the construction period to protect the HVAC system and prevent moisture or contaminants from coming into contact with carpeting, ceiling tiles, or other absorptive surfaces.
- The Project design will specify the use of adhesives, sealants, paints, coatings, flooring, and ceiling and wall systems with low-volatile organic compound (VOC) content.
- Entry mat systems will be installed at all entries.
- Direct ventilation to the outside will be provided in all chemical storage areas, including housekeeping spaces.
- The HVAC design will meet the ASHRAE Standard 55-2004.
- A post-occupancy survey will be administered and evaluated to ensure adequate indoor air quality.

3.2.14.6 Innovation and Design Process

None of the lighting in the proposed building, including compact fluorescent fixtures, will contain mercury.

3.3 Urban Design

3.3.1 Urban Context

The proposed Excel Academy campus is located on Bremen Street in East Boston. The neighborhood is densely-built, with a traditional fabric of primarily wood-frame one- and two-family houses and triple-deckers, a mix of small-scale brick and wood commercial buildings focused on Maverick Square, and small commercial nodes like Day Square. Separated from the rest of the city by the Inner Harbor and surrounded by water on three sides, East Boston shares a small peninsula of land with Logan Airport. The neighborhood is hemmed in by the airport, its auxiliary facilities and related roadways, and the elevated William McClellan Highway and Massachusetts Turnpike Extension. However, the greatest impact on East Boston is that of the low-flying planes on Logan's flight paths. Photographs of the Project site are provided in Attachment A.

East Boston is undergoing considerable redevelopment with public and private investment. The past decade has seen replacement of the former Maverick Gardens public housing with new mixed-income housing, construction of a new Maverick Square MBTA Station, and a new East Boston Neighborhood Health Center. Piers Park has also been developed along the waterfront, and many planned private housing and mixed-use developments have been constructed.

Environmental mitigation for the Central Artery/Tunnel Project included creation of the East Boston Greenway, a three-mile linear park extending from the East Boston Piers to Belle Isle Marsh and Wood Island Bay Marsh. In places, the parkland runs alongside and sometimes beneath the elevated William McClellan Highway and Massachusetts Turnpike Extension. The Greenway includes bike and pedestrian paths, and functionally links playing fields and playgrounds at East Boston Memorial Park southeast of McClellan Highway with the new Bremen Street Park to the northwest; the Bremen Street Park is located southwest of the Project site, on the other side of the East Boston branch of the Boston Public Library.

Between the Greenway plantings and elevated highway, a 24-foot-tall billboard towers over the Project site at a height approximately 75 feet above ground level. Although this billboard is a relatively minor element at ground level, it has a very visible presence above the highway and emphasizes the extremely different environments at grade and at the highway level. This can be seen in the urban context photographs on Figure 3-30a.

3.3.2 Immediate Neighborhood Context

The Project site is located adjacent to the intersection of Bremen and Bennington Streets near Day Square, a commercial node with small-scale retail, restaurants, and other commercial uses. The site is in an industrial area between the residential/commercial/light industrial fabric to the north and the elevated McClellan Highway and Mass Turnpike

View from Greenway looking South at Billboard; Proposed site to the right

View from I-90 looking towards Project site

Extension as well as industrial areas serving the airport to the south. Bremen Street itself is characterized by a mix of industrial, institutional, and residential uses. A gas station is located across Bremen Street north of the site at the intersection of Bremen Street and Bennington Street, along with auto repair shops and a series of two- and three-story wood houses on very narrow parcels (see Figure 3-30b).

The Excel Academy campus proposed on Bremen Street will build upon the City's recent redevelopment of public amenities along the street. The new East Boston branch of the Boston Public Library and Bremen Street Park are immediately southwest of the Project site, and the park features a community garden, playgrounds, a fountain, wading pool, large open lawns, and a performance amphitheater (see Figure 3-30c). The Bremen Street YMCA is located adjacent to the park.

The East Boston Greenway runs along the southeast boundary of the Project site with a densely vegetated edge to the private parcels. As described in Section 1.2.3, the Project site is highly accessible via multiple modes of transportation, including public transit (see Figure 3-30c). Excel Academy students, families, and staff will benefit substantially from this transit-oriented location.

The proposed Project will expand and enhance public amenities along Bremen Street, offering significant benefits to East Boston residents by educating middle school and high school students from East Boston and adjacent communities, providing employment opportunities, and promoting redevelopment in an area that will benefit existing local businesses.

3.3.3 Design Goals and Concept

Located on a narrow lot, and responding to the densely-built fabric on the north side of Bremen Street, the school will present its northwest façade to Bremen Street as a strong three-story streetwall. Segments of the building will slip forward and back to subdivide the mass of the classroom wing along the street, similar to the massing of the new East Boston branch of the Boston Public Library, and finer-grained existing urban fabric. A proposed site plan is provided as Figure 1-4. Because the site is extremely narrow for accommodating the school building program, new sidewalk, and bus turn-in, the front façade will not be aligned with the adjacent library but instead will be located behind the proposed sidewalk.

The building design is an asymmetrical U-shape. The cafeteria will extend out from the southeast corner of the classroom wing, while the gym will extend from the northeast corner of the classroom wing, thus framing a south-facing courtyard overlooking the Greenway and opening toward the library (see Figure 1-4 for the Proposed Site Plan).

View across site looking toward Bremen Street

Day Square Looking South; Parking and Bremen Street to the left

View from Bremen Street Park toward Library

Airport Station entry from Bremen Street Park

The proposed campus is designed to reinforce the strong sense of community and collective responsibility that is central to Excel Academy's spirit and mission. Because the campus will encompass both middle school and high school, separate entries and interior gathering places will be provided. The middle school will be located on the first floor, while the high school will occupy the second and third floors. The cafeteria, gym, and courtyard will be shared spaces.

Recessed entryways topped by projecting bays or canopies will mark an arrival at the school campus, creating a feeling of depth and providing an inviting focal point for students. The middle school entry, in the middle of the Bremen Street façade, will be topped by a projecting glazed bay that will enclose a two-story commons for the high school above. At the southwest corner of the proposed building, the high school entry will be covered by a canopy that will wrap the corner, and large glazed areas will mark the corner above.

3.3.4 Campus Layout

The tight site is efficiently organized in the proposed design, with the building toward the northeast end of the site and parking and service areas adjacent to the corresponding service areas of the East Boston branch of the Boston Public Library (see Figure 3-30d). An opaque fence will be installed adjacent to the landscaping screen of the library. The parking lot is designed to accommodate queuing lines for parents to drop off and pick up their students. A wide sidewalk will provide marshaling space for students before entering the building. Service access will occur at the same parking area. Tightly packing the vehicular uses allows the rest of the site to be dedicated to the building, open space, and pedestrian ways.

Because of its proximity to Bremen Street Park as well as the stadium and playing field at East Boston Memorial Park (accessible via the Greenway), the school will not have dedicated outdoor recreational space; the courtyard will serve as an outdoor recreation area for recess. Students will access the Greenway from a proposed gate located off the courtyard that will be secured during off-hours.

The proposed school will be located at the end of the East Boston Greenway extension, a pedestrian path that extends behind the new library and the Project site before turning under the elevated highway and continuing to Wood Isle. The proposed design for the school features a tower-like element at the corner of the gymnasium that rises above the plantings and will mark the turn in the path. The pedestrian sequence along this path is shown in Figures 3-30e and 3-30f.

View down Bremen Street toward library and Project Site

View of Library from Project site

View down East Boston Greenway toward library and Project site

View down East Boston Greenway toward Project Site

View of Project Site boundary with library and Greenway buffer plantings

View down East Boston Greenway (Project site on left side)

3.3.5 Height and Massing

The proposed Excel Academy building will vary in height but will be predominantly three stories, with the maximum 43-foot height at the street which will then step down toward the southeast, adjacent to the Greenway, at the two-story cafeteria and gym. This design fits within the context of surrounding buildings, which also vary in height from one to three stories (see Figures 1-4, 3-18, and 3-31). The adjacent library roof immediately to the southwest varies in height, with the highest point of the curved roof at approximately 40 feet above ground level. Across Bremen Street, residential buildings vary from 16 to 38 feet in height. The unused parcel to the northeast is targeted for future multi-story development.

Proposed building massing is greatest at Bremen Street, since the building will be set back more than 20 feet from the road to accommodate the bus drop-off/pick-up lane and new sidewalk; thus, it will not be an overbearing presence on the street. The school will fill in much-needed streetwall in this area, where the urban fabric has been fully eroded by the two-sided gas station, angled parking lot in the Y-intersection, and an additional parking lot directly across Bennington Street. This massing also ensures that the south-facing classrooms on the second and third floors will be set back the greatest possible distance from the elevated highway. Massing diagrams are provided as Figures 3-18 and 3-19.

As indicated in the shadow analysis (see Section 3.2.2), the proposed building will cast minimal new shadow on adjacent buildings.

3.3.6 Character and Materials

The school building will feature large, inviting windows. Reflecting Excel Academy's mission and consistent with the character of the surrounding area, cladding materials will be modern and simple fiber-cement rain-screen panels of varied colors. Projecting elements, such as the bay over the middle school entry, will be clad in aluminum panels. Windows will also be aluminum.

3.3.7 Open Space, Pedestrian Ways, and Amenities

The deep public sidewalk established at the library will continue along the front of the Excel property and will be as similar as possible in materials and character (see Figure 3-30g). Accessible paths will link main entrances of the building with drop-off areas for buses and cars.

The Project's primary open space will be the courtyard, which will be accessed from the glazed corridor at the south end of the classroom wing as well as from the cafeteria and the gym. The courtyard will be shaded to the south by deciduous trees that will allow for winter sun. A pedestrian walkway from the Greenway will connect the school property to this resource at the drop-off area and the courtyard during school hours. Gates at the Greenway entrance and at the courtyard will provide security and allow for access control.

View of Library buffer

Library sidewalk detail

Excel East Boston MS/HS Boston, Massachusetts

Figure 3-31

Perspective View from Bremen Street

Site design and landscaping are discussed in further detail in Section 2.2.2.

3.3.8 Site Signage

Signage for the school will be designed to make vehicular and pedestrian circulation patterns through the site clear and understandable to faculty, staff, families, visitors, and emergency vehicles. Awning–mounted signage will clearly mark arrival at the school campus, and signage will indicate the entry and exit from the parking area and queuing areas.

3.3.9 Vehicle Access, Circulation and Parking

Separation of vehicular and pedestrian circulation is important to maintain safety on the school campus. Parking for staff, parents, and visitors will be accommodated on-site rather than on surrounding neighborhood streets. The 50-space parking lot will include three accessible spaces. The parking lot will be located on the southwest portion of the site, adjacent to library parking. A wide circulation area will allow for parent queuing. Students will not be allowed to drive to school.

A dedicated pull-out will provide space for buses in front of the middle school entry area.

3.4 Historic and Archaeological Resources

This section describes the historic and archaeological resources within and adjacent to the Project site, and describes the Project's potential effects on these resources.

3.4.1 Project Site

The Project site is an approximately two-acre parcel of land located at 413 Bremen Street that encompasses three vacant buildings. The buildings include a ca. 1970 filling station and two one-story concrete and brick structures clad in flat asphalt brick, constructed ca. 1950. Most recent uses of the existing buildings were a hardware store/warehouse, storage, and Paul's Airport Parking. The site also encompasses a deteriorated stone wall at the northwest property line at Bremen Street. The remainder of the site is paved and used for surface parking.

The Project site is bounded to the northwest by Bremen Street, to the northeast by an unused developed parcel followed by Bennington Street, to the southeast by the Martin A. Coughlin Bypass Road and the East Boston Greenway, and to the southwest by the East Branch of the Boston Public Library followed by the Bremen Street Park and community garden. Although there is currently no sidewalk on Bremen Street along the Project site frontage, a sidewalk has been installed immediately to the southwest on Bremen Street at the new library.

3.4.2 Historic Resources in the Project Site

The Project site currently contains three vacant buildings. The buildings are not included in the State or National Register of Historic Places or the Inventory of Historic and Archaeological Assets of the Commonwealth (Inventory).

The site also includes remnants of a masonry wall at Bremen Street along the northwest property line. These wall remnants were part of the Bremen Street Wall, which is included in the Inventory. The wall, constructed in the 1930s, was originally built to a height of 44 inches and provided a barrier between residential neighborhoods to the northwest of Bremen Street and the railroad lines (no longer extant) located southeast beyond the wall. The wall originally ran the full length of Bremen Street from Sumner Street to Bennington Street (approximately one mile), and was interrupted only by the bridges at Porter and Prescott Streets (no longer extant). In the intervening years, most sections of the wall have been removed and of the few remaining sections, most have been altered. The most intact section can be found between Maverick and Gove Streets located approximately one-half mile southwest of the Project site. The portions of wall within the Project site have been extensively altered, with large sections removed and the height of most of the remaining sections reduced to approximately one foot. Given the limited remnants of the wall along its original one-mile length, as well as the altered and deteriorated condition of the remnant sections, it appears the wall lacks sufficient integrity to meet the National Register of Historic Places criteria for eligibility.

3.4.3 Historic Resources in the Project Vicinity

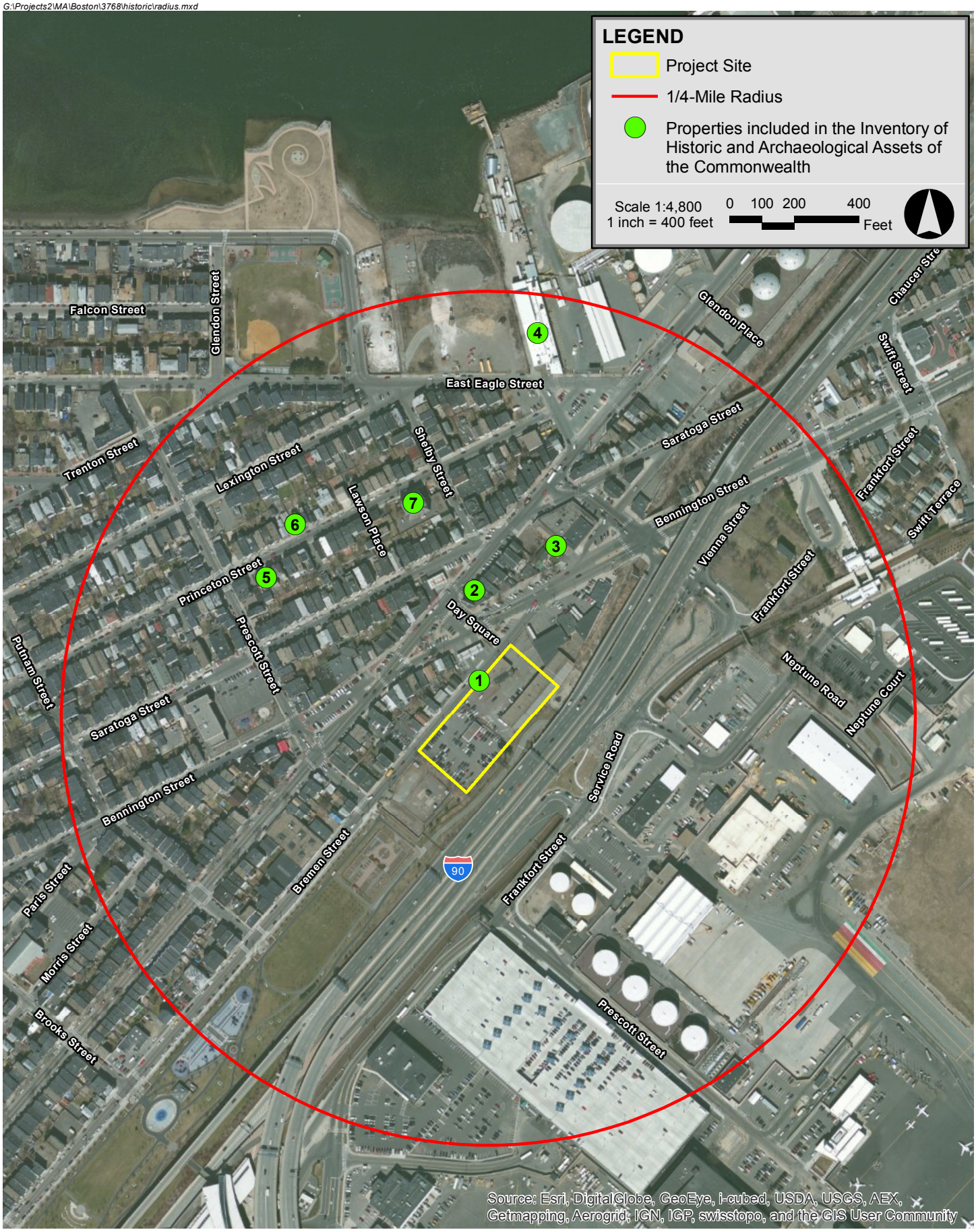
There are no State or National Register properties in the vicinity of the Project.

There are limited properties in the vicinity of the Project site that are included in the Inventory, which are listed in Table 3-17 and depicted in Figure 3-32.

Table 3-17 Historic Resources in the Project Vicinity.

No.	*Name*	*Address*
Properties included in the *Inventory of Historic and Archaeological Assets of the Commonwealth*		
1	Bremen Street Wall	Bremen Street
2	William F. McClellan Building	336-344 Bennington Street
3	Single Family Residence	360 Bennington Street
4	Boston Ice Company Distribution Center	370 East Eagle Street
5	John and Alexander McLaren Building	263 and 265 Princeton Street
6	Pinkham-Perry-Sanderson House	296-300 Princeton Street
7	Noble School and Annex	321 Princeton Street

G:\Projects2\MA\Boston\3768\historic\radius.mxd



Excel East Boston MS/HS Boston, Massachusetts

Epsilon Associates Inc.

Figure 3-32
Historic Resources

3.4.4 Impacts to Historic Resources

As described in Section 2.0, the site is proposed to be redeveloped into a middle school and high school. As part of the Project, the site plan calls for the addition of a sidewalk along Bremen Street to address safety concerns and provide access for students as well as the general public. The proposed sidewalk will tie into the new sidewalk immediately southwest of the Project site adjacent to the new East Boston branch of the Boston Public Library. To accommodate the new sidewalk, the remnant sections of stone wall within the Project site will be removed.

The Project site contains three vacant buildings. As noted above, the buildings are not included in the State or National Register of Historic Places or the Inventory. Proposed demolition of the existing buildings on the Project site will be subject to review by the Boston Landmarks Commission (BLC) under Article 85 of the Boston Zoning Code. Article 85 Applications for the buildings will be submitted to the BLC. It is anticipated that the buildings will not be determined to be historically or architecturally significant under Article 85.

Given the lack of historically or architecturally significant resources within or in the immediate vicinity of the Project site, the Project is not anticipated to have any adverse direct or indirect impacts on historic resources.

3.4.5 Archaeological Resources

The Project site consists of a previously developed urban parcel. No previously identified archaeological resources are located within the Project site. Due to previous development activities and disturbances, no impacts to archaeological resources are anticipated as a result of the Project.

3.5 Infrastructure Systems

This section describes existing utilities surrounding the Project site, identifies the proposed connections required to provide service to the proposed Project, and quantifies impacts on the existing utility systems that may result from construction and operation of the Project. The following utility systems are discussed herein:

- Sewer;
- Domestic water;
- Fire protection;
- Drainage;
- Natural gas;

- Electricity; and
- Telecommunications.

The Project is proposed to develop an approximately 70,000-square-foot school building on a previously-developed site that predominantly contains three existing vacant single-story buildings and paved parking areas. The Project is located on Bremen Street adjacent to Bennington Street and the East Boston Greenway in East Boston.

3.5.1 Wastewater

3.5.1.1 Sewer Infrastructure

Existing BWSC combined sewer mains are located in Bremen Street adjacent to the Project site: a 20- by 27-inch combined sewer beneath Bremen Street flows in a southerly direction, and a 12-inch combined sewer beneath Bennington Street flows in a northerly direction. The existing sewer system is shown on Figure 3-33.

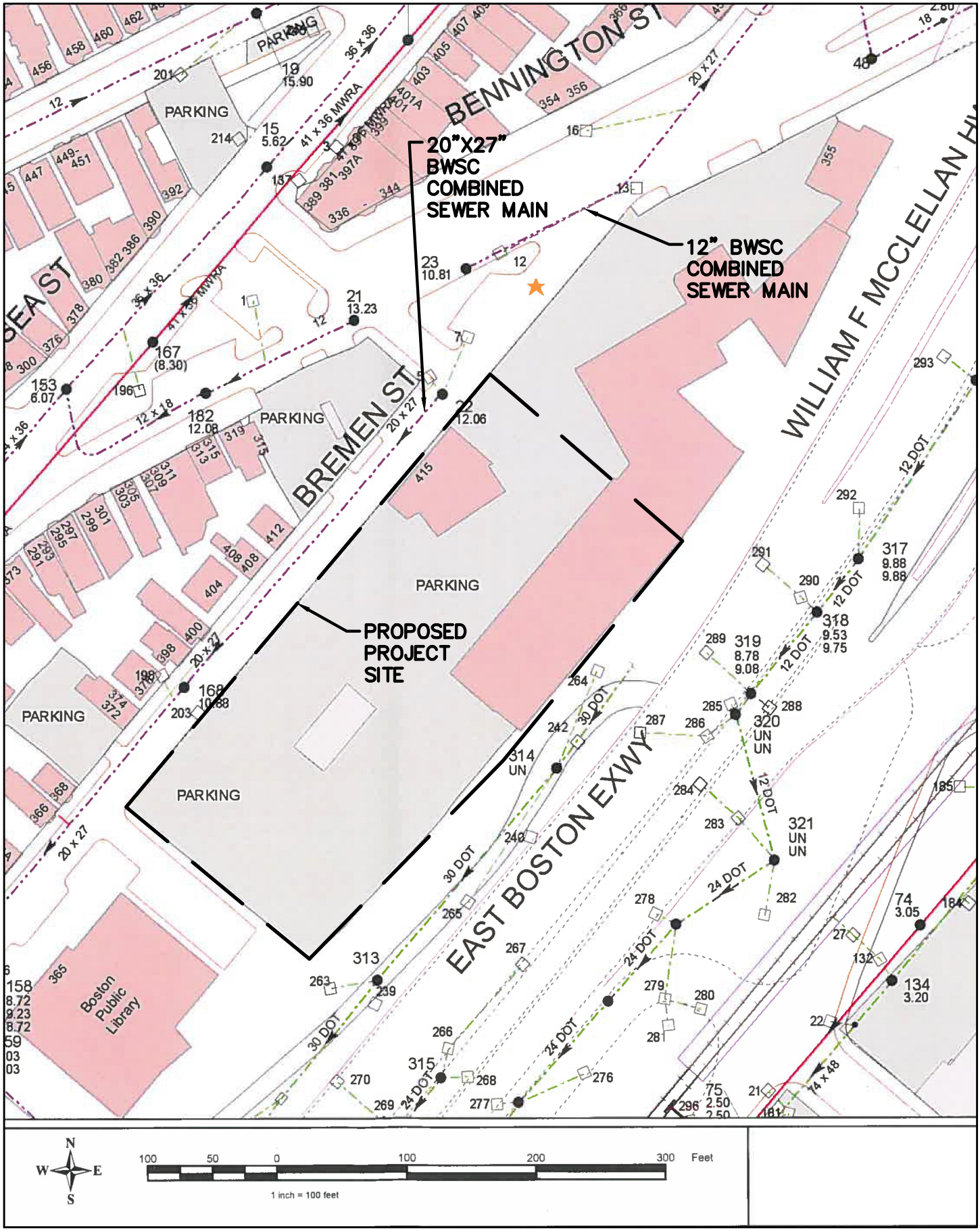
The 20- by 27-inch combined sewer beneath Bremen Street flows south and connects to a 20- by 27-inch combined sewer beneath Prescott Street which flows west. This Prescott Street combined sewer main continues flowing west, then flows north until connecting to a 24- by 36-inch combined sewer beneath Chelsea Street. This Chelsea Street combined sewer main flows north to Eagle Square, where the main is directed to either a 36- by 41-inch MWRA sanitary sewer main beneath Chelsea Street, or, during times of high flow, to a 36- by 48-inch BWSC combined sewer main within Chelsea Street which discharges to Chelsea Creek or flows north to the MWRA East Boston Steam Pumping Station. The East Boston Steam Pumping station ultimately flows to the MWRA Deer Island Waste Water Treatment Plan for treatment and disposal.

The 12-inch combined sewer beneath Bennington Street flows north to Eagle Square, where the main is directed to either the 36- by 41-inch MWRA main beneath Chelsea Street, or, during times of high flow, to the 36- by 48-inch BWSC combined sewer main within Chelsea Street which discharges to Chelsea Creek or flows north to the MWRA East Boston Pumping Station. The East Boston Steam Pumping station ultimately flows to the MWRA Deer Island Waste Water Treatment Plan for treatment and disposal.

Sewer service to the existing buildings will be removed as part of the proposed Project.

3.5.1.2 Wastewater Generation

Sewage generation rates for the proposed Project were estimated using the Massachusetts Division of Water Pollution Control Sewer System Extension and Connection Permit Program at 314 CMR 7.00 and the proposed building program. Table 3-18 contains the typical sewage generation values for the proposed sources as listed in 314 CMR 7.00.



Excel East Boston MS/HS Boston, Massachusetts

Nitsch Engineering

Figure 3-33
Existing Sewer System

Typical generation values are conservative values for estimating sewage flows from new construction. 314 CMR 7.00 sewage generation values are used to evaluate new sewage flows or an increase in flows over existing connections. Table 3-18 describes the increased sewage generation in gallons per day (gpd) due to the proposed Project. The analysis assumes no "existing" wastewater flow since buildings on the site are vacant.

Table 3-18 Estimated Project Wastewater Generation

Room Use	*Number of People*	*314 CMR Value (gpd/unit)*	*Total Flow (gpd)*
Proposed Use - School			
Students	896	20/person	17,920
Faculty	105	20/person	2,100
		total	*20,020*

3.5.1.3 Sewage System Capacity

To analyze the Project's potential impact to the existing BWSC systems in Bremen Street and Bennington Street, a sewer hydraulic capacity analysis was performed. Capacity calculations for the existing sewer system are presented in Table 3-19.

Table 3-19 Sewer Hydraulic Capacity Analysis

Manhole (BWSC Number)	*Distance (feet)*	*Invert Elevation (up)*	*Invert Elevation (down)*	*Slope (%)*	*Diameter (inches)*	*Manning's Number*	*Flow Capacity (cfs)*	*Flow Capacity (MGD)*
Bremen Street								
22 to 168	299	12.06	10.88	0.4%	15	0.013	4.06	2.62
168 to 158	330	10.88	9.23	0.5%	15	0.013	4.57	2.95
						Minimum Flow Analyzed:	4.06	2.62
Bennington Street								
23 to 24, 25	399	10.81	8.16	0.7%	18	0.013	8.56	5.53
						Minimum Flow Analyzed:	8.56	5.53

Note: 1. Manhole numbers taken from BWSC As-Builts and Sewer System Map no. 28N
2. Flow Calculations based on Manning Equation

3.5.1.4 Proposed Sewer System Conditions

The Proponent will coordinate with BWSC on the design and capacity of proposed connections to the sewer system. Since the proposed Project is expected to generate an increase in wastewater flows of approximately 20,020 gallons per day, a MassDEP Sewer Compliance Certification will be required. MassDEP is in the process of eliminating its

sewer connection permit program, so depending on the timing, the Project may not require the certification. In that case, approval for the increase in sanitary flow would come from BWSC.

Sewer services for the proposed Project will connect to the existing combined sewer mains located in Bremen Street and/or Bennington Street. All improvements and connections to BWSC infrastructure will be reviewed as part of the BWSC site plan review process for the Project. This process includes comprehensive design review of proposed service connections, an assessment of project demands and system capacity, and the establishment of service accounts.

3.5.1.5 Results of Wastewater Analysis

Capacity analysis results shown in Table 3-19 indicate the minimum hydraulic capacity for the 20- by 27-inch system in Bremen Street is 2.62 million gallons per day, and for the 12-inch system in Bennington Street is 5.53 million gallons per day. Based on an average daily flow estimate for the proposed Project of 20,020 gallons per day (0.02 million gallons per day), and with a factor of safety of 10 (total estimate = 0.02 MGD x 10 = 0.2 MGD), no capacity problems are expected within the Bremen Street or Bennington Street systems.

3.5.2 Water Supply

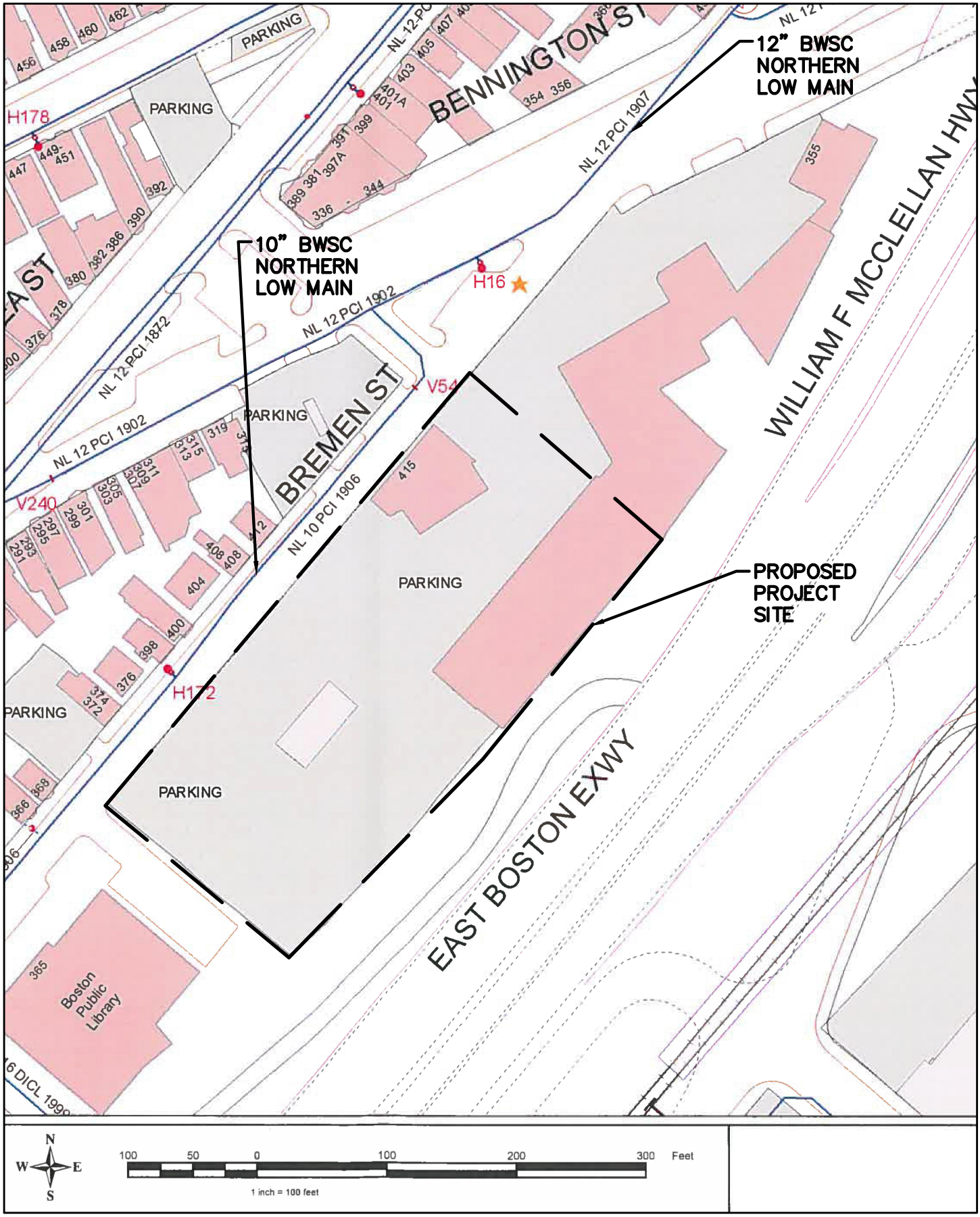
3.5.2.1 Water Infrastructure

Water for the Project site will be supplied by the BWSC systems in Bremen Street or Bennington Street. There are five water systems within the City, and these provide service to portions of the City based on ground surface elevation. The five systems are southern low (commonly known as low service), southern high (commonly known as high service), southern extra high, northern low, and northern high. There is a 10-inch Northern Low main within Bremen Street, and there is also a 12-inch Northern Low main within Bennington Street. The existing water system is illustrated in Figure 3-34.

Water service to the existing buildings will be removed as part of the proposed Project.

3.5.2.2 Existing Water System Capacity

The Proponent requested BWSC record flow test data containing actual flow and pressure for hydrants within the Project vicinity; BWSC had record data near the Project site from a hydrant flow test conducted in August 2012 (see Table 3-20). As the Project design progresses, the Proponent will request that BWSC perform hydrant flow testing adjacent to the Project site since hydrant flow data should be less than a year old to be used as a design tool.



Excel East Boston MS/HS Boston, Massachusetts

Nitsch Engineering

Figure 3-34
Existing Water System

Table 3-20 Existing Hydrant Flow Data

Hydrant	*Date of Test*	*Static Pressure (psi)*	*Residual Pressure (psi)*	*Total Flow (gpm)*	*Flow (gpm) at 20 psi*	*Flow (gpm) at 10 psi*
H170 Bremen Street	8/17/2012	68	61	1,584	4,480	4,962

Note: 1. Data provided by BWSC, October 8, 2013.

3.5.2.3 Proposed Water Consumption and Conservation

The estimated water demand for domestic services is based on the proposed Project's estimated sewage generation, described above in Section 3.5.1. A conservative factor of 1.1 (10%) was applied to the estimated average daily wastewater flows calculated with 314 CMR 7.00 values to account for consumption, system losses, and other usages to estimate an average daily water demand. As such, the Project's estimated domestic water demand is 22,022 gallons per day (20,020 x 1.1).

In accordance with requirements in the State Building Code, water conservation measures such as low-flow toilets and restricted flow faucets are included in the Project design to reduce the domestic water demand on the existing distribution system. Sensor-operated sinks with water-conserving aerators and sensor-operated toilets in all restrooms will be incorporated into design plans for the Project.

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

Domestic and fire protection water services for the Project will connect to the existing BWSC water mains in Bremen Street or Bennington Street. These service connections will meet applicable City and State codes and standards, including cross-connection backflow prevention. Compliance with standards for the domestic water system service connection will be reviewed as part of BWSC Site Plan Review Process. This review includes, but is not limited to, sizing of domestic water and fire protection services, calculation of meter sizing, backflow prevention design, and location of hydrants and siamese connections that conform to BWSC and Boston Fire Department requirements.

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

3.5.3 Stormwater

Existing BWSC combined sewer mains are located in Bremen Street and Bennington Street: a 20- by 27-inch combined sewer beneath Bremen Street flows south, and a 12-inch combined sewer beneath Bennington Street flows north. This existing infrastructure was described in greater detail in Section 3.5.1 in the context of wastewater infrastructure. In addition, an existing 30-inch MassDOT storm drain main within the East Boston Greenway flows in a southerly direction to the combined sewer within Prescott Street which flows west and is part of the East Boston Expressway closed drainage system.

There are no existing closed drainage systems on the Project site. Stormwater runoff from the existing parking lot and buildings sheet flows to adjacent properties and to the storm drains within the closed drainage system in Bremen Street and the East Boston Greenway. The existing storm drain system is illustrated in Figure 3-35.

3.5.3.1 Proposed Stormwater Infrastructure

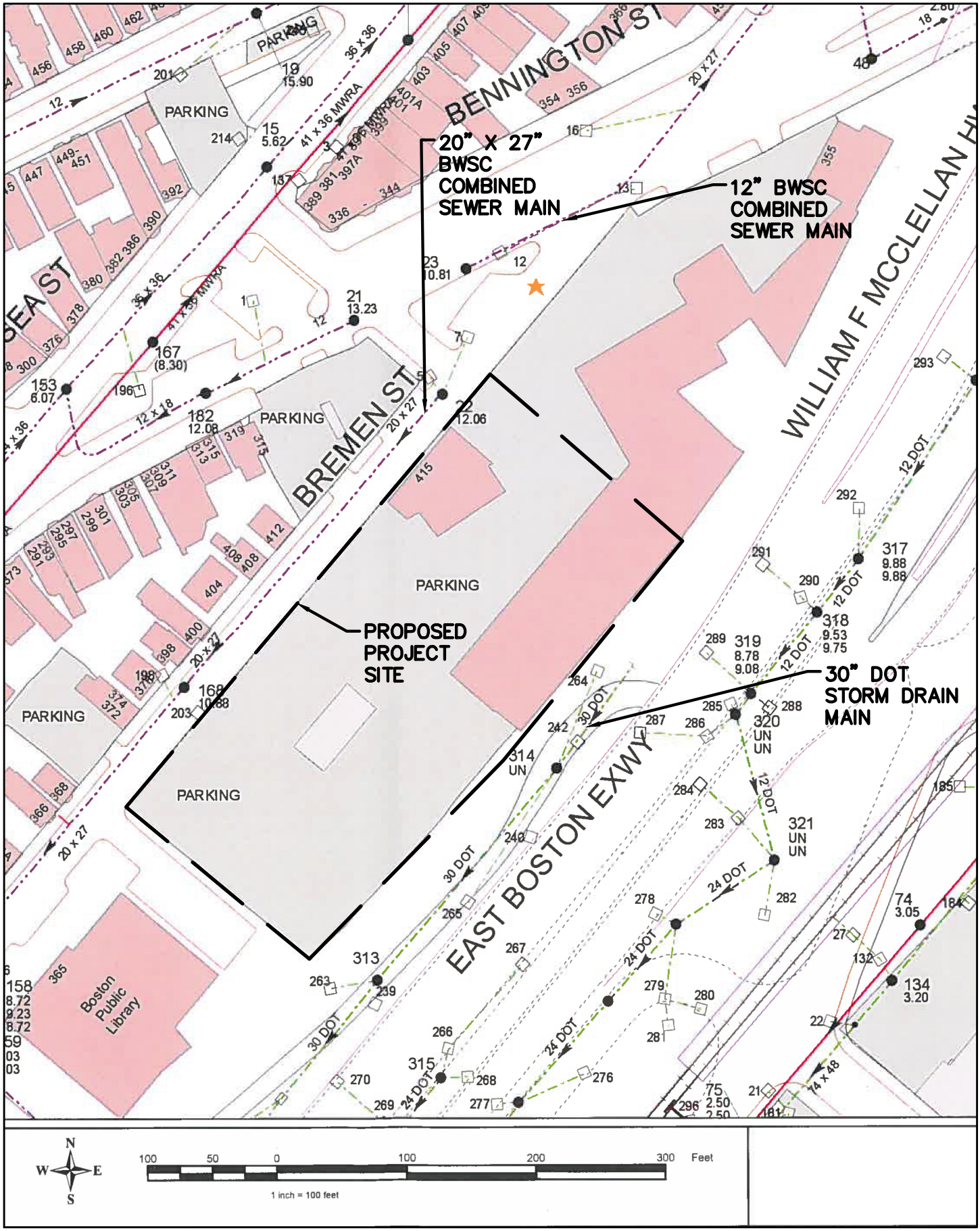
The existing Project site contains a paved parking lot with existing buildings totaling approximately 4,000 square feet in roof area, resulting in nearly 100% impervious cover. The Project will decrease impervious area on the site by approximately 27% relative to existing conditions, resulting in approximately 73% impervious cover. This site design will reduce peak rates and volumes of stormwater runoff from the site.

Stormwater from proposed building roof areas will be directed to surface infiltration basins and underground infiltration systems to achieve the required groundwater recharge volume. Stormwater from parking areas will be collected by deep sump, hooded catch basins and directed through stormwater quality structures before being directed to an underground recharge system. Overflow from the recharge systems will be directed to the BWSC storm drainage system.

All improvements and connections to BWSC infrastructure will be reviewed as part of the BWSC site plan review process, which includes comprehensive design review of the proposed service connections and assessments of project demands and system capacity.

3.5.3.2 Water Quality Impact

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



Excel East Boston MS/HS Boston, Massachusetts

Nitsch Engineering

Figure 3-35

Existing Storm Drain System

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

3.5.4 Energy and Telecommunications

Primary electric service origination will be coordinated with the utility company, and the electric utility will provide an exterior pad-mounted transformer to be located on a concrete pad. New primary conduits will be provided.

New natural gas service and metering will be provided from Bremen Street.

New communications utilities will be provided to the Project site via two four-inch below-grade conduits leading to a new head-end equipment room.

3.5.5 Infrastructure Protection

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

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

Section 4.0

Coordination with Other Governmental Agencies

4.0 COORDINATION WITH OTHER GOVERNMENTAL AGENCIES

4.1 Massachusetts Environmental Policy Act

The Project does not require specific review under the Massachusetts Environmental Policy Act (MEPA). Since the only MEPA threshold exceeded by the Project is due to demolition of remnants of the masonry wall at Bremen Street along the northwest property line (i.e., 301 CMR 11.01(10)(b)(1)), the Massachusetts Historical Commission (MHC) PNF will cover review of the Project under MHC's State Register Review and MEPA.

4.2 Massachusetts Historical Commission

The MHC has review authority over projects requiring state funding, licensing, permitting, and/or approvals that may have direct or indirect impacts to properties listed in the State Register of Historic Places (M.G. L. Chapter 9, Sections 27-27c, as amended). An MHC PNF will be submitted following submittal of the BRA Expanded PNF to initiate the review process. To facilitate the State Register review process, the MHC PNF will be submitted concurrently to the MHC and BLC.

4.3 Architectural Access Board Requirements

The Project will fully comply with the Massachusetts Architectural Access Board regulations current in force (2006) and Americans with Disabilities Act Design Guidelines (ADAAG) currently in force (2010).

4.4 Boston Civic Design Commission

During the Article 80 process, the BRA determines whether projects under 100,000 square feet are deemed to have special significance and should therefore be reviewed by the Boston Civic Design Commission (BCDC). If so determined for this Project, Studio G Architects will coordinate the review with the Executive Director of the BCDC on behalf of the Project Proponent and will prepare the required presentation drawings.

4.5 Boston Parks Commission

Since the Project is located within 100 feet of the East Boston Greenway and proposes a secure gated access to the Greenway, it is subject to review by the Boston Parks Commission.

4.6 Boston Landmarks Commission

Proposed demolition of the existing buildings on the Project site will be subject to review by the BLC under Article 85 of the Boston Zoning Code. An Article 85 Application for the property will be submitted to the BLC.

4.7 Other Permits and Approvals

Table 1-2 lists the anticipated permits, reviews, and approvals required for this Project.

4.8 Community Outreach

The Proponent is committed to effective community outreach and has already engaged various elected officials and community groups to ensure public input and communication surrounding the Project (see Section 1.6).

Section 5.0

Project Certification

5.0 PROJECT CERTIFICATION

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

Signature of Proponent's Representative

Mary Elisabeth Swerz

Friends of Excel Academy Charter Schools, Inc.
58 Moore Street
East Boston, MA 02128

20 November 213

Date

Signature of Preparer

Holly Carlson

Epsilon Associates, Inc.
3 Clock Tower Place, Suite 250
Maynard, MA 01754
(978) 897-7100

Date

5.0 PROJECT CERTIFICATION

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

Signature of Proponent's Representative

Christopher J. DeLorey

Friends of Excel Academy Charter Schools, Inc.
58 Moore Street
East Boston, MA 02128

Date

Signature of Preparer

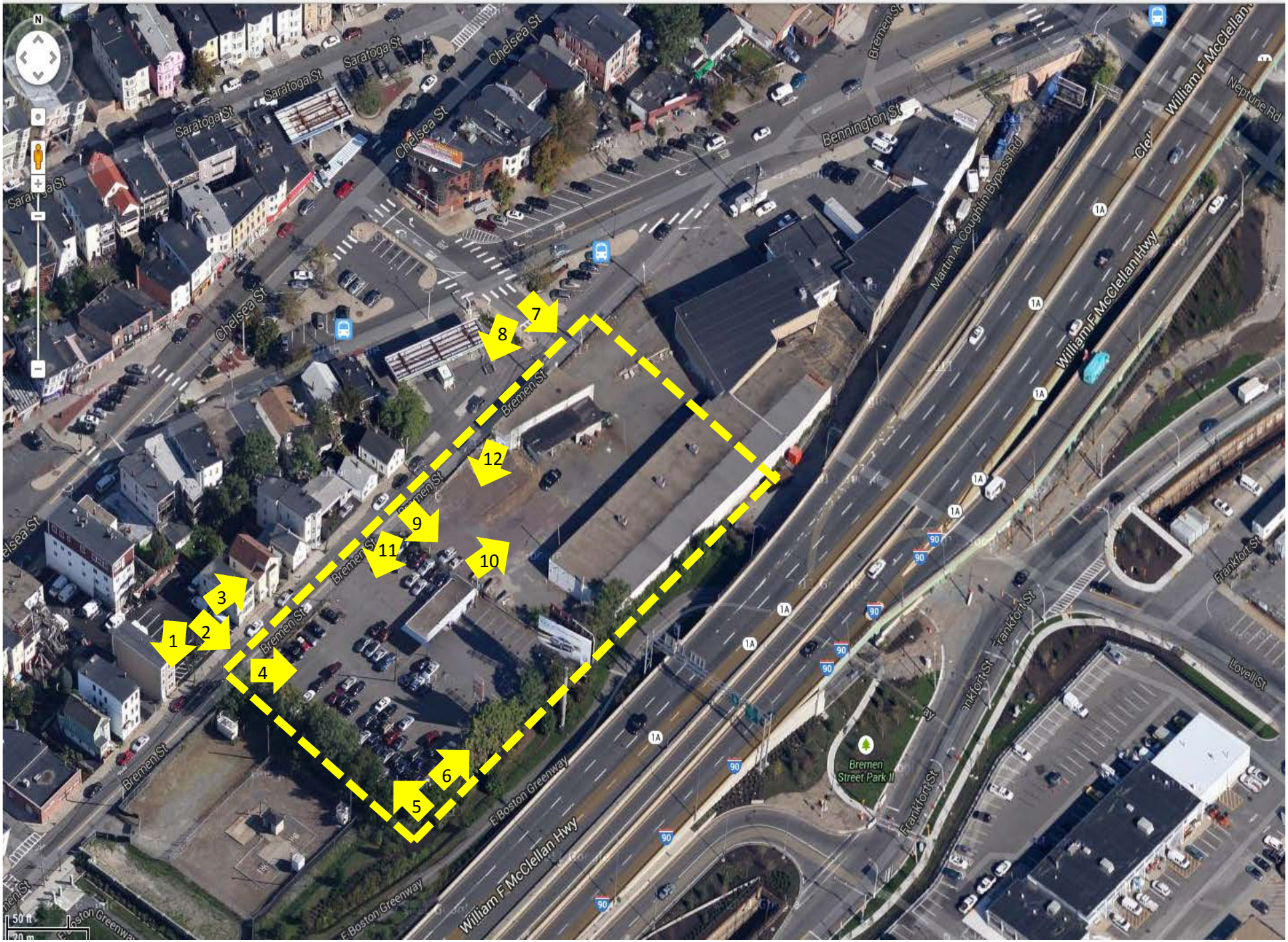
Holly Carlson

Epsilon Associates, Inc.
3 Clock Tower Place, Suite 250
Maynard, MA 01754
(978) 897-7100

11-22-2013
Date

Attachment A

Site Photographs


1
2
3
4
5
6
7
8
9
10
11
12
Bremen St
Chelsea St
Saratoga St
Bennington St
Martin A. Coughlin Bypass Rd
William F McClellan Hwy
Neptune Rd
Frankfort St
Lovell St
E Boston Greenway
Bremen Street Park II
50 ft
20 m


1


NO TRESPASSING
2


3


PAUL'S
AIRPORT
PARKING
4


5


6


7


PAUL'S
AIRPORT
PARKING
PARK
8

9

10

11

12

13

Attachment B

Floor Plans and Sections

Excel East Boston MS/HS **Boston, Massachusetts**

Epsilon ASSOCIATES INC.

studio g ARCHITECTS

Perspective

View From Bremen Street

Excel East Boston MS/HS **Boston, Massachusetts**

Epsilon ASSOCIATES INC.

studio g ARCHITECTS

Perspective

View of high school entry

Excel East Boston MS/HS **Boston, Massachusetts**

Epsilon ASSOCIATES INC.

studio g ARCHITECTS

Perspective

Aerial from Day Square/Bennington Street

Excel East Boston MS/HS **Boston, Massachusetts**

Epsilon ASSOCIATES INC.

studio g ARCHITECTS

Perspective

Aerial view of rear courtyard

Excel East Boston MS/HS **Boston, Massachusetts**

Epsilon ASSOCIATES INC.

studio g ARCHITECTS

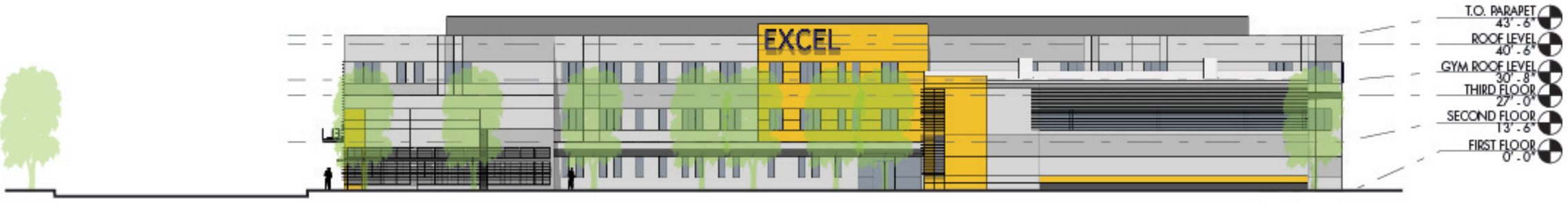
Perspective

View from East Boston Greenway

East Elevation

West Elevation

North Elevation



South Elevation

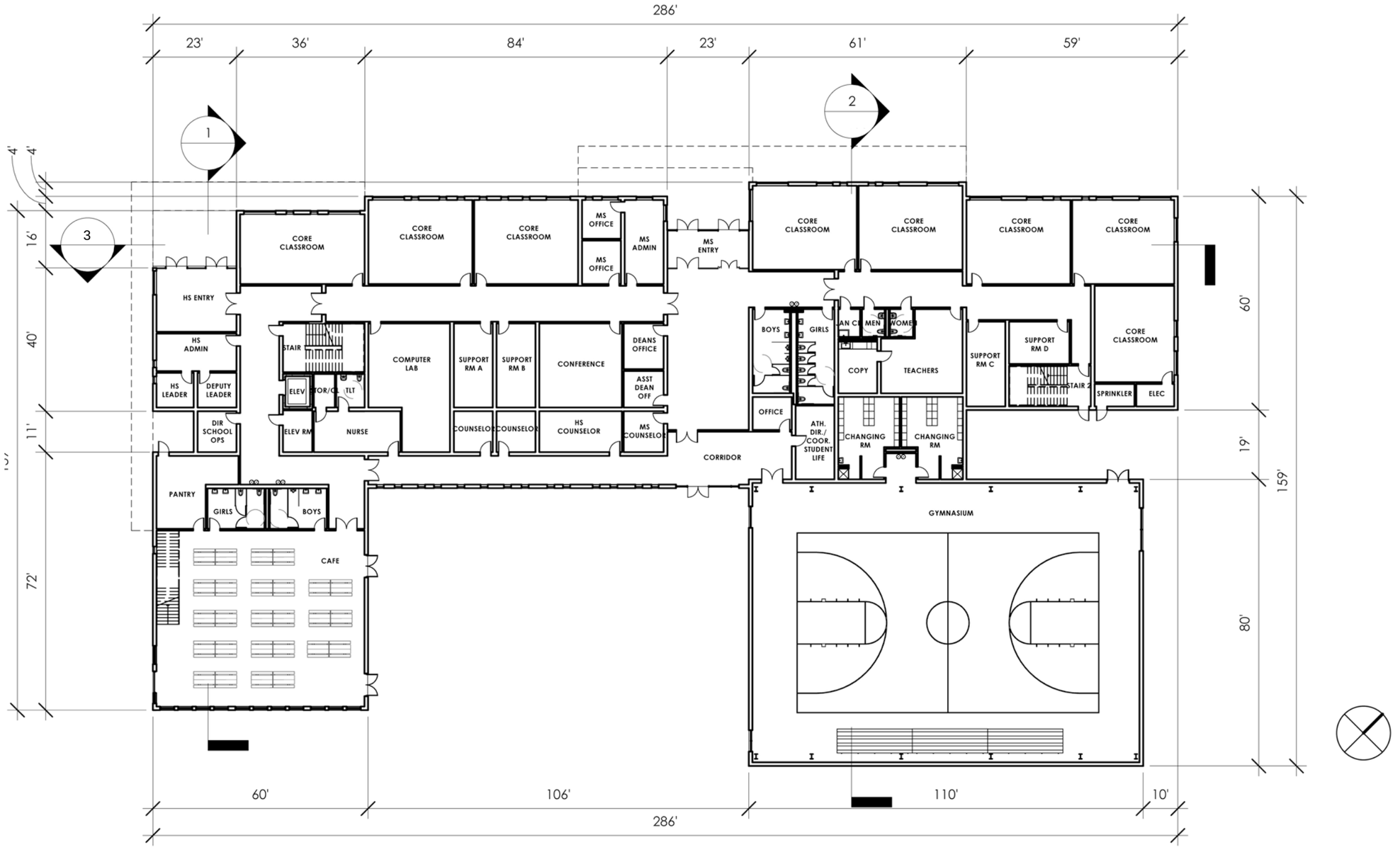
Excel East Boston MS/HS **Boston, Massachusetts**

Epsilon ASSOCIATES INC.

studio g ARCHITECTS

Exterior Elevations

Scale: 1"=30'



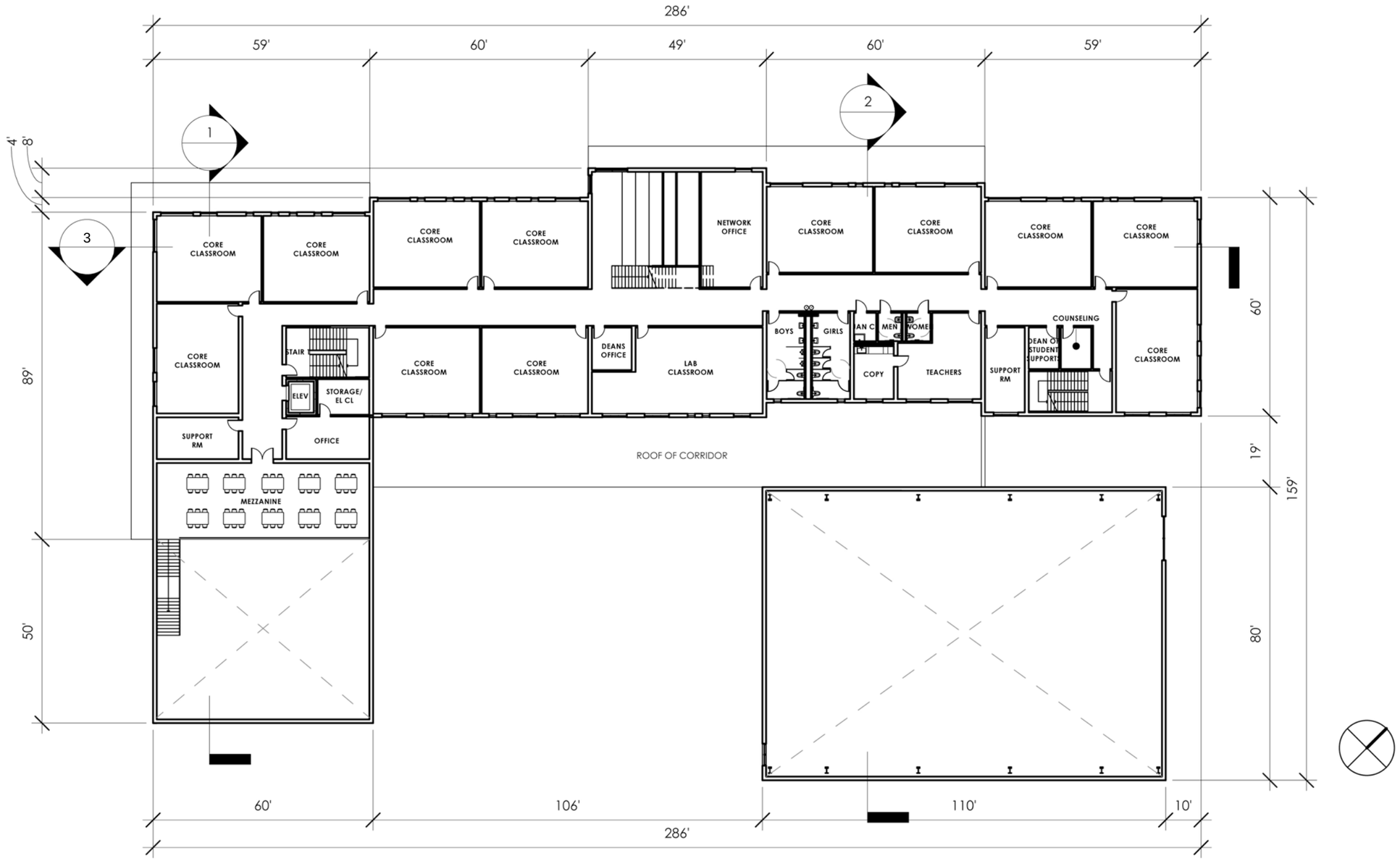
Excel East Boston MS/HS **Boston, Massachusetts**

Epsilon ASSOCIATES INC.

studio g ARCHITECTS

First Floor Plan

Scale: 1”=30’



Excel East Boston MS/HS **Boston, Massachusetts**

Epsilon Associates Inc. | studio g Architects

Second Floor Plan

Scale: 1"=30'

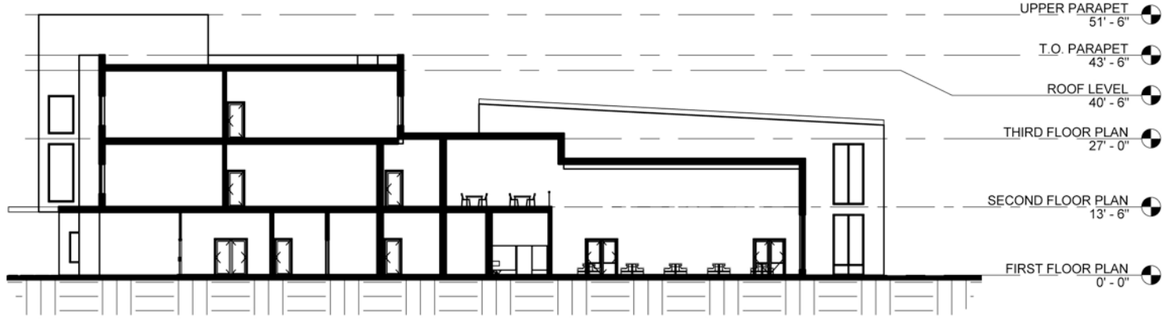
Excel East Boston MS/HS **Boston, Massachusetts**

Epsilon ASSOCIATES INC.

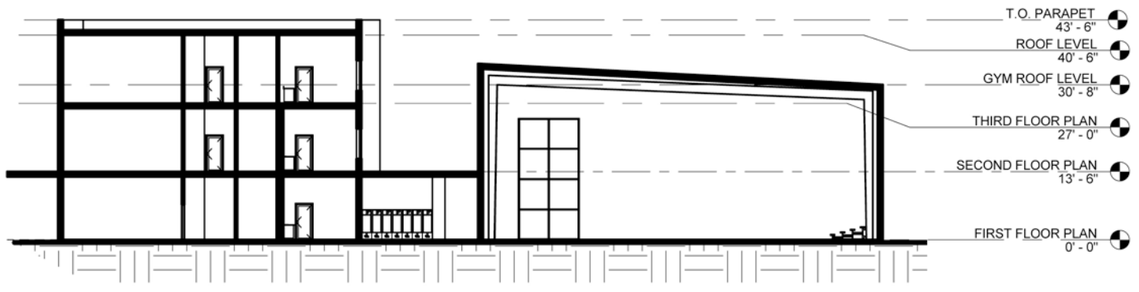
studio g ARCHITECTS

Third Floor Plan

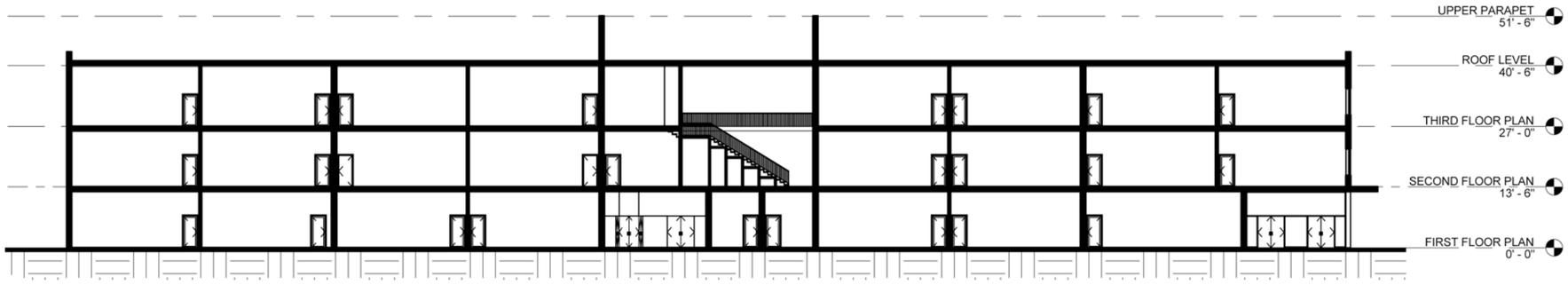
Scale: 1"=30'



Section 1



Section 2


UPPER PARAPET
51' - 6"
ROOF LEVEL
40' - 6"
THIRD FLOOR PLAN
27' - 0"
SECOND FLOOR PLAN
13' - 6"
FIRST FLOOR PLAN
0' - 0"

Section 3

Attachment C

Transportation Technical Appendices

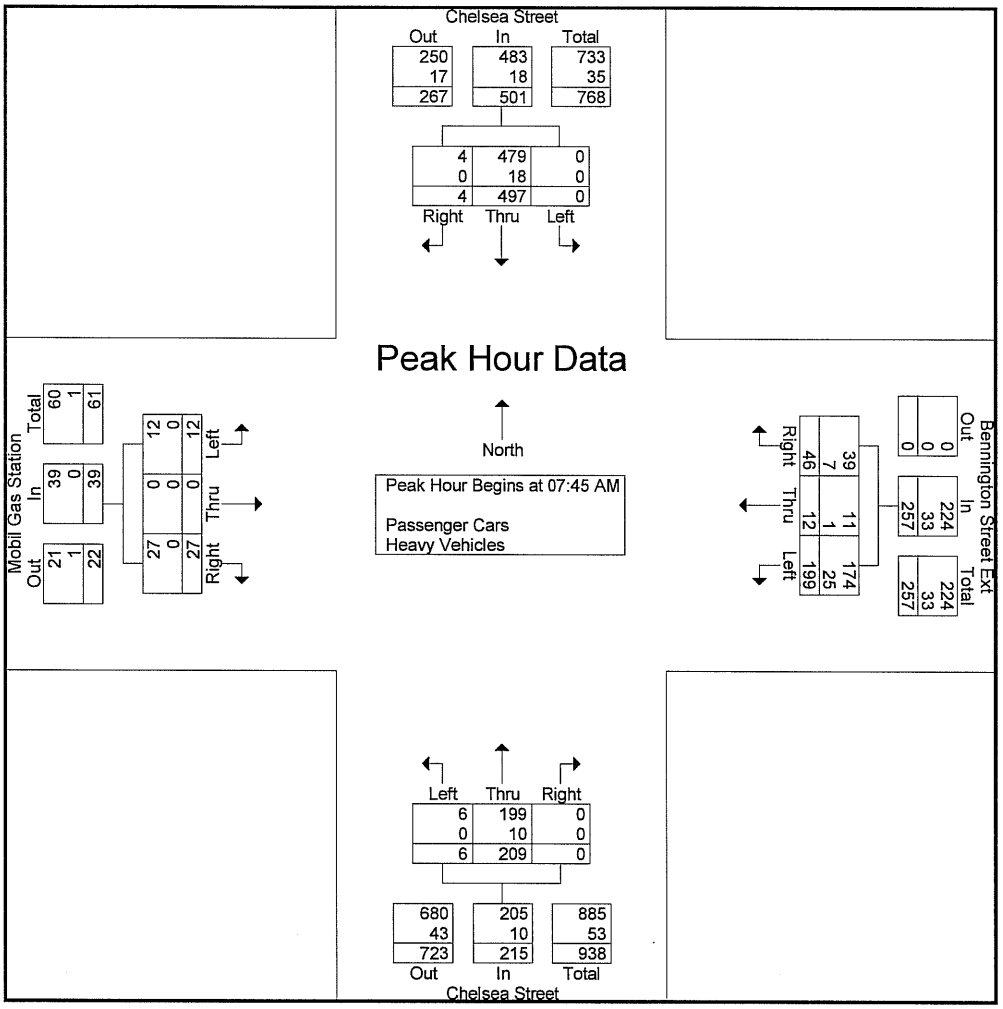
□ Traffic Volume Data

MDM TRANSPORTATION CONSULTANTS, INC.

28 Lord Road, Suite 280
Marlborough, MA 01752

N/S: Chelsea Street
E: Bennington Street Ext.
W: Mobil Gas Station
East Boston, MA

File Name : 732 Chelsea-Bennington Ext AM
Site Code : 00732001
Start Date : 10/10/2013
Page No : 2



MDM TRANSPORTATION CONSULTANTS, INC.

28 Lord Road, Suite 280
Marlborough, MA 01752

N/S: Chelsea Street
E: Bennington Street Ext.
W: Mobil Gas Station
East Boston, MA

File Name : 732 Chelsea-Bennington Ext AM
Site Code : 00732001
Start Date : 10/10/2013
Page No : 1

Groups Printed- Passenger Cars - Heavy Vehicles

	Chelsea Street From North					Bennington Street Ext From East					Chelsea Street From South					Mobil Gas Station From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	2	80	0	4	86	12	2	55	1	70	0	43	3	0	46	2	0	3	10	15	217
07:15 AM	2	83	0	1	86	10	1	38	2	51	0	40	2	4	46	5	0	2	3	10	193
07:30 AM	0	102	0	9	111	17	3	46	1	67	0	50	1	1	52	3	0	1	19	23	253
07:45 AM	1	133	0	6	140	17	4	60	2	83	0	50	0	2	52	4	0	4	28	36	311
Total	5	398	0	20	423	56	10	199	6	271	0	183	6	7	196	14	0	10	60	84	974
08:00 AM	2	132	0	4	138	11	3	48	2	64	0	45	2	4	51	7	0	1	6	14	267
08:15 AM	1	128	0	7	136	6	4	52	4	66	0	56	3	5	64	5	0	4	10	19	285
08:30 AM	0	104	0	4	108	12	1	39	1	53	0	58	1	0	59	11	0	3	7	21	241
08:45 AM	5	84	0	9	98	8	2	59	0	69	0	44	6	4	54	1	0	3	5	9	230
Total	8	448	0	24	480	37	10	198	7	252	0	203	12	13	228	24	0	11	28	63	1023
Grand Total	13	846	0	44	903	93	20	397	13	523	0	386	18	20	424	38	0	21	88	147	1997
Apprch %	1.4	93.7	0	4.9		17.8	3.8	75.9	2.5		0	91	4.2	4.7		25.9	0	14.3	59.9		
Total %	0.7	42.4	0	2.2	45.2	4.7	1	19.9	0.7	26.2	0	19.3	0.9	1	21.2	1.9	0	1.1	4.4	7.4	
Passenger Cars																					
% Passenger Cars	100	96.3	0	95.5	96.3	81.7	95	88.7	100	88	0	94.6	100	85	94.3	97.4	0	100	100	99.3	93.9
Heavy Vehicles																					
% Heavy Vehicles	0	3.7	0	4.5	3.7	18.3	5	11.3	0	12	0	5.4	0	15	5.7	2.6	0	0	0	0.7	6.1

	Chelsea Street From North				Bennington Street Ext From East				Chelsea Street From South				Mobil Gas Station From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	1	**133**	0	**134**	**17**	**4**	**60**	**81**	0	50	0	50	4	0	**4**	8	**273**
08:00 AM	**2**	132	0	134	11	3	48	62	0	45	2	47	7	0	1	8	251
08:15 AM	1	128	0	129	6	4	52	62	0	56	**3**	**59**	5	0	4	9	259
08:30 AM	0	104	0	104	12	1	39	52	0	**58**	1	59	**11**	0	3	**14**	229
Total Volume	4	497	0	501	46	12	199	257	0	209	6	215	27	0	12	39	1012
% App. Total	0.8	99.2	0		17.9	4.7	77.4		0	97.2	2.8		69.2	0	30.8		
PHF	.500	.934	.000	.935	.676	.750	.829	.793	.000	.901	.500	.911	.614	.000	.750	.696	.927
Passenger Cars	4	479	0	483	39	11	174	224	0	199	6	205	27	0	12	39	951
% Passenger Cars	100	96.4	0	96.4	84.8	91.7	87.4	87.2	0	95.2	100	95.3	100	0	100	100	94.0
Heavy Vehicles	0	18	0	18	7	1	25	33	0	10	0	10	0	0	0	0	61
% Heavy Vehicles	0	3.6	0	3.6	15.2	8.3	12.6	12.8	0	4.8	0	4.7	0	0	0	0	6.0

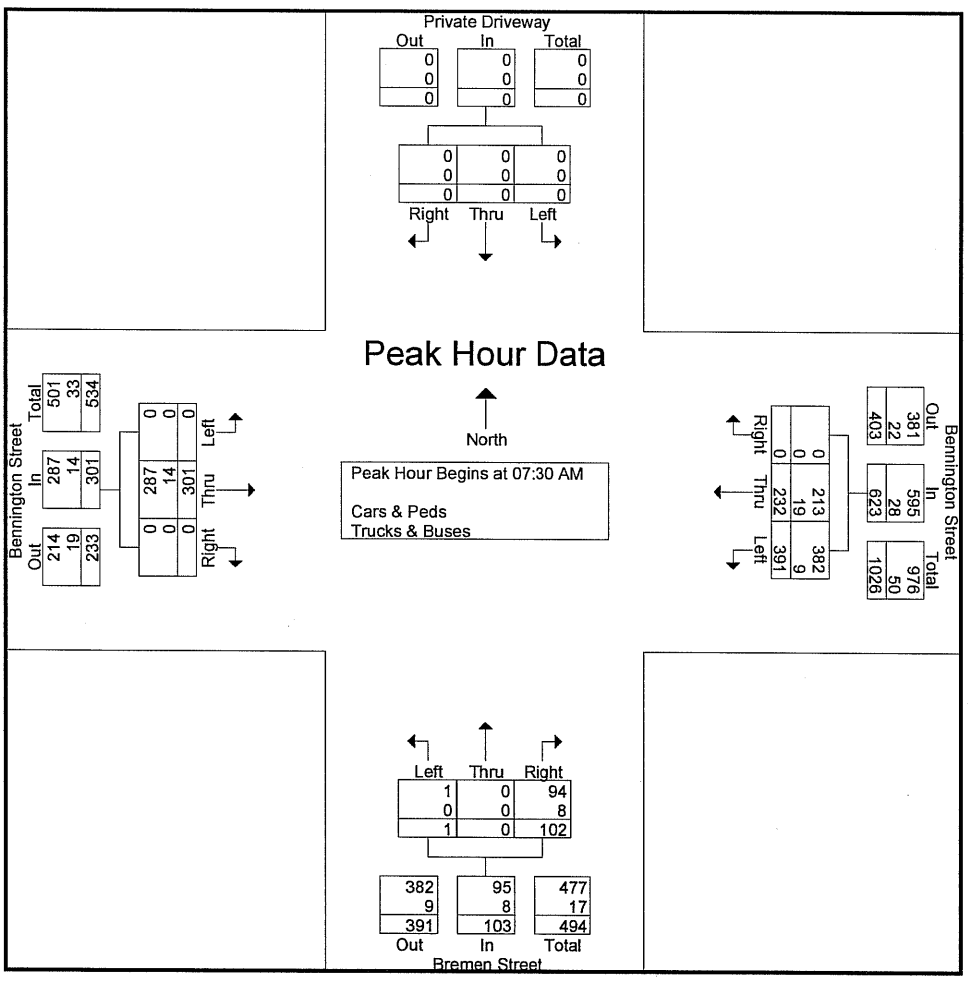
Transportation Data Corporation

Mario Perone, mperone1@verizon.net
t (781) 587-0086 f (781) 587-0189

N/S: Driveway/Bremen Street
E/W: Bennington Street
City, State: E. Boston, MA
Client: MDM/C. Jones

File Name : 04394D
Site Code : 732
Start Date : 10/10/2013
Page No : 1

	Private Driveway From North				Bennington Street From East				Bremen Street From South				Bennington Street From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	0	0	0	0	0	54	93	147	29	0	0	29	0	70	0	70	246
07:45 AM	0	0	0	0	0	**72**	86	158	22	0	**1**	23	0	70	0	70	251
08:00 AM	0	0	0	0	0	51	103	154	**36**	0	0	**36**	0	77	0	77	**267**
08:15 AM	0	0	0	0	0	55	**109**	**164**	15	0	0	15	0	**84**	0	**84**	263
Total Volume	0	0	0	0	0	232	391	623	102	0	1	103	0	301	0	301	1027
% App. Total	0	0	0		0	37.2	62.8		99	0	1		0	100	0		
PHF	.000	.000	.000	.000	.000	.806	.897	.950	.708	.000	.250	.715	.000	.896	.000	.896	.962
Cars & Peds	0	0	0	0	0	213	382	595	94	0	1	95	0	287	0	287	977
% Cars & Peds	0	0	0	0	0	91.8	97.7	95.5	92.2	0	100	92.2	0	95.3	0	95.3	95.1
Trucks & Buses	0	0	0	0	0	19	9	28	8	0	0	8	0	14	0	14	50
% Trucks & Buses	0	0	0	0	0	8.2	2.3	4.5	7.8	0	0	7.8	0	4.7	0	4.7	4.9



Transportation Data Corporation

Mario Perone, mperone1@verizon.net

t (781) 587-0086 f (781) 587-0189

N/S: Driveway/Bremen Street
E/W: Bennington Street
City, State: E. Boston, MA
Client: MDM/C. Jones

File Name : 04394D
Site Code : 732
Start Date : 10/10/2013
Page No : 1

Groups Printed- Cars & Peds - Trucks & Buses

	Private Driveway From North				Bennington Street From East				Bremen Street From South				Bennington Street From West						
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	0	0	0	0	61	64	0	33	0	0	3	0	71	0	0	3	229	232
07:15 AM	0	0	0	0	0	42	102	0	34	0	0	3	0	76	0	0	3	254	257
07:30 AM	0	0	0	0	0	54	93	0	29	0	0	3	0	70	0	0	3	246	249
07:45 AM	0	0	0	0	0	72	86	0	22	0	1	0	0	70	0	0	0	251	251
Total	0	0	0	0	0	229	345	0	118	0	1	9	0	287	0	0	9	980	989
08:00 AM	0	0	0	0	0	51	103	0	36	0	0	7	0	77	0	0	7	267	274
08:15 AM	0	0	0	0	0	55	109	0	15	0	0	0	0	84	0	2	2	263	265
08:30 AM	0	0	0	0	0	45	81	0	22	0	0	2	0	70	0	0	2	218	220
08:45 AM	0	0	0	0	0	65	68	0	8	0	0	7	0	67	0	1	8	208	216
Total	0	0	0	0	0	216	361	0	81	0	0	16	0	298	0	3	19	956	975
Grand Total	0	0	0	0	0	445	706	0	199	0	1	25	0	585	0	3	28	1936	1964
Apprch %	0	0	0		0	38.7	61.3		99.5	0	0.5		0	100	0				
Total %	0	0	0		0	23	36.5		10.3	0	0.1		0	30.2	0		1.4	98.6	
Cars & Peds	0	0	0		0	410	687		190	0	1		0	556	0		0	0	1872
% Cars & Peds	0	0	0	0	0	92.1	97.3	0	95.5	0	100	100	0	95	0	100	0	0	95.3
Trucks & Buses	0	0	0		0	35	19		9	0	0		0	29	0		0	0	92
% Trucks & Buses	0	0	0	0	0	7.9	2.7	0	4.5	0	0	0	0	5	0	0	0	0	4.7

	Private Driveway From North				Bennington Street From East				Bremen Street From South				Bennington Street From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	0	0	0	0	0	54	93	147	29	0	0	29	0	70	0	70	246
07:45 AM	0	0	0	0	0	72					1						
08:00 AM	0	0	0	0	0	51	103	154	36	0	0	36	0	77	0	77	267
08:15 AM	0	0	0	0	0	55	109	164	15	0	0	15	0	84	0	84	263
Total Volume	0	0	0	0	0	232	391	623	102	0	1	103	0	301	0	301	1027
% App. Total	0	0	0		0	37.2	62.8		99	0	1		0	100	0		
PHF	.000	.000	.000	.000	.000	.806	.897	.950	.708	.000	.250	.715	.000	.896	.000	.896	.962
Cars & Peds	0	0	0	0	0	213	382	595	94	0	1	95	0	287	0	287	977
% Cars & Peds	0	0	0	0	0	91.8	97.7	95.5	92.2	0	100	92.2	0	95.3	0	95.3	95.1
Trucks & Buses	0	0	0	0	0	19	9	28	8	0	0	8	0	14	0	14	50
% Trucks & Buses	0	0	0	0	0	8.2	2.3	4.5	7.8	0	0	7.8	0	4.7	0	4.7	4.9

Transportation Data Corporation
Mario Perone, mperone1@verizon.net
t (781) 587-0086 f (781) 587-0189

N/S: Driveway/Bremen Street
E/W: Bennington Street
City, State: E. Boston, MA
Client: MDM/C. Jones

File Name : 04394D
Site Code : 732
Start Date : 10/10/2013
Page No : 1

Groups Printed- Trucks & Buses

	Private Driveway From North			Bennington Street From East			Bremen Street From South			Bennington Street From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
07:00 AM	0	0	0	0	2	2	0	0	0	0	3	0	7
07:15 AM	0	0	0	0	4	4	0	0	0	0	2	0	10
07:30 AM	0	0	0	0	6	3	2	0	0	0	4	0	15
07:45 AM	0	0	0	0	5	3	2	0	0	0	1	0	11
Total	0	0	0	0	17	12	4	0	0	0	10	0	43
08:00 AM	0	0	0	0	7	2	3	0	0	0	5	0	17
08:15 AM	0	0	0	0	1	1	1	0	0	0	4	0	7
08:30 AM	0	0	0	0	4	2	1	0	0	0	2	0	9
08:45 AM	0	0	0	0	6	2	0	0	0	0	8	0	16
Total	0	0	0	0	18	7	5	0	0	0	19	0	49
Grand Total	0	0	0	0	35	19	9	0	0	0	29	0	92
Apprch %	0	0	0	0	64.8	35.2	100	0	0	0	100	0	
Total %	0	0	0	0	38	20.7	9.8	0	0	0	31.5	0	

	Private Driveway From North				Bennington Street From East				Bremen Street From South				Bennington Street From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	0	0	0	0	0	4	**4**	8	0	0	0	0	0	2	0	2	10
07:30 AM	0	0	0	0	0	6	3	**9**	2	0	0	2	0	4	0	4	15
07:45 AM	0	0	0	0	0	5	3	8	2	0	0	2	0	1	0	1	11
08:00 AM	0	0	0	0	0	**7**	2	9	**3**	0	0	**3**	0	**5**	0	**5**	**17**
Total Volume	0	0	0	0	0	22	12	34	7	0	0	7	0	12	0	12	53
% App. Total	0	0	0		0	64.7	35.3		100	0	0		0	100	0		
PHF	.000	.000	.000	.000	.000	.786	.750	.944	.583	.000	.000	.583	.000	.600	.000	.600	.779

Transportation Data Corporation

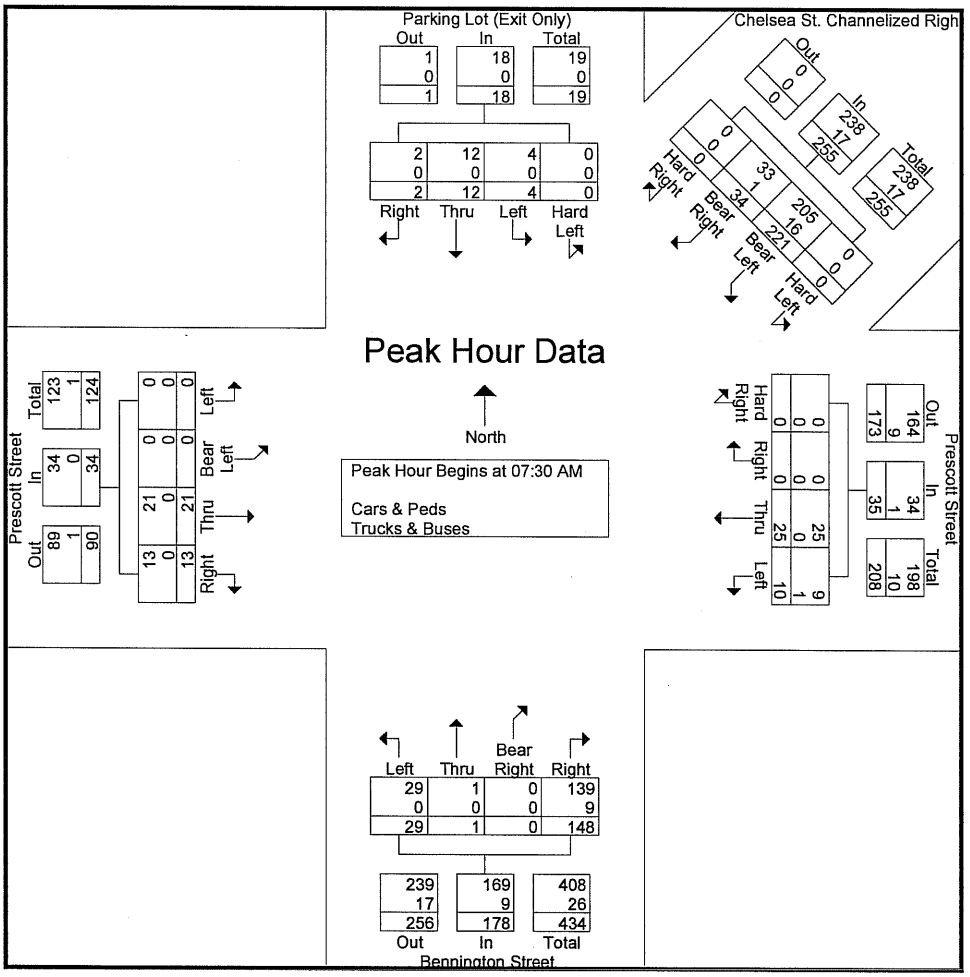
Mario Perone, mperone1@verizon.net

t (781) 587-0086 f (781) 587-0189

N/S: Public Lot/Bennington Street
E,W/NE: Prescott St./Chelsea St. SB & WB
City, State: E. Boston, MA
Client: MDM/C. Jones

File Name : 04394A
Site Code : 732
Start Date : 10/10/2013
Page No : 1

	Parking Lot (Exit Only) From North					Chelsea St. Channelized Right From Northeast					Prescott Street From East					Bennington Street From South					Prescott Street From West					
Start Time	Right	Thru	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	App. Total	Right	Bear Right	Thru	Left	App. Total	Right	Thru	Bear Left	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 07:30 AM																										
07:30 AM	0	1	0	0	1	0	8	43	0	51	0	0	5	2	7	35	0	0	6	41	**4**	**10**	0	0	**14**	114
07:45 AM	**1**	**6**	1	0	**8**	0	**12**	53	0	65	0	0	6	1	7	33	0	0	7	40	4	6	0	0	10	130
08:00 AM	1	2	1	0	4	0	7	**66**	0	**73**	0	0	6	**6**	**12**	37	0	0	**9**	46	3	3	0	0	6	**141**
08:15 AM	0	3	**2**	0	5	0	7	59	0	66	0	0	**8**	1	9	**43**	0	**1**	7	**51**	2	2	0	0	4	135
Total Volume	2	12	4	0	18	0	34	221	0	255	0	0	25	10	35	148	0	1	29	178	13	21	0	0	34	520
% App. Total	11.1	66.7	22.2	0		0	13.3	86.7	0		0	0	71.4	28.6		83.1	0	0.6	16.3		38.2	61.8	0	0		
PHF	.500	.500	.500	.000	.563	.000	.708	.837	.000	.873	.000	.000	.781	.417	.729	.860	.000	.250	.806	.873	.813	.525	.000	.000	.607	.922
Cars & Peds	2	12	4	0	18	0	33	205	0	238	0	0	25	9	34	139	0	1	29	169	13	21	0	0	34	493
% Cars & Peds	100	100	100	0	100	0	97.1	92.8	0	93.3	0	0	100	90.0	97.1	93.9	0	100	100	94.9	100	100	0	0	100	94.8
Trucks & Buses	0	0	0	0	0	0	1	16	0	17	0	0	0	1	1	9	0	0	0	9	0	0	0	0	0	27
% Trucks & Buses	0	0	0	0	0	0	2.9	7.2	0	6.7	0	0	0	10.0	2.9	6.1	0	0	0	5.1	0	0	0	0	0	5.2



Transportation Data Corporation

Mario Perone, mperone1@verizon.net

t (781) 587-0086 f (781) 587-0189

N/S: Public Lot/Bennington Street
E,W/NE: Prescott St./Chelsea St. SB & WB
City, State: E. Boston, MA
Client: MDM/C. Jones

File Name : 04394A
Site Code : 732
Start Date : 10/10/2013
Page No : 1

Groups Printed- Cars & Peds - Trucks & Buses

	Parking Lot (Exit Only) From North					Chelsea St. Channelized Right From Northeast					Prescott Street From East					Bennington Street From South					Prescott Street From West							
Start Time	Right	Thru	Left	Hard Left	Peds	Hard Right	Bear Right	Bear Left	Hard Left	Peds	Hard Right	Right	Thru	Left	Peds	Right	Bear Right	Thru	Left	Peds	Right	Thru	Bear Left	Left	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	3	0	0	3	0	7	50	0	0	0	0	6	1	0	29	0	0	3	15	1	7	0	0	4	22	107	129
07:15 AM	0	2	1	0	8	0	9	39	0	0	0	0	6	3	0	38	0	0	3	11	1	8	0	0	3	22	110	132
07:30 AM	0	1	0	0	2	0	8	43	0	0	0	0	5	2	0	35	0	0	6	16	4	10	0	0	15	33	114	147
07:45 AM	1	6	1	0	4	0	12	53	0	0	0	0	6	1	6	33	0	0	7	22	4	6	0	0	6	38	130	168
Total	1	12	2	0	17	0	36	185	0	0	0	0	23	7	6	135	0	0	19	64	10	31	0	0	28	115	461	576
08:00 AM	1	2	1	0	0	0	7	66	0	0	0	0	6	6	2	37	0	0	9	22	3	3	0	0	10	34	141	175
08:15 AM	0	3	2	0	3	0	7	59	0	0	0	0	8	1	0	43	0	1	7	14	2	2	0	0	7	24	135	159
08:30 AM	1	0	2	0	0	0	6	46	0	0	0	0	6	3	1	36	0	0	9	9	2	3	0	0	8	18	114	132
08:45 AM	2	3	2	0	2	0	7	39	0	0	0	0	4	2	5	35	0	0	6	20	2	10	0	0	14	41	112	153
Total	4	8	7	0	5	0	27	210	0	0	0	0	24	12	8	151	0	1	31	65	9	18	0	0	39	117	502	619
Grand Total	5	20	9	0	22	0	63	395	0	0	0	0	47	19	14	286	0	1	50	129	19	49	0	0	67	232	963	1195
Apprch %	14.7	58.8	26.5	0		0	13.8	86.2	0		0	0	71.2	28.8		84.9	0	0.3	14.8		27.9	72.1	0	0				
Total %	0.5	2.1	0.9	0		0	6.5	41	0		0	0	4.9	2		29.7	0	0.1	5.2		2	5.1	0	0		19.4	80.6	
Cars & Peds	5	20	9	0		0	62	370	0		0	0	47	18		268	0	1	50		19	49	0	0		0	0	1150
% Cars & Peds	100	100	100	0	100	0	98.4	93.7	0	0	0	0	100	94.7	100	93.7	0	100	100	100	100	100	0	0	100	0	0	96.2
Trucks & Buses	0	0	0	0		0	1	25	0		0	0	0	1		18	0	0	0		0	0	0	0		0	0	45
% Trucks & Buses	0	0	0	0	0	0	1.6	6.3	0	0	0	0	0	5.3	0	6.3	0	0	0	0	0	0	0	0	0	0	0	3.8

	Parking Lot (Exit Only) From North					Chelsea St. Channelized Right From Northeast					Prescott Street From East					Bennington Street From South					Prescott Street From West						
Start Time	Right	Thru	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	App. Total	Right	Bear Right	Thru	Left	App. Total	Right	Thru	Bear Left	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 07:30 AM																										
07:30 AM	0	1	0	0	1	0	8	43	0	51	0	0	5	2	7	35	0	0	6	41	**4**	**10**	0	0	**14**	114
07:45 AM	**1**	**6**	1	0	**8**	0	**12**	53	0	65	0	0	6	1	7	33	0	0	7	40	4	6	0	0	10	130
08:00 AM	1	2	1	0	4	0	7	**66**	0	**73**	0	0	6	**6**	**12**	37	0	0	**9**	46	3	3	0	0	6	**141**
08:15 AM	0	3	**2**	0	5	0	7	59	0	66	0	0	**8**	1	9	**43**	0	**1**	7	**51**	2	2	0	0	4	135
Total Volume	2	12	4	0	18	0	34	221	0	255	0	0	25	10	35	148	0	1	29	178	13	21	0	0	34	520
% App. Total	11.1	66.7	22.2	0		0	13.3	86.7	0		0	0	71.4	28.6		83.1	0	0.6	16.3		38.2	61.8	0	0		
PHF	.500	.500	.500	.000	.563	.000	.708	.837	.000	.873	.000	.000	.781	.417	.729	.860	.000	.250	.806	.873	.813	.525	.000	.000	.607	.922
Cars & Peds	2	12	4	0	18	0	33	205	0	238	0	0	25	9	34	139	0	1	29	169	13	21	0	0	34	493
% Cars & Peds	100	100	100	0	100	0	97.1	92.8	0	93.3	0	0	100	90.0	97.1	93.9	0	100	100	94.9	100	100	0	0	100	94.8
Trucks & Buses	0	0	0	0	0	0	1	16	0	17	0	0	0	1	1	9	0	0	0	9	0	0	0	0	0	27
% Trucks & Buses	0	0	0	0	0	0	2.9	7.2	0	6.7	0	0	0	10.0	2.9	6.1	0	0	0	5.1	0	0	0	0	0	5.2

Transportation Data Corporation

Mario Perone, mperone1@verizon.net

t (781) 587-0086 f (781) 587-0189

N/S: Public Lot/Bennington Street
E,W/NE: Prescott St./Chelsea St. SB & WB
City, State: E. Boston, MA
Client: MDM/C. Jones

File Name : 04394A
Site Code : 732
Start Date : 10/10/2013
Page No : 1

Groups Printed- Trucks & Buses

	Parking Lot (Exit Only) From North				Chelsea St. Channelized Right From Northeast				Prescott Street From East				Bennington Street From South				Prescott Street From West				
Start Time	Right	Thru	Left	Hard Left	Hard Right	Bear Right	Bear Left	Hard Left	Hard Right	Right	Thru	Left	Right	Bear Right	Thru	Left	Right	Thru	Bear Left	Left	Int. Total
07:00 AM	0	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	0	0	4
07:15 AM	0	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	0	0	4
07:30 AM	0	0	0	0	0	0	5	0	0	0	0	0	2	0	0	0	0	0	0	0	7
07:45 AM	0	0	0	0	0	0	3	0	0	0	0	0	1	0	0	0	0	0	0	0	4
Total	0	0	0	0	0	0	12	0	0	0	0	0	7	0	0	0	0	0	0	0	19
08:00 AM	0	0	0	0	0	1	7	0	0	0	0	1	3	0	0	0	0	0	0	0	12
08:15 AM	0	0	0	0	0	0	1	0	0	0	0	0	3	0	0	0	0	0	0	0	4
08:30 AM	0	0	0	0	0	0	3	0	0	0	0	0	1	0	0	0	0	0	0	0	4
08:45 AM	0	0	0	0	0	0	2	0	0	0	0	0	4	0	0	0	0	0	0	0	6
Total	0	0	0	0	0	1	13	0	0	0	0	1	11	0	0	0	0	0	0	0	26
Grand Total	0	0	0	0	0	1	25	0	0	0	0	1	18	0	0	0	0	0	0	0	45
Apprch %	0	0	0	0	0	3.8	96.2	0	0	0	0	100	100	0	0	0	0	0	0	0	
Total %	0	0	0	0	0	2.2	55.6	0	0	0	0	2.2	40	0	0	0	0	0	0	0	

	Parking Lot (Exit Only) From North					Chelsea St. Channelized Right From Northeast					Prescott Street From East					Bennington Street From South					Prescott Street From West					
Start Time	Right	Thru	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	App. Total	Right	Bear Right	Thru	Left	App. Total	Right	Thru	Bear Left	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 07:15 AM																										
07:15 AM	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	4
07:30 AM	0	0	0	0	0	0	0	5	0	5	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	7
07:45 AM	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	4
08:00 AM	0	0	0	0	0	0	**1**	7	0	**8**	0	0	0	**1**	**1**	**3**	0	0	0	**3**	0	0	0	0	0	**12**
Total Volume	0	0	0	0	0	0	1	17	0	18	0	0	0	1	1	8	0	0	0	8	0	0	0	0	0	27
% App. Total	0	0	0	0		0	5.6	94.4	0		0	0	0	100		100	0	0	0		0	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.250	.607	.000	.563	.000	.000	.000	.250	.250	.667	.000	.000	.000	.667	.000	.000	.000	.000	.000	.563

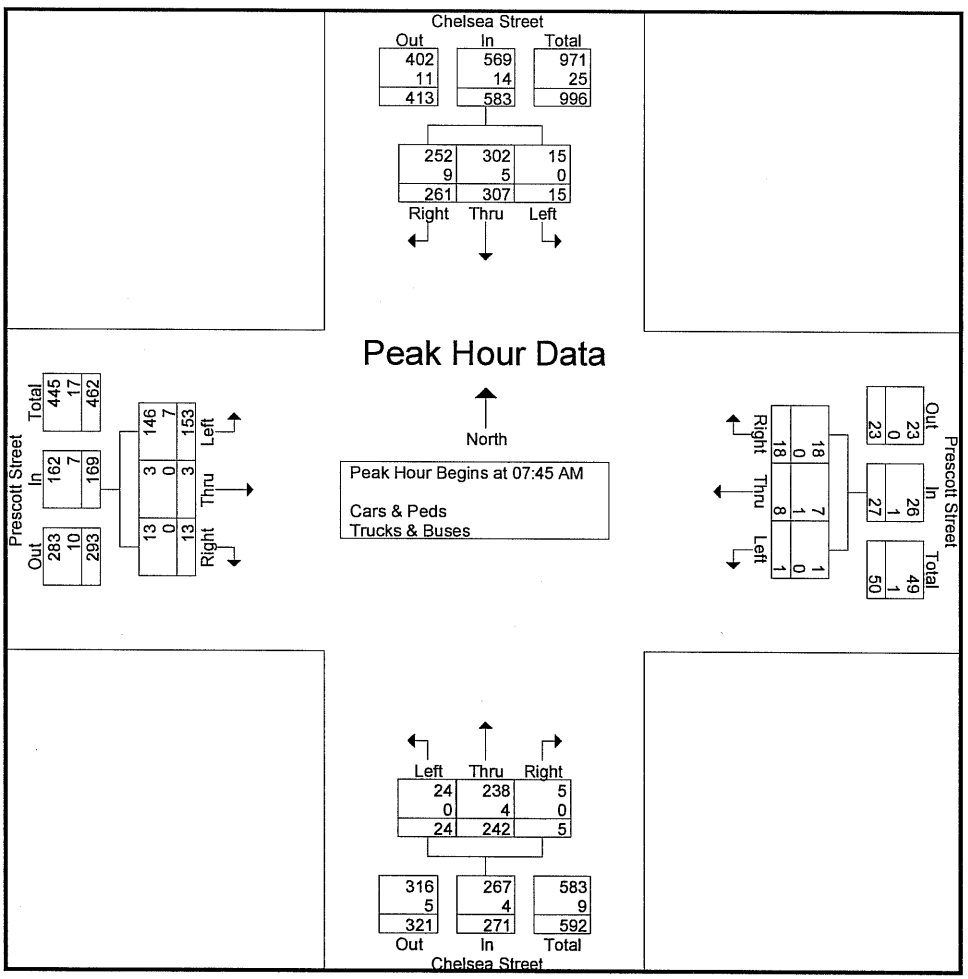
Transportation Data Corporation

Mario Perone, mperone1@verizon.net
t (781) 587-0086 f (781) 587-0189

N/S: Chelsea Street
E/W: Prescott Street
City, State: E. Boston, MA
Client: MDM/C. Jones

File Name : 04394B
Site Code : 732
Start Date : 10/10/2013
Page No : 1

	Chelsea Street From North				Prescott Street From East				Chelsea Street From South				Prescott Street From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	62	**86**	3	151	2	2	**1**	5	1	59	5	65	**5**	**1**	34	40	261
08:00 AM	**76**	76	3	**155**	3	**3**	0	6	1	61	**7**	69	4	1	36	41	271
08:15 AM	64	82	**7**	153	4	2	0	6	0	**67**	7	**74**	4	1	**42**	**47**	**280**
08:30 AM	59	63	2	124	**9**	1	0	**10**	**3**	55	5	63	0	0	41	41	238
Total Volume	261	307	15	583	18	8	1	27	5	242	24	271	13	3	153	169	1050
% App. Total	44.8	52.7	2.6		66.7	29.6	3.7		1.8	89.3	8.9		7.7	1.8	90.5		
PHF	.859	.892	.536	.940	.500	.667	.250	.675	.417	.903	.857	.916	.650	.750	.911	.899	.938
Cars & Peds	252	302	15	569	18	7	1	26	5	238	24	267	13	3	146	162	1024
% Cars & Peds	96.6	98.4	100	97.6	100	87.5	100	96.3	100	98.3	100	98.5	100	100	95.4	95.9	97.5
Trucks & Buses	9	5	0	14	0	1	0	1	0	4	0	4	0	0	7	7	26
% Trucks & Buses	3.4	1.6	0	2.4	0	12.5	0	3.7	0	1.7	0	1.5	0	0	4.6	4.1	2.5



Transportation Data Corporation

Mario Perone, mperone1@verizon.net

t (781) 587-0086 f (781) 587-0189

N/S: Chelsea Street
E/W: Prescott Street
City, State: E. Boston, MA
Client: MDM/C. Jones

File Name : 04394B
Site Code : 732
Start Date : 10/10/2013
Page No : 1

Groups Printed- Cars & Peds - Trucks & Buses

	Chelsea Street From North				Prescott Street From East				Chelsea Street From South				Prescott Street From West						
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	58	58	2	4	1	2	1	8	1	64	7	13	1	2	35	2	27	232	259
07:15 AM	50	55	1	7	3	1	0	3	1	48	7	8	3	0	42	0	18	211	229
07:30 AM	49	71	2	1	1	1	0	5	1	55	6	6	4	1	41	1	13	232	245
07:45 AM	62	86	3	4	2	2	1	9	1	59	5	9	5	1	34	4	26	261	287
Total	219	270	8	16	7	6	2	25	4	226	25	36	13	4	152	7	84	936	1020
08:00 AM	76	76	3	0	3	3	0	8	1	61	7	17	4	1	36	3	28	271	299
08:15 AM	64	82	7	4	4	2	0	3	0	67	7	7	4	1	42	0	14	280	294
08:30 AM	59	63	2	1	9	1	0	3	3	55	5	7	0	0	41	0	11	238	249
08:45 AM	47	81	1	4	9	1	3	8	2	61	4	18	1	0	45	4	34	255	289
Total	246	302	13	9	25	7	3	22	6	244	23	49	9	2	164	7	87	1044	1131
Grand Total	465	572	21	25	32	13	5	47	10	470	48	85	22	6	316	14	171	1980	2151
Apprch %	44	54.1	2		64	26	10		1.9	89	9.1		6.4	1.7	91.9				
Total %	23.5	28.9	1.1		1.6	0.7	0.3		0.5	23.7	2.4		1.1	0.3	16		7.9	92.1	
Cars & Peds	445	559	21		32	12	5		10	459	48		22	6	301		0	0	2091
% Cars & Peds	95.7	97.7	100	100	100	92.3	100	100	100	97.7	100	100	100	100	95.3	100	0	0	97.2
Trucks & Buses	20	13	0		0	1	0		0	11	0		0	0	15		0	0	60
% Trucks & Buses	4.3	2.3	0	0	0	7.7	0	0	0	2.3	0	0	0	0	4.7	0	0	0	2.8

	Chelsea Street From North				Prescott Street From East				Chelsea Street From South				Prescott Street From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	62	86					1						5	1			
08:00 AM	76	76	3	155	3	3	0	6	1	61	7	69	4	1	36	41	271
08:15 AM	64	82	7	153	4	2	0	6	0	67	7	74	4	1	42	47	280
08:30 AM	59	63	2	124	9	1	0	10	3	55	5	63	0	0	41	41	238
Total Volume	261	307	15	583	18	8	1	27	5	242	24	271	13	3	153	169	1050
% App. Total	44.8	52.7	2.6		66.7	29.6	3.7		1.8	89.3	8.9		7.7	1.8	90.5		
PHF	.859	.892	.536	.940	.500	.667	.250	.675	.417	.903	.857	.916	.650	.750	.911	.899	.938
Cars & Peds	252	302	15	569	18	7	1	26	5	238	24	267	13	3	146	162	1024
% Cars & Peds	96.6	98.4	100	97.6	100	87.5	100	96.3	100	98.3	100	98.5	100	100	95.4	95.9	97.5
Trucks & Buses	9	5	0	14	0	1	0	1	0	4	0	4	0	0	7	7	26
% Trucks & Buses	3.4	1.6	0	2.4	0	12.5	0	3.7	0	1.7	0	1.5	0	0	4.6	4.1	2.5

Transportation Data Corporation
Mario Perone, mperone1@verizon.net
_t (781) 587-0086 f (781) 587-0189_

N/S: Chelsea Street
E/W: Prescott Street
City, State: E. Boston, MA
Client: MDM/C. Jones

File Name : 04394B
Site Code : 732
Start Date : 10/10/2013
Page No : 1

Groups Printed- Trucks & Buses

	Chelsea Street From North			Prescott Street From East			Chelsea Street From South			Prescott Street From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
07:00 AM	2	4	0	0	0	0	0	2	0	0	0	2	10
07:15 AM	2	1	0	0	0	0	0	2	0	0	0	1	6
07:30 AM	5	0	0	0	0	0	0	1	0	0	0	2	8
07:45 AM	1	3	0	0	0	0	0	0	0	0	0	0	4
Total	10	8	0	0	0	0	0	5	0	0	0	5	28
08:00 AM	4	1	0	0	1	0	0	2	0	0	0	3	11
08:15 AM	1	1	0	0	0	0	0	1	0	0	0	3	6
08:30 AM	3	0	0	0	0	0	0	1	0	0	0	1	5
08:45 AM	2	3	0	0	0	0	0	2	0	0	0	3	10
Total	10	5	0	0	1	0	0	6	0	0	0	10	32
Grand Total	20	13	0	0	1	0	0	11	0	0	0	15	60
Apprch %	60.6	39.4	0	0	100	0	0	100	0	0	0	100	
Total %	33.3	21.7	0	0	1.7	0	0	18.3	0	0	0	25	

	Chelsea Street From North				Prescott Street From East				Chelsea Street From South				Prescott Street From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	**4**	1	0	**5**	0	**1**	0	**1**	0	**2**	0	**2**	0	0	**3**	**3**	**11**
08:15 AM	1	1	0	2	0	0	0	0	0	1	0	1	0	0	3	3	6
08:30 AM	3	0	0	3	0	0	0	0	0	1	0	1	0	0	1	1	5
08:45 AM	2	**3**	0	5	0	0	0	0	0	2	0	2	0	0	3	3	10
Total Volume	10	5	0	15	0	1	0	1	0	6	0	6	0	0	10	10	32
% App. Total	66.7	33.3	0		0	100	0		0	100	0		0	0	100		
PHF	.625	.417	.000	.750	.000	.250	.000	.250	.000	.750	.000	.750	.000	.000	.833	.833	.727

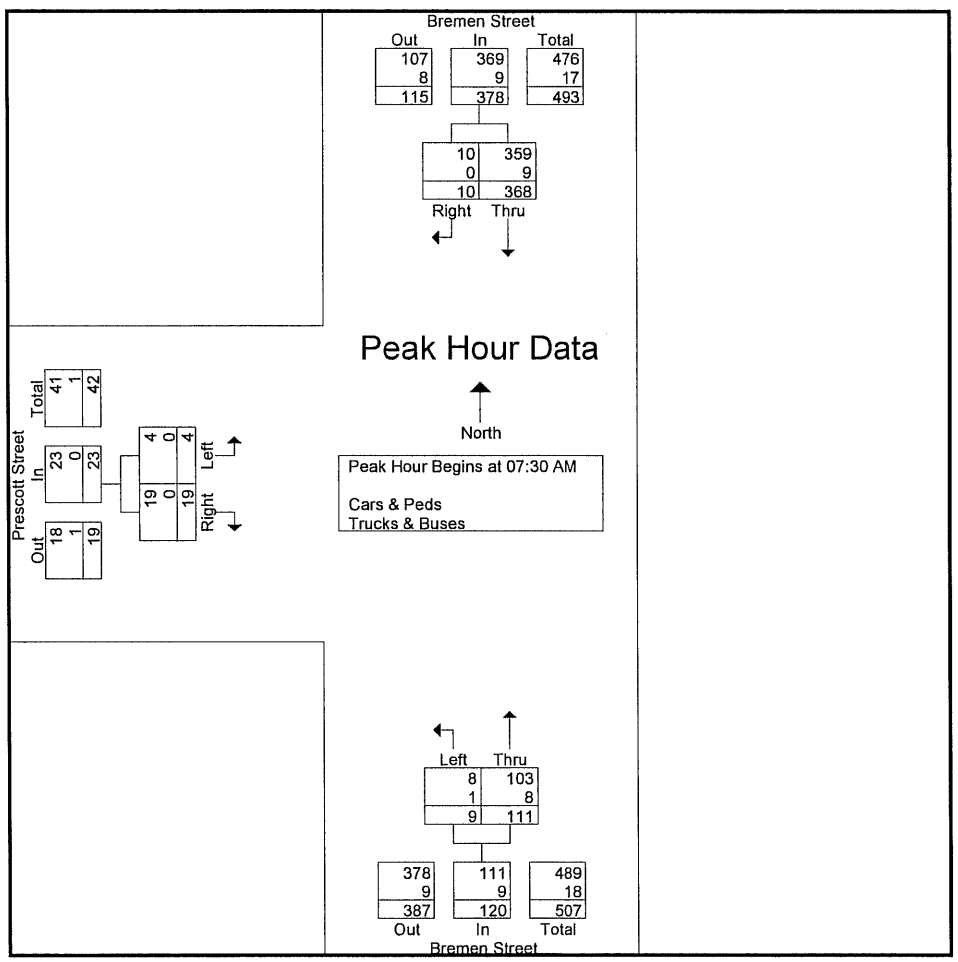
Transportation Data Corporation

Mario Perone, mperone1@verizon.net
tel (781) 587-0086 cell (781) 439-4999

N/S: Bremen Street
E/W: Prescott Street
City, State: E. Boston, MA
Client: MDM/C. Jones

File Name : 04394C
Site Code : 732
Start Date : 10/10/2013
Page No : 1

	Bremen Street From North			Bremen Street From South			Prescott Street From West			
Start Time	Right	Thru	App. Total	Thru	Left	App. Total	Right	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:30 AM										
07:30 AM	1	82	83	30	1	31	3	1	4	118
07:45 AM	2	87	89	26	**3**	29	5	0	5	123
08:00 AM	**5**	96	101	**35**	2	**37**	5	0	5	**143**
08:15 AM	2	**103**	**105**	20	3	23	**6**	**3**	**9**	137
Total Volume	10	368	378	111	9	120	19	4	23	521
% App. Total	2.6	97.4		92.5	7.5		82.6	17.4		
PHF	.500	.893	.900	.793	.750	.811	.792	.333	.639	.911
Cars & Peds	10	359	369	103	8	111	19	4	23	503
% Cars & Peds	100	97.6	97.6	92.8	88.9	92.5	100	100	100	96.5
Trucks & Buses	0	9	9	8	1	9	0	0	0	18
% Trucks & Buses	0	2.4	2.4	7.2	11.1	7.5	0	0	0	3.5



Transportation Data Corporation
Mario Perone, mperone1@verizon.net
tel (781) 587-0086 cell (781) 439-4999

N/S: Bremen Street
E/W: Prescott Street
City, State: E. Boston, MA
Client: MDM/C. Jones

File Name : 04394C
Site Code : 732
Start Date : 10/10/2013
Page No : 1

Groups Printed- Cars & Peds - Trucks & Buses

	Bremen Street From North			Bremen Street From South			Prescott Street From West					
Start Time	Right	Thru	Peds	Thru	Left	Peds	Right	Left	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	2	66	0	36	0	15	2	3	0	15	109	124
07:15 AM	3	86	0	35	0	13	1	1	0	13	126	139
07:30 AM	1	82	0	30	1	9	3	1	0	9	118	127
07:45 AM	2	87	0	26	3	10	5	0	0	10	123	133
Total	8	321	0	127	4	47	11	5	0	47	476	523
08:00 AM	5	96	0	35	2	12	5	0	0	12	143	155
08:15 AM	2	103	0	20	3	10	6	3	0	10	137	147
08:30 AM	7	67	0	22	2	12	4	0	0	12	102	114
08:45 AM	4	51	0	5	9	13	2	0	0	13	71	84
Total	18	317	0	82	16	47	17	3	0	47	453	500
Grand Total	26	638	0	209	20	94	28	8	0	94	929	1023
Apprch %	3.9	96.1		91.3	8.7		77.8	22.2				
Total %	2.8	68.7		22.5	2.2		3	0.9		9.2	90.8	
Cars & Peds	26	621		198	19		28	8		0	0	994
% Cars & Peds	100	97.3	0	94.7	95	100	100	100	0	0	0	97.2
Trucks & Buses	0	17		11	1		0	0		0	0	29
% Trucks & Buses	0	2.7	0	5.3	5	0	0	0	0	0	0	2.8

	Bremen Street From North			Bremen Street From South			Prescott Street From West			
Start Time	Right	Thru	App. Total	Thru	Left	App. Total	Right	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:30 AM										
07:30 AM	1	82	83	30	1	31	3	1	4	118
07:45 AM	2	87	89	26	**3**	29	5	0	5	123
08:00 AM	**5**	96	101	**35**	2	**37**	5	0	5	**143**
08:15 AM	2	**103**	**105**	20	3	23	**6**	**3**	**9**	137
Total Volume	10	368	378	111	9	120	19	4	23	521
% App. Total	2.6	97.4		92.5	7.5		82.6	17.4		
PHF	.500	.893	.900	.793	.750	.811	.792	.333	.639	.911
Cars & Peds	10	359	369	103	8	111	19	4	23	503
% Cars & Peds	100	97.6	97.6	92.8	88.9	92.5	100	100	100	96.5
Trucks & Buses	0	9	9	8	1	9	0	0	0	18
% Trucks & Buses	0	2.4	2.4	7.2	11.1	7.5	0	0	0	3.5

Transportation Data Corporation

Mario Perone, mperone1@verizon.net
tel (781) 587-0086 cell (781) 439-4999

N/S: Bremen Street
E/W: Prescott Street
City, State: E. Boston, MA
Client: MDM/C. Jones

File Name : 04394C
Site Code : 732
Start Date : 10/10/2013
Page No : 1

Groups Printed- Trucks & Buses

	Bremen Street From North		Bremen Street From South		Prescott Street From West		
Start Time	Right	Thru	Thru	Left	Right	Left	Int. Total
07:00 AM	0	2	1	0	0	0	3
07:15 AM	0	5	1	0	0	0	6
07:30 AM	0	3	1	0	0	0	4
07:45 AM	0	3	3	0	0	0	6
Total	0	13	6	0	0	0	19
08:00 AM	0	2	3	1	0	0	6
08:15 AM	0	1	1	0	0	0	2
08:30 AM	0	1	1	0	0	0	2
08:45 AM	0	0	0	0	0	0	0
Total	0	4	5	1	0	0	10
Grand Total	0	17	11	1	0	0	29
Apprch %	0	100	91.7	8.3	0	0	
Total %	0	58.6	37.9	3.4	0	0	

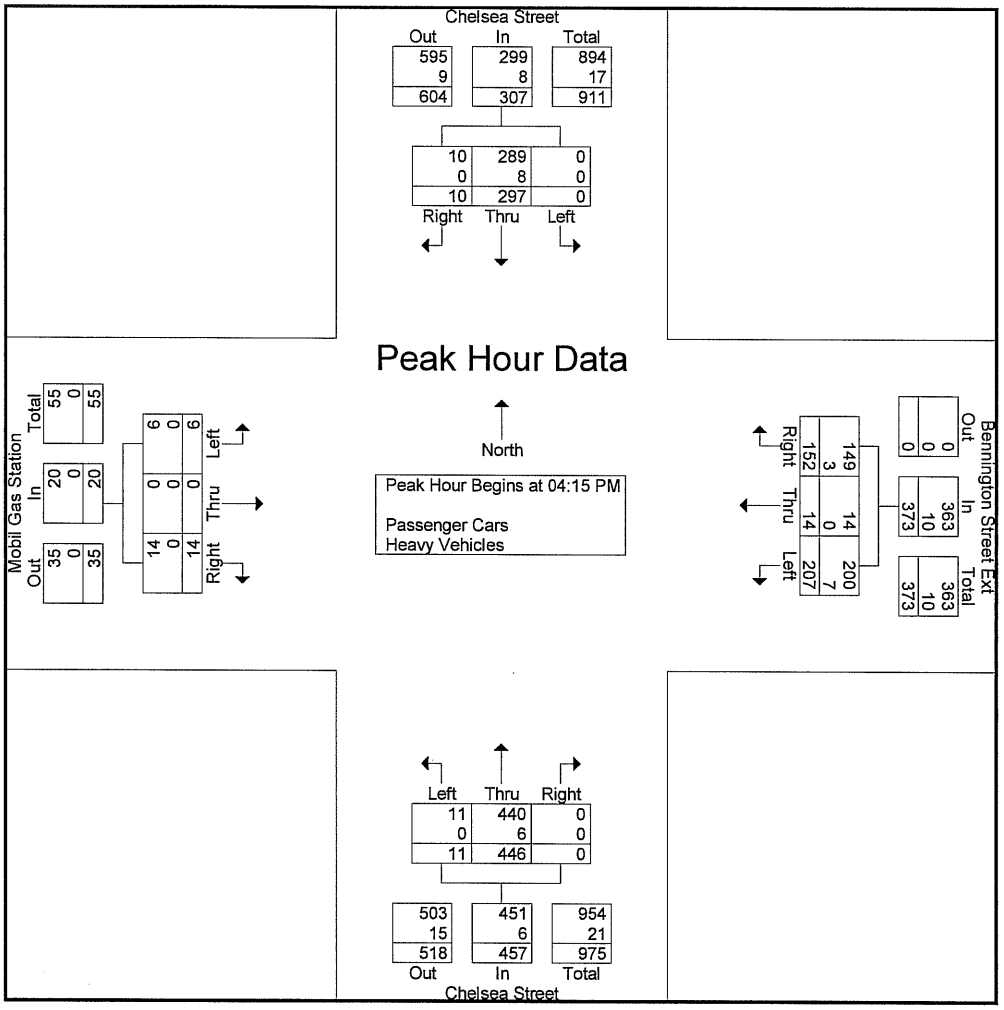
	Bremen Street From North			Bremen Street From South			Prescott Street From West			
Start Time	Right	Thru	App. Total	Thru	Left	App. Total	Right	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:15 AM										
07:15 AM	0	**5**	**5**	1	0	1	0	0	0	**6**
07:30 AM	0	3	3	1	0	1	0	0	0	4
07:45 AM	0	3	3	**3**	0	3	0	0	0	6
08:00 AM	0	2	2	**3**	**1**	**4**	0	0	0	6
Total Volume	0	13	13	8	1	9	0	0	0	22
% App. Total	0	100		88.9	11.1		0	0		
PHF	.000	.650	.650	.667	.250	.563	.000	.000	.000	.917

MDM TRANSPORTATION CONSULTANTS, INC.

28 Lord Road, Suite 280
Marlborough, MA 01752

N/S: Chelsea Street
E: Bennington Street Ext
W: Mobil Gas Station
East Boston, MA

File Name : 732 Chelsea-Bennington Ext PM
Site Code : 00732002
Start Date : 10/10/2013
Page No : 2



MDM TRANSPORTATION CONSULTANTS, INC.

28 Lord Road, Suite 280
Marlborough, MA 01752

N/S: Chelsea Street
E: Bennington Street Ext
W: Mobil Gas Station
East Boston, MA

File Name : 732 Chelsea-Bennington Ext PM
Site Code : 00732002
Start Date : 10/10/2013
Page No : 1

Groups Printed- Passenger Cars - Heavy Vehicles

	Chelsea Street From North					Bennington Street Ext From East					Chelsea Street From South					Mobil Gas Station From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
03:00 PM	1	76	0	9	86	25	6	49	1	81	0	90	3	5	98	1	0	6	10	17	282
03:15 PM	1	74	0	15	90	34	3	42	11	90	0	104	5	0	109	3	0	3	18	24	313
03:30 PM	1	76	0	9	86	22	3	52	5	82	0	102	4	4	110	3	0	4	21	28	306
03:45 PM	2	70	0	19	91	45	4	50	12	111	0	95	1	2	98	4	0	4	16	24	324
Total	5	296	0	52	353	126	16	193	29	364	0	391	13	11	415	11	0	17	65	93	1225
04:00 PM	4	104	0	9	117	42	1	51	11	105	0	107	3	8	118	2	0	4	26	32	372
04:15 PM	3	84	0	7	94	32	1	60	5	98	0	113	5	1	119	7	0	5	12	24	335
04:30 PM	1	82	0	6	89	47	5	49	2	103	0	105	2	3	110	2	0	1	8	11	313
04:45 PM	0	55	0	19	74	30	6	56	8	100	0	118	2	3	123	1	0	0	23	24	321
Total	8	325	0	41	374	151	13	216	26	406	0	443	12	15	470	12	0	10	69	91	1341
05:00 PM	6	76	0	7	89	43	2	42	8	95	0	110	2	0	112	4	0	0	17	21	317
05:15 PM	1	88	0	14	103	56	0	47	6	109	0	103	4	0	107	6	0	6	16	28	347
05:30 PM	2	75	0	2	79	33	7	56	5	101	0	117	2	0	119	2	0	2	10	14	313
05:45 PM	6	91	0	7	104	25	3	64	8	100	0	88	0	2	90	2	0	3	25	30	324
Total	15	330	0	30	375	157	12	209	27	405	0	418	8	2	428	14	0	11	68	93	1301
Grand Total	28	951	0	123	1102	434	41	618	82	1175	0	1252	33	28	1313	37	0	38	202	277	3867
Apprch %	2.5	86.3	0	11.2		36.9	3.5	52.6	7		0	95.4	2.5	2.1		13.4	0	13.7	72.9		
Total %	0.7	24.6	0	3.2	28.5	11.2	1.1	16	2.1	30.4	0	32.4	0.9	0.7	34	1	0	1	5.2	7.2	
Passenger Cars												1235									
% Passenger Cars	100	97.5	0	98.4	97.6	97.2	100	95.6	90.2	96	0	98.6	100	85.7	98.4	100	0	100	98	98.6	97.5
Heavy Vehicles																					
% Heavy Vehicles	0	2.5	0	1.6	2.4	2.8	0	4.4	9.8	4	0	1.4	0	14.3	1.6	0	0	0	2	1.4	2.5

	Chelsea Street From North				Bennington Street Ext From East				Chelsea Street From South				Mobil Gas Station From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 4:15:00 PM to 5:00:00 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 4:15:00 PM																	
4:15:00 PM	3	**84**	0	**87**	32	1	**60**	93	0	113	**5**	118	**7**	0	**5**	**12**	**310**
4:30:00 PM	1	82	0	83	**47**	5	49	**101**	0	105	2	107	2	0	1	3	294
4:45:00 PM	0	55	0	55	30	**6**	56	92	0	**118**	2	**120**	1	0	0	1	268
5:00:00 PM	**6**	76	0	82	43	2	42	87	0	110	2	112	4	0	0	4	285
Total Volume	10	297	0	307	152	14	207	373	0	446	11	457	14	0	6	20	1157
% App. Total	3.3	96.7	0		40.8	3.8	55.5		0	97.6	2.4		70	0	30		
PHF	.417	.884	.000	.882	.809	.583	.863	.923	.000	.945	.550	.952	.500	.000	.300	.417	.933
Passenger Cars	10	289	0	299	149	14	200	363	0	440	11	451	14	0	6	20	1133
% Passenger Cars	100	97.3	0	97.4	98.0	100	96.6	97.3	0	98.7	100	98.7	100	0	100	100	97.9
Heavy Vehicles	0	8	0	8	3	0	7	10	0	6	0	6	0	0	0	0	24
% Heavy Vehicles	0	2.7	0	2.6	2.0	0	3.4	2.7	0	1.3	0	1.3	0	0	0	0	2.1

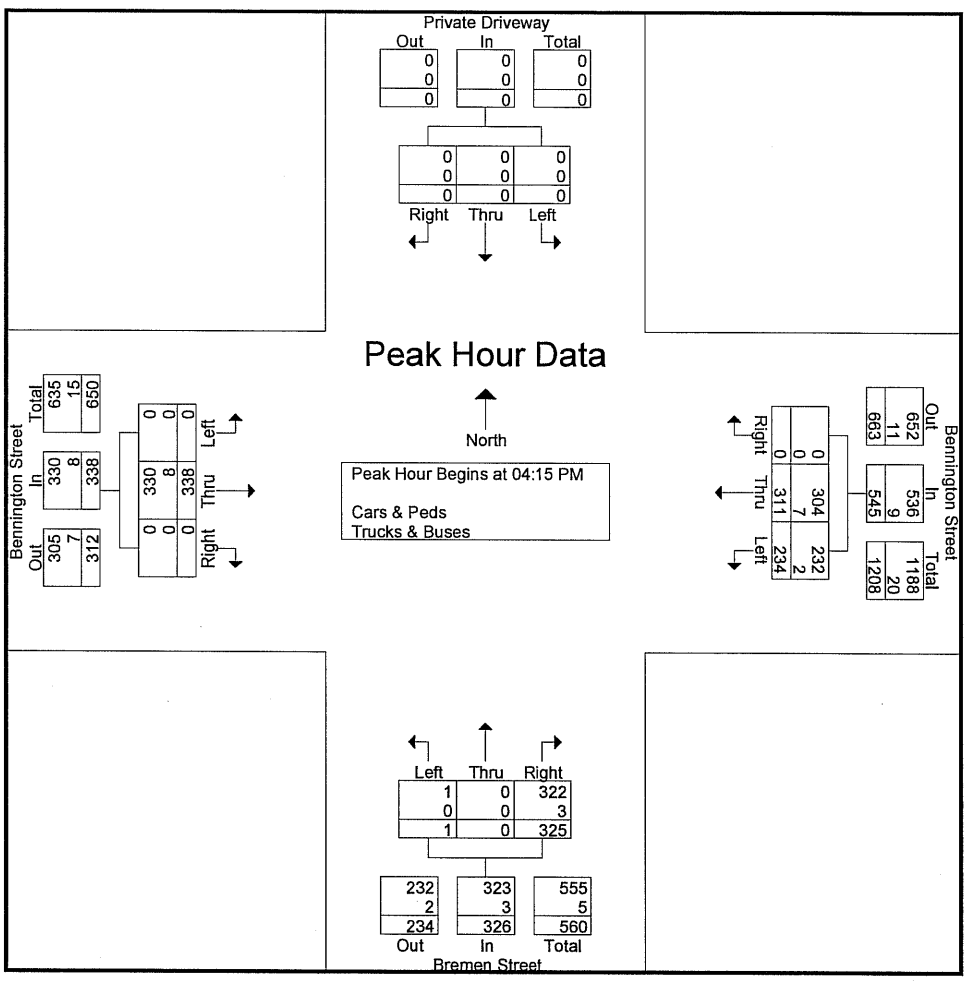
Transportation Data Corporation

Mario Perone, mperone1@verizon.net
t (781) 587-0086 f (781) 587-0189

N/S: Driveway/Bremen Street
E/W: Bennington Street
City, State: E. Boston, MA
Client: MDM/C. Jones

File Name : 04394DD
Site Code : 732
Start Date : 10/10/2013
Page No : 1

	Private Driveway From North				Bennington Street From East				Bremen Street From South				Bennington Street From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:15 PM																	
04:15 PM	0	0	0	0	0	80	58	138	74	0	0	74	0	86	0	86	298
04:30 PM	0	0	0	0	0	**85**	51	136	74	0	0	74	0	78	0	78	288
04:45 PM	0	0	0	0	0	72	53	125	85	0	1	86	0	**89**	0	**89**	300
05:00 PM	0	0	0	0	0	74	**72**	**146**	**92**	0	0	**92**	0	85	0	85	**323**
Total Volume	0	0	0	0	0	311	234	545	325	0	1	326	0	338	0	338	1209
% App. Total	0	0	0		0	57.1	42.9		99.7	0	0.3		0	100	0		
PHF	.000	.000	.000	.000	.000	.915	.813	.933	.883	.000	.250	.886	.000	.949	.000	.949	.936
Cars & Peds	0	0	0	0	0	304	232	536	322	0	1	323	0	330	0	330	1189
% Cars & Peds	0	0	0	0	0	97.7	99.1	98.3	99.1	0	100	99.1	0	97.6	0	97.6	98.3
Trucks & Buses	0	0	0	0	0	7	2	9	3	0	0	3	0	8	0	8	20
% Trucks & Buses	0	0	0	0	0	2.3	0.9	1.7	0.9	0	0	0.9	0	2.4	0	2.4	1.7



Transportation Data Corporation

Mario Perone, mperone1@verizon.net

t (781) 587-0086 f (781) 587-0189

N/S: Driveway/Bremen Street
E/W: Bennington Street
City, State: E. Boston, MA
Client: MDM/C. Jones

File Name : 04394DD
Site Code : 732
Start Date : 10/10/2013
Page No : 1

Groups Printed- Cars & Peds - Trucks & Buses

	Private Driveway From North				Bennington Street From East				Bremen Street From South				Bennington Street From West						
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Exclu. Total	Inclu. Total	Int. Total
03:00 PM	0	0	0	0	0	76	58	0	29	0	0	4	0	93	0	0	4	256	260
03:15 PM	0	0	0	0	0	71	59	0	58	0	0	2	0	77	0	1	3	265	268
03:30 PM	0	0	0	0	0	72	63	0	50	0	0	5	0	86	0	0	5	271	276
03:45 PM	0	0	0	0	0	72	60	0	66	0	0	1	0	85	0	2	3	283	286
Total	0	0	0	0	0	291	240	0	203	0	0	12	0	341	0	3	15	1075	1090
04:00 PM	0	0	0	0	0	78	56	0	64	0	0	0	0	81	0	3	3	279	282
04:15 PM	0	0	0	0	0	80	58	0	74	0	0	2	0	86	0	4	6	298	304
04:30 PM	0	0	0	0	0	85	51	0	74	0	0	2	0	78	0	0	2	288	290
04:45 PM	0	0	0	0	0	72	53	0	85	0	1	4	0	89	0	0	4	300	304
Total	0	0	0	0	0	315	218	0	297	0	1	8	0	334	0	7	15	1165	1180
05:00 PM	0	0	0	0	0	74	72	0	92	0	0	2	0	85	0	1	3	323	326
05:15 PM	0	0	0	0	0	89	58	0	70	0	2	1	0	68	0	1	2	287	289
05:30 PM	0	0	0	0	0	76	66	0	65	0	1	4	0	72	0	1	5	280	285
05:45 PM	0	0	0	0	0	68	68	0	64	0	0	9	0	74	0	1	10	274	284
Total	0	0	0	0	0	307	264	0	291	0	3	16	0	299	0	4	20	1164	1184
Grand Total	0	0	0	0	0	913	722	0	791	0	4	36	0	974	0	14	50	3404	3454
Apprch %	0	0	0		0	55.8	44.2		99.5	0	0.5		0	100	0				
Total %	0	0	0		0	26.8	21.2		23.2	0	0.1		0	28.6	0		1.4	98.6	
Cars & Peds	0	0	0		0	885	706		783	0	4		0	946	0		0	0	3374
% Cars & Peds	0	0	0	0	0	96.9	97.8	0	99	0	100	100	0	97.1	0	100	0	0	97.7
Trucks & Buses	0	0	0		0	28	16		8	0	0		0	28	0		0	0	80
% Trucks & Buses	0	0	0	0	0	3.1	2.2	0	1	0	0	0	0	2.9	0	0	0	0	2.3

	Private Driveway From North				Bennington Street From East				Bremen Street From South				Bennington Street From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:15 PM																	
04:15 PM	0	0	0	0	0	80	58	138	74	0	0	74	0	86	0	86	298
04:30 PM	0	0	0	0	0	85											
04:45 PM	0	0	0	0	0	72	53	125	85	0	1	86	0	89	0	89	300
05:00 PM	0	0	0	0	0	74	72	146	92	0	0	92	0	85	0	85	323
Total Volume	0	0	0	0	0	311	234	545	325	0	1	326	0	338	0	338	1209
% App. Total	0	0	0		0	57.1	42.9		99.7	0	0.3		0	100	0		
PHF	.000	.000	.000	.000	.000	.915	.813	.933	.883	.000	.250	.886	.000	.949	.000	.949	.936
Cars & Peds	0	0	0	0	0	304	232	536	322	0	1	323	0	330	0	330	1189
% Cars & Peds	0	0	0	0	0	97.7	99.1	98.3	99.1	0	100	99.1	0	97.6	0	97.6	98.3
Trucks & Buses	0	0	0	0	0	7	2	9	3	0	0	3	0	8	0	8	20
% Trucks & Buses	0	0	0	0	0	2.3	0.9	1.7	0.9	0	0	0.9	0	2.4	0	2.4	1.7

Transportation Data Corporation
Mario Perone, mperone1@verizon.net
_t (781) 587-0086 f (781) 587-0189_

N/S: Driveway/Bremen Street
E/W: Bennington Street
City, State: E. Boston, MA
Client: MDM/C. Jones

File Name : 04394DD
Site Code : 732
Start Date : 10/10/2013
Page No : 1

Groups Printed- Trucks & Buses

	Private Driveway From North			Bennington Street From East			Bremen Street From South			Bennington Street From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
03:00 PM	0	0	0	0	1	3	0	0	0	0	6	0	10
03:15 PM	0	0	0	0	2	4	1	0	0	0	3	0	10
03:30 PM	0	0	0	0	2	1	0	0	0	0	2	0	5
03:45 PM	0	0	0	0	6	3	2	0	0	0	3	0	14
Total	0	0	0	0	11	11	3	0	0	0	14	0	39
04:00 PM	0	0	0	0	5	1	1	0	0	0	3	0	10
04:15 PM	0	0	0	0	2	1	1	0	0	0	2	0	6
04:30 PM	0	0	0	0	3	0	1	0	0	0	1	0	5
04:45 PM	0	0	0	0	1	0	1	0	0	0	3	0	5
Total	0	0	0	0	11	2	4	0	0	0	9	0	26
05:00 PM	0	0	0	0	1	1	0	0	0	0	2	0	4
05:15 PM	0	0	0	0	3	1	1	0	0	0	0	0	5
05:30 PM	0	0	0	0	1	1	0	0	0	0	2	0	4
05:45 PM	0	0	0	0	1	0	0	0	0	0	1	0	2
Total	0	0	0	0	6	3	1	0	0	0	5	0	15
Grand Total	0	0	0	0	28	16	8	0	0	0	28	0	80
Apprch %	0	0	0	0	63.6	36.4	100	0	0	0	100	0	
Total %	0	0	0	0	35	20	10	0	0	0	35	0	

	Private Driveway From North				Bennington Street From East				Bremen Street From South				Bennington Street From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:00 PM																	
03:00 PM	0	0	0	0	0	1	3	4	0	0	0	0	0	**6**	0	**6**	10
03:15 PM	0	0	0	0	0	2	**4**	6	1	0	0	1	0	3	0	3	10
03:30 PM	0	0	0	0	0	2	1	3	0	0	0	0	0	2	0	2	5
03:45 PM	0	0	0	0	0	**6**	3	**9**	**2**	0	0	**2**	0	3	0	3	**14**
Total Volume	0	0	0	0	0	11	11	22	3	0	0	3	0	14	0	14	39
% App. Total	0	0	0		0	50	50		100	0	0		0	100	0		
PHF	.000	.000	.000	.000	.000	.458	.688	.611	.375	.000	.000	.375	.000	.583	.000	.583	.696

Transportation Data Corporation

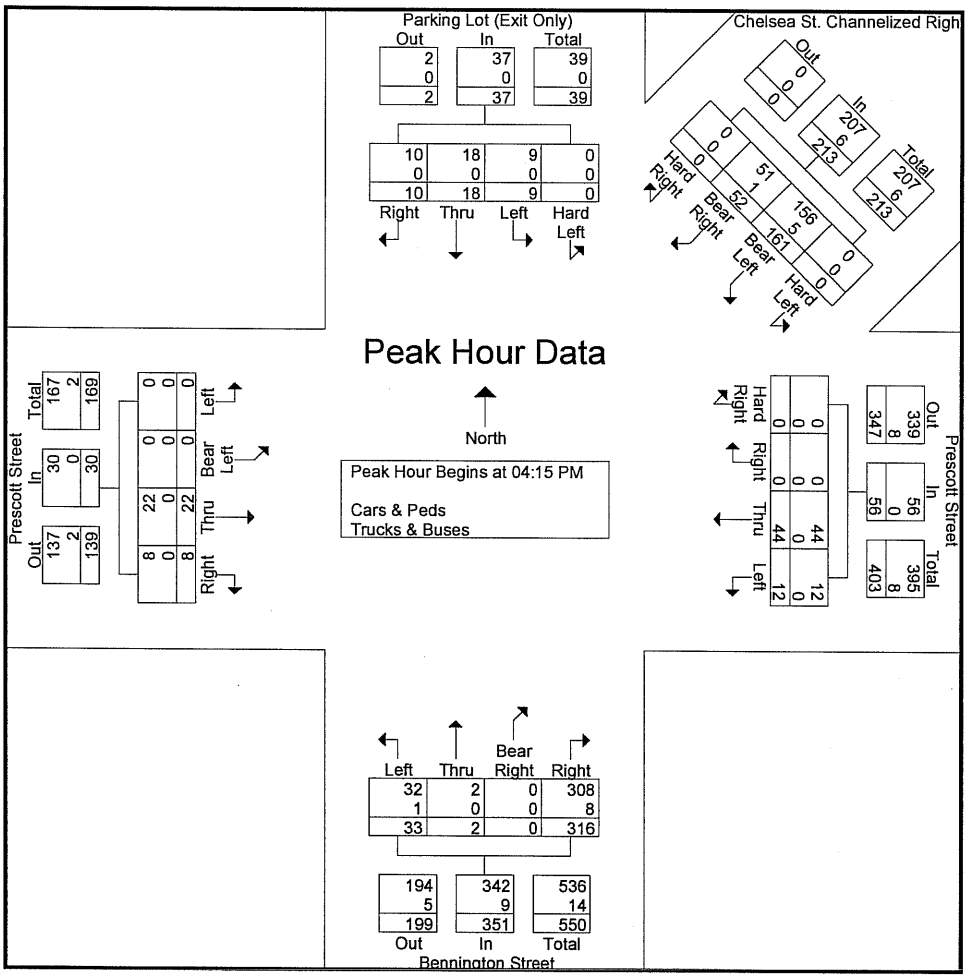
Mario Perone, mperone1@verizon.net

t (781) 587-0086 f (781) 587-0189

N/S: Public Lot/Bennington Street
E,W/NE: Prescott St./Chelsea St. SB & WB
City, State: E. Boston, MA
Client: MDM/C. Jones

File Name : 04394AA
Site Code : 732
Start Date : 10/10/2013
Page No : 1

	Parking Lot (Exit Only) From North					Chelsea St. Channelized Right From Northeast					Prescott Street From East					Bennington Street From South					Prescott Street From West					
Start Time	Right	Thru	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	App. Total	Right	Bear Right	Thru	Left	App. Total	Right	Thru	Bear Left	Left	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 04:15 PM																										
04:15 PM	3	**9**	**4**	0	**16**	0	**16**	**50**	0	**66**	0	0	6	**4**	10	77	0	**1**	8	86	**3**	**9**	0	0	**12**	**190**
04:30 PM	1	3	3	0	7	0	11	39	0	50	0	0	9	3	12	77	0	0	6	83	2	1	0	0	3	155
04:45 PM	**4**	2	2	0	8	0	11	41	0	52	0	0	13	3	16	**81**	0	0	9	90	2	6	0	0	8	174
05:00 PM	2	4	0	0	6	0	14	31	0	45	0	0	**16**	2	**18**	81	0	1	**10**	**92**	1	6	0	0	7	168
Total Volume	10	18	9	0	37	0	52	161	0	213	0	0	44	12	56	316	0	2	33	351	8	22	0	0	30	687
% App. Total	27	48.6	24.3	0		0	24.4	75.6	0		0	0	78.6	21.4		90	0	0.6	9.4		26.7	73.3	0	0		
PHF	.625	.500	.563	.000	.578	.000	.813	.805	.000	.807	.000	.000	.688	.750	.778	.975	.000	.500	.825	.954	.667	.611	.000	.000	.625	.904
Cars & Peds	10	18	9	0	37	0	51	156	0	207	0	0	44	12	56	308	0	2	32	342	8	22	0	0	30	672
% Cars & Peds	100	100	100	0	100	0	98.1	96.9	0	97.2	0	0	100	100	100	97.5	0	100	97.0	97.4	100	100	0	0	100	97.8
Trucks & Buses	0	0	0	0	0	0	1	5	0	6	0	0	0	0	0	8	0	0	1	9	0	0	0	0	0	15
% Trucks & Buses	0	0	0	0	0	0	1.9	3.1	0	2.8	0	0	0	0	0	2.5	0	0	3.0	2.6	0	0	0	0	0	2.2



Transportation Data Corporation

Mario Perone, mperone1@verizon.net

t (781) 587-0086 f (781) 587-0189

N/S: Public Lot/Bennington Street
E,W/NE: Prescott St./Chelsea St. SB & WB
City, State: E. Boston, MA
Client: MDM/C. Jones

File Name : 04394AA
Site Code : 732
Start Date : 10/10/2013
Page No : 1

Groups Printed- Cars & Peds - Trucks & Buses

	Parking Lot (Exit Only) From North					Chelsea St. Channelized Right From Northeast					Prescott Street From East					Bennington Street From South					Prescott Street From West							
Start Time	Right	Thru	Left	Hard Left	Peds	Hard Right	Bear Right	Bear Left	Hard Left	Peds	Hard Right	Right	Thru	Left	Peds	Right	Bear Right	Thru	Left	Peds	Right	Thru	Bear Left	Left	Peds	Exclu. Total	Inclu. Total	Int. Total
03:00 PM	8	6	6	0	6	0	6	42	0	0	0	0	14	3	9	53	0	0	17	26	0	4	0	0	22	63	159	222
03:15 PM	6	6	3	0	1	0	9	37	0	0	0	0	17	1	4	71	0	0	13	24	1	4	0	0	13	42	168	210
03:30 PM	2	4	4	0	13	0	7	49	0	0	0	0	6	2	4	73	0	0	6	32	3	2	0	0	15	64	158	222
03:45 PM	1	3	4	0	4	0	6	48	0	0	0	0	6	4	3	59	0	0	3	18	3	7	0	0	17	42	144	186
Total	17	19	17	0	24	0	28	176	0	0	0	0	43	10	20	256	0	0	39	100	7	17	0	0	67	211	629	840
04:00 PM	0	5	3	0	2	0	7	40	0	0	0	0	8	3	2	62	0	0	8	20	6	5	0	0	13	37	147	184
04:15 PM	3	9	4	0	2	0	16	50	0	0	0	0	6	4	2	77	0	1	8	25	3	9	0	0	14	43	190	233
04:30 PM	1	3	3	0	2	0	11	39	0	0	0	0	9	3	1	77	0	0	6	20	2	1	0	0	8	31	155	186
04:45 PM	4	2	2	0	2	0	11	41	0	0	0	0	13	3	0	81	0	0	9	19	2	6	0	0	17	38	174	212
Total	8	19	12	0	8	0	45	170	0	0	0	0	36	13	5	297	0	1	31	84	13	21	0	0	52	149	666	815
05:00 PM	2	4	0	0	3	0	14	31	0	0	0	0	16	2	3	81	0	1	10	14	1	6	0	0	9	29	168	197
05:15 PM	3	5	3	0	2	0	11	40	0	0	0	0	11	3	0	54	0	0	7	33	0	7	0	0	21	56	144	200
05:30 PM	2	4	3	0	5	0	6	52	0	0	0	0	18	5	1	79	0	0	4	15	2	2	0	0	7	28	177	205
05:45 PM	1	5	2	0	2	0	10	50	0	0	0	0	14	3	4	62	0	0	10	23	2	6	0	0	29	58	165	223
Total	8	18	8	0	12	0	41	173	0	0	0	0	59	13	8	276	0	1	31	85	5	21	0	0	66	171	654	825
Grand Total	33	56	37	0	44	0	114	519	0	0	0	0	138	36	33	829	0	2	101	269	25	59	0	0	185	531	1949	2480
Apprch %	26.2	44.4	29.4	0		0	18	82	0		0	0	79.3	20.7		88.9	0	0.2	10.8		29.8	70.2	0	0				
Total %	1.7	2.9	1.9	0		0	5.8	26.6	0		0	0	7.1	1.8		42.5	0	0.1	5.2		1.3	3	0	0		21.4	78.6	
Cars & Peds	33	56	37	0		0	113	498	0		0	0	138	36		808	0	2	100		25	59	0	0		0	0	2436
% Cars & Peds	100	100	100	0	100	0	99.1	96	0	0	0	0	100	100	100	97.5	0	100	99	100	100	100	0	0	100	0	0	98.2
Trucks & Buses	0	0	0	0		0	1	21	0		0	0	0	0		21	0	0	1		0	0	0	0		0	0	44
% Trucks & Buses	0	0	0	0	0	0	0.9	4	0	0	0	0	0	0	0	2.5	0	0	1	0	0	0	0	0	0	0	0	1.8

	Parking Lot (Exit Only) From North					Chelsea St. Channelized Right From Northeast					Prescott Street From East					Bennington Street From South					Prescott Street From West					
Start Time	Right	Thru	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	App. Total	Right	Bear Right	Thru	Left	App. Total	Right	Thru	Bear Left	Left	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 04:15 PM																										
04:15 PM	3	**9**	**4**	0	**16**	0	**16**	**50**	0	**66**	0	0	6	**4**	10	77	0	**1**	8	86	**3**	**9**	0	0	**12**	**190**
04:30 PM	1	3	3	0	7	0	11	39	0	50	0	0	9	3	12	77	0	0	6	83	2	1	0	0	3	155
04:45 PM	**4**	2	2	0	8	0	11	41	0	52	0	0	13	3	16	**81**	0	0	9	90	2	6	0	0	8	174
05:00 PM	2	4	0	0	6	0	14	31	0	45	0	0	**16**	2	**18**	81	0	1	**10**	**92**	1	6	0	0	7	168
Total Volume	10	18	9	0	37	0	52	161	0	213	0	0	44	12	56	316	0	2	33	351	8	22	0	0	30	687
% App. Total	27	48.6	24.3	0		0	24.4	75.6	0		0	0	78.6	21.4		90	0	0.6	9.4		26.7	73.3	0	0		
PHF	.625	.500	.563	.000	.578	.000	.813	.805	.000	.807	.000	.000	.688	.750	.778	.975	.000	.500	.825	.954	.667	.611	.000	.000	.625	.904
Cars & Peds	10	18	9	0	37	0	51	156	0	207	0	0	44	12	56	308	0	2	32	342	8	22	0	0	30	672
% Cars & Peds	100	100	100	0	100	0	98.1	96.9	0	97.2	0	0	100	100	100	97.5	0	100	97.0	97.4	100	100	0	0	100	97.8
Trucks & Buses	0	0	0	0	0	0	1	5	0	6	0	0	0	0	0	8	0	0	1	9	0	0	0	0	0	15
% Trucks & Buses	0	0	0	0	0	0	1.9	3.1	0	2.8	0	0	0	0	0	2.5	0	0	3.0	2.6	0	0	0	0	0	2.2

Transportation Data Corporation

Mario Perone, mperone1@verizon.net

t (781) 587-0086 f (781) 587-0189

N/S: Public Lot/Bennington Street
E,W/NE: Prescott St./Chelsea St. SB & WB
City, State: E. Boston, MA
Client: MDM/C. Jones

File Name : 04394AA
Site Code : 732
Start Date : 10/10/2013
Page No : 1

Groups Printed- Trucks & Buses

	Parking Lot (Exit Only) From North				Chelsea St. Channelized Right From Northeast				Prescott Street From East				Bennington Street From South				Prescott Street From West				
Start Time	Right	Thru	Left	Hard Left	Hard Right	Bear Right	Bear Left	Hard Left	Hard Right	Right	Thru	Left	Right	Bear Right	Thru	Left	Right	Thru	Bear Left	Left	Int. Total
03:00 PM	0	0	0	0	0	0	1	0	0	0	0	0	3	0	0	0	0	0	0	0	4
03:15 PM	0	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	0	0	4
03:30 PM	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	4
03:45 PM	0	0	0	0	0	0	1	0	0	0	0	0	3	0	0	0	0	0	0	0	4
Total	0	0	0	0	0	0	8	0	0	0	0	0	8	0	0	0	0	0	0	0	16
04:00 PM	0	0	0	0	0	0	5	0	0	0	0	0	3	0	0	0	0	0	0	0	8
04:15 PM	0	0	0	0	0	1	2	0	0	0	0	0	1	0	0	0	0	0	0	0	4
04:30 PM	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	3
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	1	0	0	0	0	4
Total	0	0	0	0	0	1	9	0	0	0	0	0	8	0	0	1	0	0	0	0	19
05:00 PM	0	0	0	0	0	0	1	0	0	0	0	0	3	0	0	0	0	0	0	0	4
05:15 PM	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
05:45 PM	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	2
Total	0	0	0	0	0	0	4	0	0	0	0	0	5	0	0	0	0	0	0	0	9
Grand Total	0	0	0	0	0	1	21	0	0	0	0	0	21	0	0	1	0	0	0	0	44
Apprch %	0	0	0	0	0	4.5	95.5	0	0	0	0	0	95.5	0	0	4.5	0	0	0	0	
Total %	0	0	0	0	0	2.3	47.7	0	0	0	0	0	47.7	0	0	2.3	0	0	0	0	

	Parking Lot (Exit Only) From North					Chelsea St. Channelized Right From Northeast					Prescott Street From East					Bennington Street From South					Prescott Street From West					
Start Time	Right	Thru	Left	Hard Left	App. Total	Hard Right	Bear Right	Bear Left	Hard Left	App. Total	Hard Right	Right	Thru	Left	App. Total	Right	Bear Right	Thru	Left	App. Total	Right	Thru	Bear Left	Left	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 03:15 PM																										
03:15 PM	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	4
03:30 PM	0	0	0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
03:45 PM	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	**3**	0	0	0	**3**	0	0	0	0	0	4
04:00 PM	0	0	0	0	0	0	0	**5**	0	**5**	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	**8**
Total Volume	0	0	0	0	0	0	0	12	0	12	0	0	0	0	0	8	0	0	0	8	0	0	0	0	0	20
% App. Total	0	0	0	0		0	0	100	0		0	0	0	0		100	0	0	0		0	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.600	.000	.600	.000	.000	.000	.000	.000	.667	.000	.000	.000	.667	.000	.000	.000	.000	.000	.625

Transportation Data Corporation

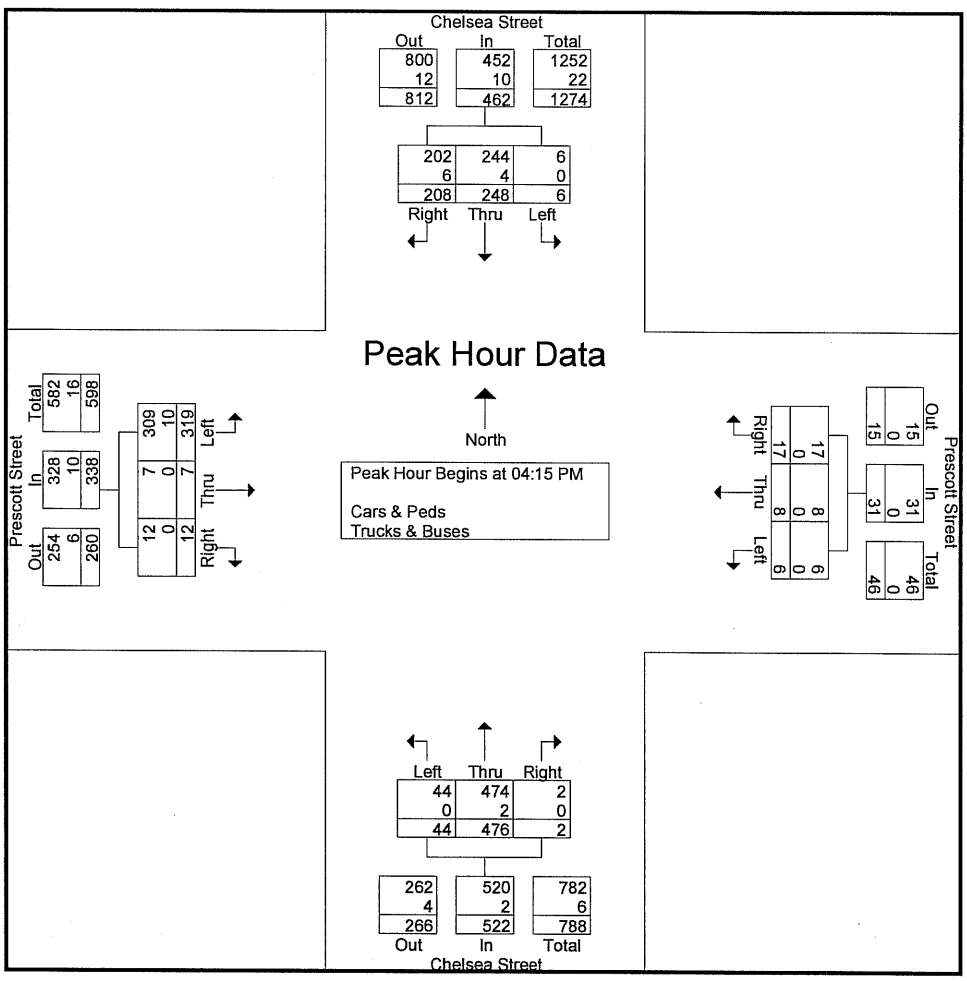
Mario Perone, mperone1@verizon.net

t (781) 587-0086 f (781) 587-0189

N/S: Chelsea Street
E/W: Prescott Street
City, State: E. Boston, MA
Client: MDM/C. Jones

File Name : 04394BB
Site Code : 732
Start Date : 10/10/2013
Page No : 1

	Chelsea Street From North				Prescott Street From East				Chelsea Street From South				Prescott Street From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:15 PM																	
04:15 PM	**71**	**68**	**3**	**142**	6	1	1	8	**1**	**127**	7	135	2	**2**	**83**	87	**372**
04:30 PM	48	63	0	111	3	1	0	4	0	106	11	117	0	2	75	77	309
04:45 PM	44	61	2	107	**7**	2	2	**11**	0	121	**13**	134	4	1	78	83	335
05:00 PM	45	56	1	102	1	**4**	**3**	8	1	122	13	**136**	**6**	2	83	**91**	337
Total Volume	208	248	6	462	17	8	6	31	2	476	44	522	12	7	319	338	1353
% App. Total	45	53.7	1.3		54.8	25.8	19.4		0.4	91.2	8.4		3.6	2.1	94.4		
PHF	.732	.912	.500	.813	.607	.500	.500	.705	.500	.937	.846	.960	.500	.875	.961	.929	.909
Cars & Peds	202	244	6	452	17	8	6	31	2	474	44	520	12	7	309	328	1331
% Cars & Peds	97.1	98.4	100	97.8	100	100	100	100	100	99.6	100	99.6	100	100	96.9	97.0	98.4
Trucks & Buses	6	4	0	10	0	0	0	0	0	2	0	2	0	0	10	10	22
% Trucks & Buses	2.9	1.6	0	2.2	0	0	0	0	0	0.4	0	0.4	0	0	3.1	3.0	1.6



Transportation Data Corporation

Mario Perone, mperone1@verizon.net

t (781) 587-0086 f (781) 587-0189

N/S: Chelsea Street
E/W: Prescott Street
City, State: E. Boston, MA
Client: MDM/C. Jones

File Name : 04394BB
Site Code : 732
Start Date : 10/10/2013
Page No : 1

Groups Printed- Cars & Peds - Trucks & Buses

	Chelsea Street From North				Prescott Street From East				Chelsea Street From South				Prescott Street From West						
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Exclu. Total	Inclu. Total	Int. Total
03:00 PM	50	66	2	5	26	4	1	6	1	105	14	21	3	1	59	6	38	332	370
03:15 PM	45	65	2	4	5	3	5	12	2	99	16	9	4	0	71	2	27	317	344
03:30 PM	59	48	7	17	7	2	0	13	2	114	7	24	6	2	84	5	59	338	397
03:45 PM	56	51	5	4	5	2	2	9	1	105	6	9	1	3	67	6	28	304	332
Total	210	230	16	30	43	11	8	40	6	423	43	63	14	6	281	19	152	1291	1443
04:00 PM	47	69	4	2	1	2	2	18	1	95	6	8	1	0	71	5	33	299	332
04:15 PM	71	68	3	7	6	1	1	16	1	127	7	16	2	2	83	3	42	372	414
04:30 PM	48	63	0	4	3	1	0	9	0	106	11	10	0	2	75	2	25	309	334
04:45 PM	44	61	2	2	7	2	2	5	0	121	13	11	4	1	78	6	24	335	359
Total	210	261	9	15	17	6	5	48	2	449	37	45	7	5	307	16	124	1315	1439
05:00 PM	45	56	1	4	1	4	3	13	1	122	13	15	6	2	83	5	37	337	374
05:15 PM	53	63	1	4	8	2	2	10	0	108	12	20	5	0	62	2	36	316	352
05:30 PM	57	67	3	9	5	5	3	8	1	119	16	7	5	1	80	0	24	362	386
05:45 PM	66	61	4	2	4	2	2	15	0	97	15	11	3	2	69	2	30	325	355
Total	221	247	9	19	18	13	10	46	2	446	56	53	19	5	294	9	127	1340	1467
Grand Total	641	738	34	64	78	30	23	134	10	1318	136	161	40	16	882	44	403	3946	4349
Apprch %	45.4	52.2	2.4		59.5	22.9	17.6		0.7	90	9.3		4.3	1.7	94				
Total %	16.2	18.7	0.9		2	0.8	0.6		0.3	33.4	3.4		1	0.4	22.4		9.3	90.7	
Cars & Peds	621	728	34		78	30	23		10	1310	136		40	16	859		0	0	4288
% Cars & Peds	96.9	98.6	100	100	100	100	100	100	100	99.4	100	100	100	100	97.4	100	0	0	98.6
Trucks & Buses	20	10	0		0	0	0		0	8	0		0	0	23		0	0	61
% Trucks & Buses	3.1	1.4	0	0	0	0	0	0	0	0.6	0	0	0	0	2.6	0	0	0	1.4

	Chelsea Street From North				Prescott Street From East				Chelsea Street From South				Prescott Street From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:15 PM																	
04:15 PM	71	68	3	142					1	127				2	83		372
04:30 PM	48	63	0	111	3	1	0	4	0	106	11	117	0	2	75	77	309
04:45 PM	44	61	2	107	7	2	2	11	0	121	13	134	4	1	78	83	335
05:00 PM	45	56	1	102	1	4	3	8	1	122	13	136	6	2	83	91	337
Total Volume	208	248	6	462	17	8	6	31	2	476	44	522	12	7	319	338	1353
% App. Total	45	53.7	1.3		54.8	25.8	19.4		0.4	91.2	8.4		3.6	2.1	94.4		
PHF	.732	.912	.500	.813	.607	.500	.500	.705	.500	.937	.846	.960	.500	.875	.961	.929	.909
Cars & Peds	202	244	6	452	17	8	6	31	2	474	44	520	12	7	309	328	1331
% Cars & Peds	97.1	98.4	100	97.8	100	100	100	100	100	99.6	100	99.6	100	100	96.9	97.0	98.4
Trucks & Buses	6	4	0	10	0	0	0	0	0	2	0	2	0	0	10	10	22
% Trucks & Buses	2.9	1.6	0	2.2	0	0	0	0	0	0.4	0	0.4	0	0	3.1	3.0	1.6

Transportation Data Corporation

Mario Perone, mperone1@verizon.net
t (781) 587-0086 f (781) 587-0189

N/S: Chelsea Street
E/W: Prescott Street
City, State: E. Boston, MA
Client: MDM/C. Jones

File Name : 04394BB
Site Code : 732
Start Date : 10/10/2013
Page No : 1

Groups Printed- Trucks & Buses

	Chelsea Street From North			Prescott Street From East			Chelsea Street From South			Prescott Street From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
03:00 PM	2	0	0	0	0	0	0	2	0	0	0	3	7
03:15 PM	2	0	0	0	0	0	0	1	0	0	0	2	5
03:30 PM	2	2	0	0	0	0	0	2	0	0	0	0	6
03:45 PM	1	3	0	0	0	0	0	0	0	0	0	3	7
Total	7	5	0	0	0	0	0	5	0	0	0	8	25
04:00 PM	4	0	0	0	0	0	0	1	0	0	0	3	8
04:15 PM	3	0	0	0	0	0	0	1	0	0	0	1	5
04:30 PM	2	1	0	0	0	0	0	0	0	0	0	3	6
04:45 PM	0	1	0	0	0	0	0	1	0	0	0	3	5
Total	9	2	0	0	0	0	0	3	0	0	0	10	24
05:00 PM	1	2	0	0	0	0	0	0	0	0	0	3	6
05:15 PM	2	0	0	0	0	0	0	0	0	0	0	0	2
05:30 PM	0	1	0	0	0	0	0	0	0	0	0	1	2
05:45 PM	1	0	0	0	0	0	0	0	0	0	0	1	2
Total	4	3	0	0	0	0	0	0	0	0	0	5	12
Grand Total	20	10	0	0	0	0	0	8	0	0	0	23	61
Apprch %	66.7	33.3	0	0	0	0	0	100	0	0	0	100	
Total %	32.8	16.4	0	0	0	0	0	13.1	0	0	0	37.7	

	Chelsea Street From North				Prescott Street From East				Chelsea Street From South				Prescott Street From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:15 PM																	
03:15 PM	2	0	0	2	0	0	0	0	0	1	0	1	0	0	2	2	5
03:30 PM	2	2	0	**4**	0	0	0	0	0	**2**	0	**2**	0	0	0	0	6
03:45 PM	1	**3**	0	4	0	0	0	0	0	0	0	0	0	0	**3**	**3**	7
04:00 PM	**4**	0	0	4	0	0	0	0	0	1	0	1	0	0	3	3	**8**
Total Volume	9	5	0	14	0	0	0	0	0	4	0	4	0	0	8	8	26
% App. Total	64.3	35.7	0		0	0	0		0	100	0		0	0	100		
PHF	.563	.417	.000	.875	.000	.000	.000	.000	.000	.500	.000	.500	.000	.000	.667	.667	.813

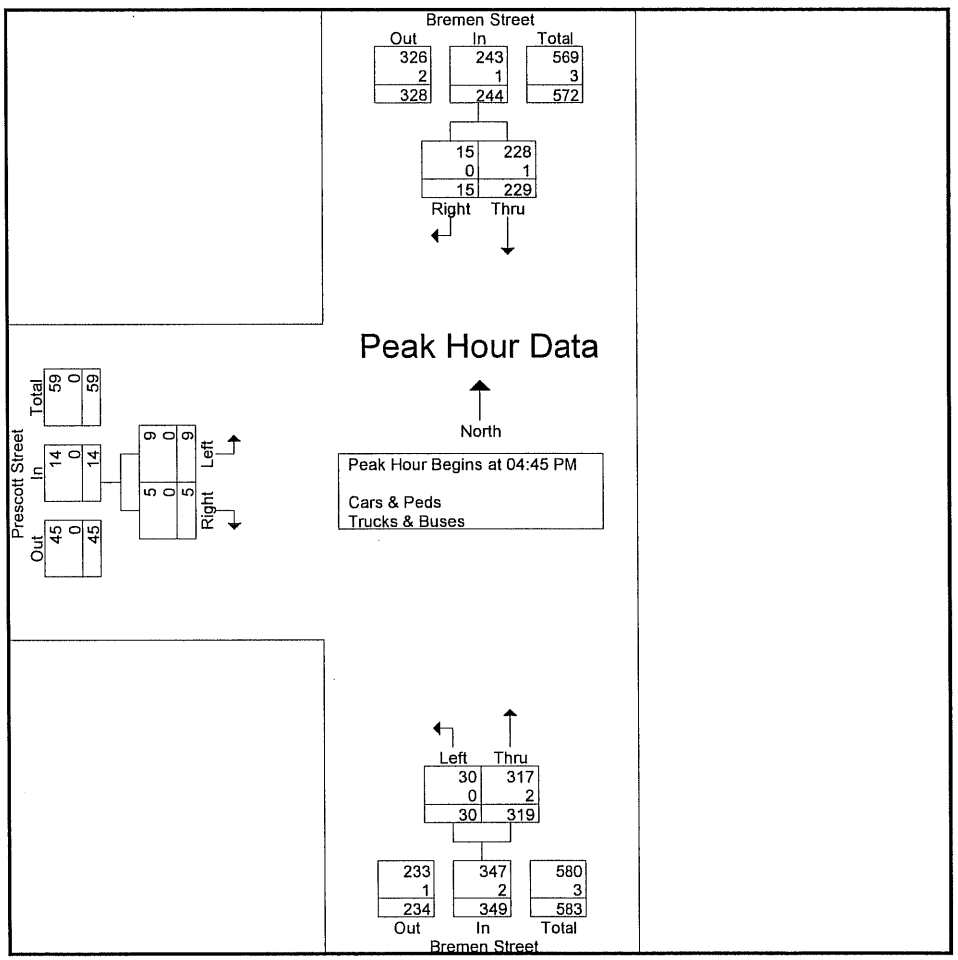
Transportation Data Corporation

Mario Perone, mperone1@verizon.net
tel (781) 587-0086 cell (781) 439-4999

N/S: Bremen Street
E/W: Prescott Street
City, State: E. Boston, MA
Client: MDM/C. Jones

File Name : 04394CC
Site Code : 732
Start Date : 10/10/2013
Page No : 1

	Bremen Street From North			Bremen Street From South			Prescott Street From West			
Start Time	Right	Thru	App. Total	Thru	Left	App. Total	Right	Left	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:45 PM										
04:45 PM	4	51	55	87	8	95	0	**4**	4	154
05:00 PM	**5**	59	64	**94**	5	**99**	**2**	1	3	**166**
05:15 PM	2	55	57	71	**9**	80	1	1	2	139
05:30 PM	4	**64**	**68**	67	8	75	2	3	**5**	148
Total Volume	15	229	244	319	30	349	5	9	14	607
% App. Total	6.1	93.9		91.4	8.6		35.7	64.3		
PHF	.750	.895	.897	.848	.833	.881	.625	.563	.700	.914
Cars & Peds	15	228	243	317	30	347	5	9	14	604
% Cars & Peds	100	99.6	99.6	99.4	100	99.4	100	100	100	99.5
Trucks & Buses	0	1	1	2	0	2	0	0	0	3
% Trucks & Buses	0	0.4	0.4	0.6	0	0.6	0	0	0	0.5



Transportation Data Corporation

Mario Perone, mperone1@verizon.net
tel (781) 587-0086 cell (781) 439-4999

N/S: Bremen Street
E/W: Prescott Street
City, State: E. Boston, MA
Client: MDM/C. Jones

File Name : 04394CC
Site Code : 732
Start Date : 10/10/2013
Page No : 1

Groups Printed- Cars & Peds - Trucks & Buses

	Bremen Street From North			Bremen Street From South			Prescott Street From West					
Start Time	Right	Thru	Peds	Thru	Left	Peds	Right	Left	Peds	Exclu. Total	Inclu. Total	Int. Total
03:00 PM	4	64	0	33	24	10	3	2	0	10	130	140
03:15 PM	11	53	0	53	4	10	2	3	1	11	126	137
03:30 PM	4	63	0	52	4	13	7	4	0	13	134	147
03:45 PM	5	58	0	67	3	8	2	6	1	9	141	150
Total	24	238	0	205	35	41	14	15	2	43	531	574
04:00 PM	2	68	0	77	4	6	3	1	0	6	155	161
04:15 PM	3	55	0	70	5	6	5	1	0	6	139	145
04:30 PM	1	53	0	87	3	10	1	0	1	11	145	156
04:45 PM	4	51	0	87	8	14	0	4	0	14	154	168
Total	10	227	0	321	20	36	9	6	1	37	593	630
05:00 PM	5	59	0	94	5	8	2	1	0	8	166	174
05:15 PM	2	55	0	71	9	7	1	1	1	8	139	147
05:30 PM	4	64	0	67	8	12	2	3	0	12	148	160
05:45 PM	2	63	0	74	6	10	3	2	2	12	150	162
Total	13	241	0	306	28	37	8	7	3	40	603	643
Grand Total	47	706	0	832	83	114	31	28	6	120	1727	1847
Apprch %	6.2	93.8		90.9	9.1		52.5	47.5				
Total %	2.7	40.9		48.2	4.8		1.8	1.6		6.5	93.5	
Cars & Peds	46	695		824	83		31	28		0	0	1827
% Cars & Peds	97.9	98.4	0	99	100	100	100	100	100	0	0	98.9
Trucks & Buses	1	11		8	0		0	0		0	0	20
% Trucks & Buses	2.1	1.6	0	1	0	0	0	0	0	0	0	1.1

	Bremen Street From North			Bremen Street From South			Prescott Street From West			
Start Time	Right	Thru	App. Total	Thru	Left	App. Total	Right	Left	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:45 PM										
04:45 PM	4	51	55	87	8	95	0	**4**	4	154
05:00 PM	**5**	59	64	**94**	5	**99**	**2**	1	3	**166**
05:15 PM	2	55	57	71	**9**	80	1	1	2	139
05:30 PM	4	**64**	**68**	67	8	75	2	3	**5**	148
Total Volume	15	229	244	319	30	349	5	9	14	607
% App. Total	6.1	93.9		91.4	8.6		35.7	64.3		
PHF	.750	.895	.897	.848	.833	.881	.625	.563	.700	.914
Cars & Peds	15	228	243	317	30	347	5	9	14	604
% Cars & Peds	100	99.6	99.6	99.4	100	99.4	100	100	100	99.5
Trucks & Buses	0	1	1	2	0	2	0	0	0	3
% Trucks & Buses	0	0.4	0.4	0.6	0	0.6	0	0	0	0.5

Transportation Data Corporation
Mario Perone, mperone1@verizon.net
tel (781) 587-0086 cell (781) 439-4999

N/S: Bremen Street
E/W: Prescott Street
City, State: E. Boston, MA
Client: MDM/C. Jones

File Name : 04394CC
Site Code : 732
Start Date : 10/10/2013
Page No : 1

Groups Printed- Trucks & Buses

	Bremen Street From North		Bremen Street From South		Prescott Street From West		
Start Time	Right	Thru	Thru	Left	Right	Left	Int. Total
03:00 PM	0	2	0	0	0	0	2
03:15 PM	1	3	1	0	0	0	5
03:30 PM	0	1	0	0	0	0	1
03:45 PM	0	3	2	0	0	0	5
Total	1	9	3	0	0	0	13
04:00 PM	0	1	1	0	0	0	2
04:15 PM	0	0	1	0	0	0	1
04:30 PM	0	0	1	0	0	0	1
04:45 PM	0	0	1	0	0	0	1
Total	0	1	4	0	0	0	5
05:00 PM	0	0	0	0	0	0	0
05:15 PM	0	0	1	0	0	0	1
05:30 PM	0	1	0	0	0	0	1
05:45 PM	0	0	0	0	0	0	0
Total	0	1	1	0	0	0	2
Grand Total	1	11	8	0	0	0	20
Apprch %	8.3	91.7	100	0	0	0	
Total %	5	55	40	0	0	0	

	Bremen Street From North			Bremen Street From South			Prescott Street From West			
Start Time	Right	Thru	App. Total	Thru	Left	App. Total	Right	Left	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 03:00 PM										
03:00 PM	0	2	2	0	0	0	0	0	0	2
03:15 PM	**1**	**3**	**4**	1	0	1	0	0	0	**5**
03:30 PM	0	1	1	0	0	0	0	0	0	1
03:45 PM	0	3	3	**2**	0	**2**	0	0	0	5
Total Volume	1	9	10	3	0	3	0	0	0	13
% App. Total	10	90		100	0		0	0		
PHF	.250	.750	.625	.375	.000	.375	.000	.000	.000	.650

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RAPID TRANSIT/ KEY BUS ROUTES MAP

LEGEND

- Subway
- Silver Line
- Key Bus Route (Frequent Service)
- Commuter Rail
- Ferry
- Free shuttle bus service provided by Massport
- Accessible station. All MBTA bus and ferry services are accessible
- Transfer station
- Terminus station
- AMTRAK service

NOTES:

Customer Communications & Travel Information

MBTA Transit Police

Elevator/escalator hotline updates

*Roadside: Accessible for Silver Line only.
*Braintree: Open 5:15 AM to 6:30 PM weekdays only.

For information on Commuter Rail stations not depicted here including station accessibility, contact MBTA Customer Communications & Travel Information.

Fares

PRICE PER TRIP	Local Bus	Bus + Bus	Rapid Transit	Bus + Rapid Transit
CharlieCard	$1.50	$1.50	$2.00	$2.00
CharlieTicket	$2.00	$2.00	$2.50	$4.50***
Cash-on-Board	$2.00	$4.00	$2.50	$4.50***
Student*	$0.75	$0.75	$1.00	$1.00
Senior/TAP**	$0.75	$0.75	$1.00	$1.00
UNLIMITED TRIP PASSES				
1-Day	$11.00	$11.00	$11.00	$11.00
7-Day	$18.00	$18.00	$18.00	$18.00
Monthly	$48.00	$48.00	$70.00	$70.00
Senior/TAP Monthly	$28.00/month for unlimited travel on Local Bus and Rapid Transit			

VALID PASSES: LinkPass ($70/mo.); StudentPass* ($25/mo. M-F only or $28/mo. 7 days); Senior/TAP Pass* ($28/mo.); and express bus, commuter rail, and boat passes.

FREE FARES: Children under 12 ride free when accompanied by an adult; Blind Access CharlieCard holders ride free: if using a guide, the guide rides free

* Available to students through participating middle schools and high schools.

** Available to Medicare cardholders, seniors 65+, and persons with disabilities.

***For Silver Line SL4 or SL5 pay $2.50. Also see "transfers."

TRANSFERS

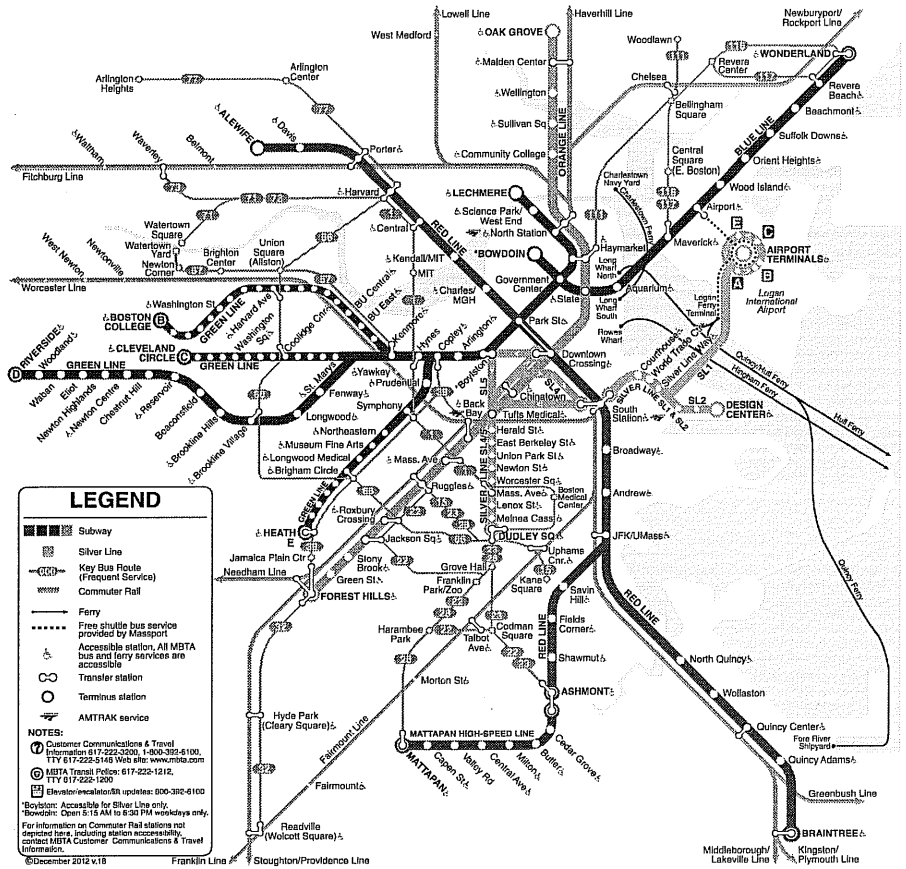
If paying with a CharlieTicket or CharlieCard, discounted transfers that are available are automatic — just use the same ticket or card throughout your trip. If paying with cash onboard a vehicle, free transfers are only allowed between rapid transit lines, and in either of the following cases you must ask for a transfer ticket from the operator before paying your fare:

- Boarding Silver Line SL4 or SL5 and transferring to other rapid transit.
- Boarding at a farebox aboard the Green Line or Silver Lines and transferring to Silver Line SL4 or SL5 later in your trip.

Free transfers between the Mattapan High Speed Line and the Red Line at Ashmont.

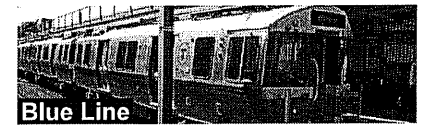
SCHEDULES

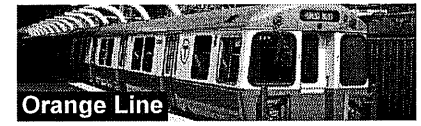
Schedules are available at the following stations: Park Street, Airport, Malden, Harvard, Government Center (Green Line Level), Back Bay, Downtown Crossing (Orange Line Level), and Quincy Center, or ask a Customer Service Agent. Schedules are also available at Boston City Hall, the State Transportation Building Library (10 Park Plaza), 45 High St, and online at mbta.com.

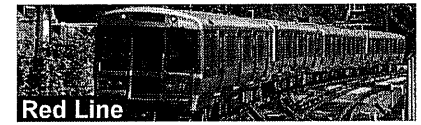


Rapid Transit

Fall August 31, 2013 - December 27, 2013







Massachusetts Bay Transportation Authority

massDOT Massachusetts Department of Transportation

Information 617-222-3200 • 1-800-392-6100
(TTY) 617-222-5146 • www.mbta.com

RAPID TRANSIT LINE

WEEKDAY

	FIRST TRIP	RUSH HOUR SERVICE	MIDDAY SERVICE	EVENING SERVICE	LATE NIGHT SERVICE	LAST TRIP
RED LINE						
LV ALEWIFE	5:24AM	9 MINS.	14 MINS.	12 MINS.	12 MINS.	12:15AM
LV BRAINTREE	5:15AM	9 MINS.	14 MINS.	12 MINS.	12 MINS.	12:18AM
LV ALEWIFE	5:16AM	9 MINS.	14 MINS.	12 MINS.	12 MINS.	w 12:22AM
LV ASHMONT	5:16AM	9 MINS.	14 MINS.	12 MINS.	12 MINS.	w 12:30AM
"M" LV ASHMONT*	5:17AM	5 MINS.	8 MINS.	12 MINS.	12 MINS.	w 1:05AM
LV MATTAPAN*	5:05AM	5 MINS.	8 MINS.	12 MINS.	12 MINS.	12:53AM
BLUE LINE*						
LV WONDERLAND	5:13AM	5 MINS.	9 MINS.	9 MINS.	13 MINS.	12:26AM
LV WOOD ISLAND	5:15AM	5 MINS.	9 MINS.	9 MINS.	13 MINS.	12:33AM
LV GOV'T CENTER	5:30AM	5 MINS.	9 MINS.	9 MINS.	13 MINS.	w 1:00AM
ORANGE LINE						
LV OAK GROVE	5:16AM	6 MINS.	8 MINS.	10 MINS.	10 MINS.	w 12:30AM
LV FOREST HILLS	5:16AM	6 MINS.	8 MINS.	10 MINS.	10 MINS.	w 12:35AM
GREEN LINE						
"B" LV BOSTON COLLEGE	5:01AM	7 MINS.	9 MINS.	10 MINS.	11 MINS.	12:10AM
LV GOVERNMENT CTR.	5:39AM	7 MINS.	9 MINS.	10 MINS.	11 MINS.	w 12:52AM
"C" LV CLEVELAND CIR.	5:01AM*	7 MINS.	10 MINS.	7 MINS.	14 MINS.	12:10AM
LV NORTH STATION	5:55AM	7 MINS.	10 MINS.	7 MINS.	14 MINS.	w 12:50AM
"D" LV RIVERSIDE	4:56AM	7 MINS.	11 MINS.	10 MINS.	13 MINS.	12:05AM
LV GOVERNMENT CTR.	5:34AM	7 MINS.	11 MINS.	10 MINS.	13 MINS.	w 12:47AM
"E" LV LECHMERE	5:01AM	6 MINS.	8 MINS.	10 MINS.	14 MINS.	w 12:30AM
LV HEATH STREET	5:30AM	6 MINS.	8 MINS.	10 MINS.	14 MINS.	w 12:47AM

SATURDAY

	FIRST TRIP	A.M. PEAK SERVICE	P.M. PEAK SERVICE	EVENING SERVICE	LATE NIGHT SERVICE	LAST TRIP
RED LINE						
LV ALEWIFE	5:24AM	14 MINS.	14 MINS.	14 MINS.	14 MINS.	12:15AM
LV BRAINTREE	5:15AM	14 MINS.	14 MINS.	14 MINS.	14 MINS.	12:18AM
LV ALEWIFE	5:16AM	14 MINS.	14 MINS.	14 MINS.	14 MINS.	w 12:22AM
LV ASHMONT	5:16AM	14 MINS.	14 MINS.	14 MINS.	14 MINS.	w 12:30AM
"M" LV ASHMONT*	5:15AM	26 MINS.	12 MINS.	12 MINS.	26 MINS.	w 1:05AM
LV MATTAPAN*	5:05AM	26 MINS.	12 MINS.	12 MINS.	26 MINS.	12:53AM
BLUE LINE*						
LV WONDERLAND	5:25AM	9 MINS.	9 MINS.	9 MINS.	13 MINS.	12:26AM
LV WOOD ISLAND	5:15AM	9 MINS.	9 MINS.	9 MINS.	13 MINS.	12:33AM
LV GOV'T CENTER	5:29AM	9 MINS.	9 MINS.	9 MINS.	13 MINS.	w 1:00AM
ORANGE LINE						
LV OAK GROVE	5:16AM	10 MINS.	8 MINS.	10 MINS.	10 MINS.	w 12:30AM
LV FOREST HILLS	5:16AM	10 MINS.	8 MINS.	10 MINS.	10 MINS.	w 12:35AM
GREEN LINE						
"B" LV BOSTON COLLEGE	4:45AM*	7 MINS.	7 MINS.	7 MINS.	11 MINS.	12:10AM
LV GOVERNMENT CTR.	5:35AM	7 MINS.	7 MINS.	7 MINS.	11 MINS.	w 12:52AM
"C" LV CLEVELAND CIR.	4:50AM*	10 MINS.	8 MINS.	8 MINS.	10 MINS.	12:10AM
LV NORTH STATION	5:30AM	10 MINS.	8 MINS.	8 MINS.	10 MINS.	w 12:50AM
"D" LV RIVERSIDE	4:55AM	10 MINS.	8 MINS.	10 MINS.	10 MINS.	12:05AM
LV GOVERNMENT CTR.	5:34AM	10 MINS.	8 MINS.	10 MINS.	10 MINS.	w 12:47AM
"E" LV LECHMERE	5:01AM	10 MINS.	9 MINS.	10 MINS.	10 MINS.	w 12:30AM
LV HEATH STREET	5:30AM	10 MINS.	9 MINS.	10 MINS.	10 MINS.	w 12:47AM

SUNDAY

	FIRST TRIP	A.M. PEAK SERVICE	P.M. PEAK SERVICE	EVENING SERVICE	LATE NIGHT SERVICE	LAST TRIP
RED LINE						
LV ALEWIFE	6:08AM	16 MINS.	16 MINS.	16 MINS.	16 MINS.	12:15AM
LV BRAINTREE	6:00AM	16 MINS.	16 MINS.	16 MINS.	16 MINS.	12:18AM
LV ALEWIFE	6:00AM	16 MINS.	16 MINS.	16 MINS.	16 MINS.	w 12:22AM
LV ASHMONT	6:00AM	16 MINS.	16 MINS.	16 MINS.	16 MINS.	w 12:30AM
"M" LV ASHMONT*	6:03AM	26 MINS.	12 MINS.	12 MINS.	26 MINS.	w 1:05AM
LV MATTAPAN*	5:51AM	26 MINS.	12 MINS.	12 MINS.	26 MINS.	12:53AM
BLUE LINE*						
LV WONDERLAND	5:58AM	13 MINS.	9 MINS.	9 MINS.	13 MINS.	12:26AM
LV WOOD ISLAND	6:05AM	13 MINS.	9 MINS.	9 MINS.	13 MINS.	12:33AM
LV GOV'T CENTER	6:21AM	13 MINS.	9 MINS.	9 MINS.	13 MINS.	w 1:00AM
ORANGE LINE						
LV OAK GROVE	6:00AM	13 MINS.	10 MINS.	10 MINS.	10 MINS.	w 12:30AM
LV FOREST HILLS	6:00AM	13 MINS.	10 MINS.	10 MINS.	10 MINS.	w 12:35AM
GREEN LINE						
"B" LV BOSTON COLLEGE	5:20AM*	10 MINS.	9 MINS.	10 MINS.	10 MINS.	12:10AM
LV GOVERNMENT CTR.	6:06AM	10 MINS.	9 MINS.	10 MINS.	10 MINS.	w 12:52AM
"C" LV CLEVELAND CIR.	5:30AM*	10 MINS.	10 MINS.	10 MINS.	10 MINS.	12:10AM
LV NORTH STATION	6:06AM	10 MINS.	10 MINS.	10 MINS.	10 MINS.	w 12:50AM
"D" LV RIVERSIDE	5:25AM	10 MINS.	10 MINS.	10 MINS.	10 MINS.	12:05AM
LV GOVERNMENT CTR.	6:04AM	10 MINS.	10 MINS.	10 MINS.	10 MINS.	w 12:47AM
"E" LV LECHMERE	5:35AM	12 MINS.	12 MINS.	12 MINS.	12 MINS.	w 12:30AM
LV HEATH STREET	6:15AM	12 MINS.	12 MINS.	12 MINS.	12 MINS.	w 12:47AM

★ The first 2 "C" Line AM inbound trips run through to Lechmere Station on Weekdays. ★ The first "B" Line and the second "C" Line AM inbound trips run through to Lechmere Station on Saturday and Sunday.

SILVER LINE

	FIRST TRIP	RUSH HOUR SERVICE	MIDDAY SERVICE	EVENING SERVICE	LATE NIGHT SERVICE	LAST TRIP
SL1 LV LOGAN AIRPORT	5:38AM	10 MINS.	10 MINS.	10 MINS.	12 MINS.	12:45AM
LV SOUTH STATION	5:40AM	10 MINS.	10 MINS.	10 MINS.	12 MINS.	12:30AM
SL2 LV DESIGN CENTER	6:03AM	5 MINS.	10 MINS.	9 MINS.	15 MINS.	12:30AM
LV SOUTH STATION	5:45AM	5 MINS.	10 MINS.	9 MINS.	15 MINS.	w 12:50AM
Additional Waterfront-only service						
LV SILVER LINE WAY	5:28AM	5 MINS.	Use SL1/SL2			
LV SOUTH STATION	5:35AM	5 MINS.				12:55AM
SL4 LV DUDLEY STATION	5:20AM	10 MINS.	15 MINS.	15 MINS.	20 MINS.	12:20AM
LV SOUTH STATION	5:40AM	10 MINS.	15 MINS.	15 MINS.	20 MINS.	12:40AM
SL5 LV DUDLEY STATION	5:15AM	7 MINS.	10 MINS.	8 MINS.	15 MINS.	12:46AM
DOWNTOWN CROSSING	5:30AM	7 MINS.	10 MINS.	8 MINS.	15 MINS.	w 1:02AM

	FIRST TRIP	A.M. PEAK SERVICE	P.M. PEAK SERVICE	EVENING SERVICE	LATE NIGHT SERVICE	LAST TRIP
SL1 LV LOGAN AIRPORT	5:33AM	12 MINS.	12 MINS.	12 MINS.	12 MINS.	12:45AM
LV SOUTH STATION	5:35AM	12 MINS.	12 MINS.	12 MINS.	12 MINS.	12:30AM
SL2 LV DESIGN CENTER	6:10AM	15 MINS.	15 MINS.	15 MINS.	15 MINS.	12:35AM
LV SOUTH STATION	5:50AM	15 MINS.	15 MINS.	15 MINS.	15 MINS.	w 12:48AM
Additional Waterfront-only service						
LV SILVER LINE WAY	5:28AM	Use SL1/SL2				
LV SOUTH STATION						12:52AM
SL4 LV DUDLEY STATION	5:23AM	15 MINS.	15 MINS.	15 MINS.	20 MINS.	12:20AM
LV SOUTH STATION	5:40AM	15 MINS.	15 MINS.	15 MINS.	20 MINS.	12:40AM
SL5 LV DUDLEY STATION	5:19AM	10 MINS.	10 MINS.	11 MINS.	11 MINS.	12:46AM
DOWNTOWN CROSSING	5:34AM	10 MINS.	10 MINS.	11 MINS.	11 MINS.	w 1:00AM

	FIRST TRIP	A.M. PEAK SERVICE	P.M. PEAK SERVICE	EVENING SERVICE	LATE NIGHT SERVICE	LAST TRIP
SL1 LV LOGAN AIRPORT	5:50AM	12 MINS.	8 MINS.	8 MINS.	8 MINS.	12:45AM
LV SOUTH STATION	6:12AM	12 MINS.	8 MINS.	8 MINS.	8 MINS.	12:30AM
SL2 LV DESIGN CENTER	6:50AM	15 MINS.	15 MINS.	15 MINS.	15 MINS.	12:34AM
LV SOUTH STATION	6:35AM	15 MINS.	15 MINS.	15 MINS.	15 MINS.	w 12:48AM
Additional Waterfront-only service						
LV SILVER LINE WAY	6:05AM	Use SL1/SL2				
LV SOUTH STATION						1:00AM
SL4 LV DUDLEY STATION	6:02AM	15 MINS.	15 MINS.	15 MINS.	20 MINS.	12:20AM
LV SOUTH STATION	6:20AM	15 MINS.	15 MINS.	15 MINS.	20 MINS.	12:40AM
SL5 LV DUDLEY STATION	6:00AM	10 MINS.	8 MINS.	9 MINS.	9 MINS.	12:25AM
DOWNTOWN CROSSING	6:15AM	10 MINS.	8 MINS.	9 MINS.	9 MINS.	w 12:47AM

Schedule Periods Note:

Rush Hour AM: approx. 6:30AM - 9:00AM
Midday: approx. 9:00AM - 3:30PM
Rush Hour PM: approx. 3:30PM - 6:30PM
Evening: approx. 6:30PM - 8:00PM
Late Night: approx. 8:00PM - Close

***Mattapan Line Note:**

Saturday and Sunday Before 10:00AM and After 8:00PM Trips depart every 26 minutes and the rest of day every 12 minutes. Also, See Separate Schedule Card.

Blue Line Note:

Weekdays the Last train to Bowdoin Station arrives at 6:12PM and the Last train departs Bowdoin Station at 6:18PM. NO service to/from Bowdoin Station all day Saturday and Sunday.

***Blue Line - Replacement Bus Service:**

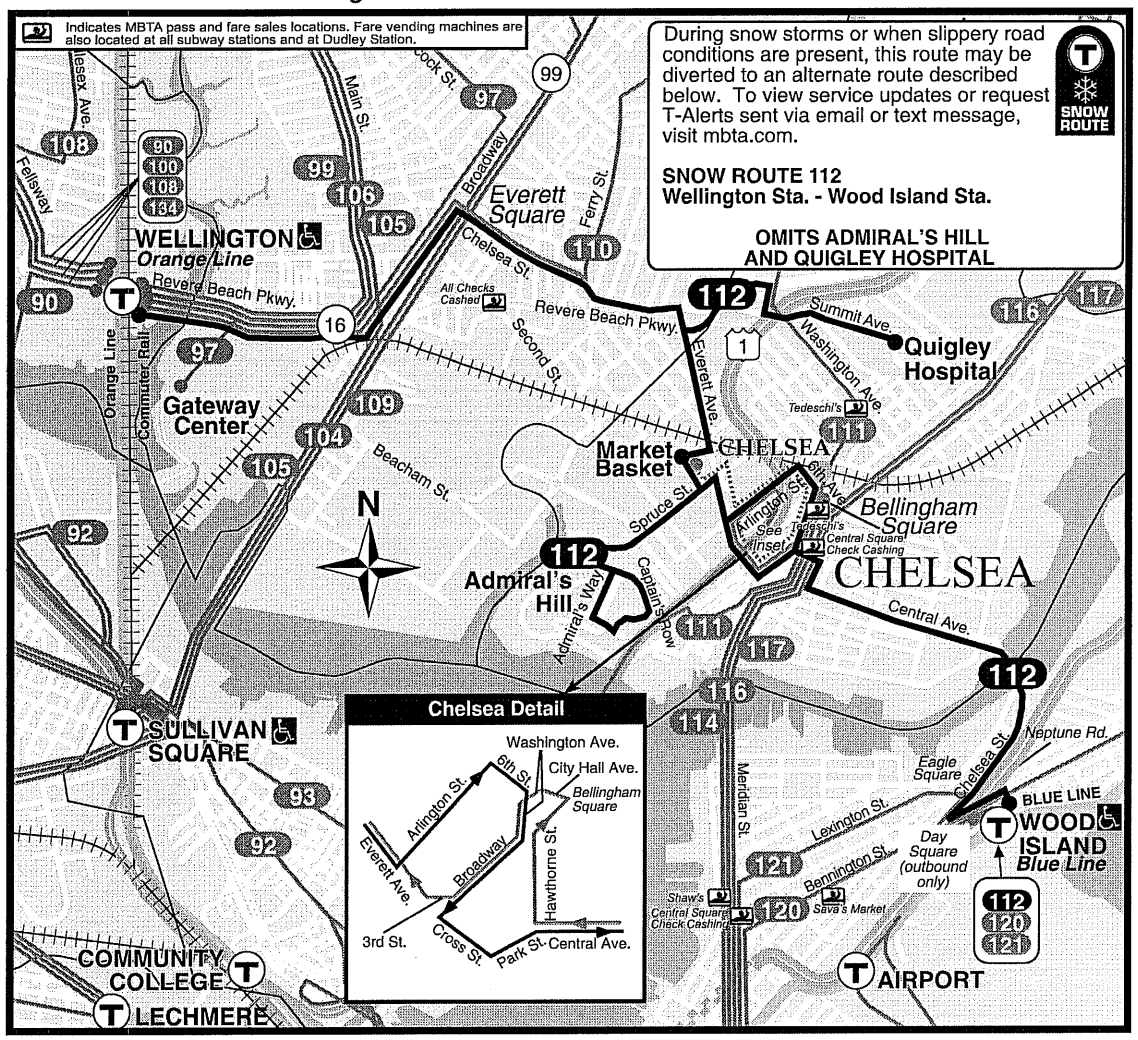
Due to construction at Orient Heights Station trains will only run through the station and not stop. Please use shuttle bus service between Orient Heights and Suffolk Downs Stations for connection to the Blue Line. However, on Weekdays and Saturdays the first shuttle bus trip will run between Orient Heights and Wood Island to connect to the 5:15AM departure from Wood Island. **Also, Orient Heights Station is tentatively scheduled to reopen during Fall 2013. When station reopens shuttle bus service will end. Further information will be distributed when available.**

w - Last trips wait at some stations, primarily in the downtown area, for connecting service. Departure times are approximate.

Fall 2013 Holidays

Sept. 2 - See Sunday
Oct. 14 - See Saturday except Green & Silver Lines see Weekday.
Nov. 11 - See Weekday
Nov. 28 - See Sunday
Nov. 29 - See Weekday except Green Line see Saturday.
Dec. 25 - See Sunday

Route 112 *Wellington Station - Wood Island Station via Market Basket & Admiral's Hill*



schedule change

112

FALL August 31, 2013 - December 27, 2013

Wellington Station - Wood Island Station

via Market Basket & Admiral's Hill

Serving: Everett Sq., Quigley Hospital, Bellingham Sq., and connections to the Blue & Orange Lines & Newburyport/Rockport Commuter Rail

Arrive times are approximate, subject to traffic.

Customer Service/Travel Info 617-222-3200
Toll Free.....1-800-392-6100
Hearing Impaired (TTY).....617-222-5146

For more schedule or travel information, visit:
www.mbta.com

Massachusetts Bay Transportation Authority

massDOT Massachusetts Department of Transportation

112 WEEKDAY

INBOUND			OUTBOUND		
Leave Wellington Station	Arrive Bellingham Square	Arrive Wood Island Station	Leave Wood Island Station	Arrive Bellingham Square	Arrive Wellington Station
6:20A	6:47A	6:55A	b 6:10A	6:18A	6:47A
7:00	7:33	7:43	6:40	6:47	7:29
7:40	8:13	8:23	7:20	7:27	8:04
8:20	8:53	9:03	8:00	8:07	8:43
9:00	9:33	9:43	8:40	8:47	9:19
9:40	10:13	10:23	9:20	9:26	10:04
10:20	11:00	11:11	10:00	10:06	10:44
11:00	11:32	11:41	10:40	10:46	11:24
11:40	**12:19P**	**12:29P**	11:20	11:26	**12:04P**
12:20P	**12:56P**	**1:13P**	**12:00N**	**12:06P**	**12:46P**
1:00	**1:42**	**1:50**	**12:40P**	**12:47**	**1:30**
1:40	**2:23**	**2:31**	**1:20**	**1:27**	**2:09**
2:20	**3:03**	**3:11**	**2:00**	**2:08**	**2:50**
3:00	**3:40**	**3:50**	**2:40**	**2:48**	**3:30**
3:40	**4:18**	**4:28**	**3:20**	**3:28**	**4:10**
4:20	**4:58**	**5:08**	**4:00**	**4:08**	**4:50**
5:00	**5:38**	**5:48**	**4:40**	**4:48**	**5:29**
5:40	**6:18**	**6:28**	**5:20**	**5:28**	**6:04**
6:20	**6:54**	**7:03**	**6:00**	**6:07**	**6:44**
7:00	**7:33**	**7:42**	**6:40**	**6:46**	**7:21**
			7:20	**7:26**	**7:59**
			8:00	**8:06**	**8:39**

b - Omits Quigley Hospital.

EXCEPT WHERE NOTED,

Inbound buses toward Wood Island Sta. serve Market Basket then Admiral's Hill.

Outbound buses toward Wellington Sta. serve Admiral's Hill then Market Basket.

112 SATURDAY

INBOUND			OUTBOUND		
Leave Wellington Station	Arrive Bellingham Square	Arrive Wood Island Station	Leave Wood Island Station	Arrive Bellingham Square	Arrive Wellington Station
7:00A	7:30A	7:34A	7:00A	7:06A	7:40A
7:50	8:19	8:26	7:50	7:56	8:30
8:40	9:09	9:17	8:40	8:47	9:21
9:30	10:07	10:15	9:30	9:37	10:11
10:20	10:57	11:05	10:20	10:27	11:05
11:10	11:47	11:58	11:10	11:16	11:54
11:50	**12:27P**	**12:38P**			
12:30P	**1:07P**	**1:18P**	**12:00N**	**12:07P**	**12:49P**
1:10	**1:46**	**1:57**	**12:45**	**12:52**	**1:34**
1:50	**2:24**	**2:35**	**1:25**	**1:32**	**2:14**
2:30	**3:04**	**3:15**	**2:05**	**2:12**	**2:54**
3:10	**3:44**	**3:55**	**2:45**	**2:52**	**3:34**
3:50	**4:24**	**4:35**	**3:25**	**3:32**	**4:14**
4:30	**5:05**	**5:17**	**4:05**	**4:12**	**4:54**
5:10	**5:48**	**5:58**	**4:45**	**4:52**	**5:34**
5:50	**6:27**	**6:37**	**5:25**	**5:32**	**6:14**
6:30	**7:07**	**7:17**	**6:05**	**6:12**	**6:54**
			6:45	**6:52**	**7:28**
			7:25	**7:33**	**8:09**

ALL BUSES ARE ACCESSIBLE TO PERSONS WITH DISABILITIES.

Route 112
Wellington Sta. - Wood Island Sta. via Market Basket & Admiral's Hill

112 SUNDAY

INBOUND			OUTBOUND		
Leave Wellington Station	Arrive Bellingham Square	Arrive Wood Island Station	Leave Wood Island Station	Arrive Bellingham Square	Arrive Wellington Station
a 8:30A	9:00A	9:11A	a 9:15A	9:20A	9:54A
a10:00	10:30	10:41	10:45	10:52	11:31
10:50	11:22	11:36	11:40	11:47	**12:26P**
11:40	**12:12P**	**12:26P**			
12:30P	**1:02P**	**1:16P**	**12:30P**	**12:37P**	**1:16P**
1:20	**1:52**	**2:06**	**1:20**	**1:27**	**2:06**
2:10	**2:42**	**2:56**	**2:10**	**2:17**	**2:56**
3:00	**3:32**	**3:46**	**3:00**	**3:07**	**3:46**
3:50	**4:20**	**4:32**	**3:50**	**3:57**	**4:31**
4:40	**5:09**	**5:21**	**4:40**	**4:46**	**5:20**
5:30	**5:59**	**6:11**	**5:30**	**5:36**	**6:10**
6:15	**6:44**	**6:56**	**6:15**	**6:21**	**6:55**
7:00	**7:29**	**7:41**			

a - Omits Market Basket.

FARES

PAYING WITH...	1-BUS TRIP	2-BUS TRIP	BUS + SUBWAY TRIP
CharlieCard	$1.50	$1.50	$2.00
CharlieTicket	$2.00	$2.00	$4.50
Cash onboard	$2.00	$4.00	$4.50
Student CharlieCard*	$0.75	$0.75	$1.00
Senior/TAP CharlieCard**	$0.75	$0.75	$1.00

Children under 12 ride free when accompanied by an adult.
Blind Access CharlieCard holders ride free; if using a guide, the guide rides free.

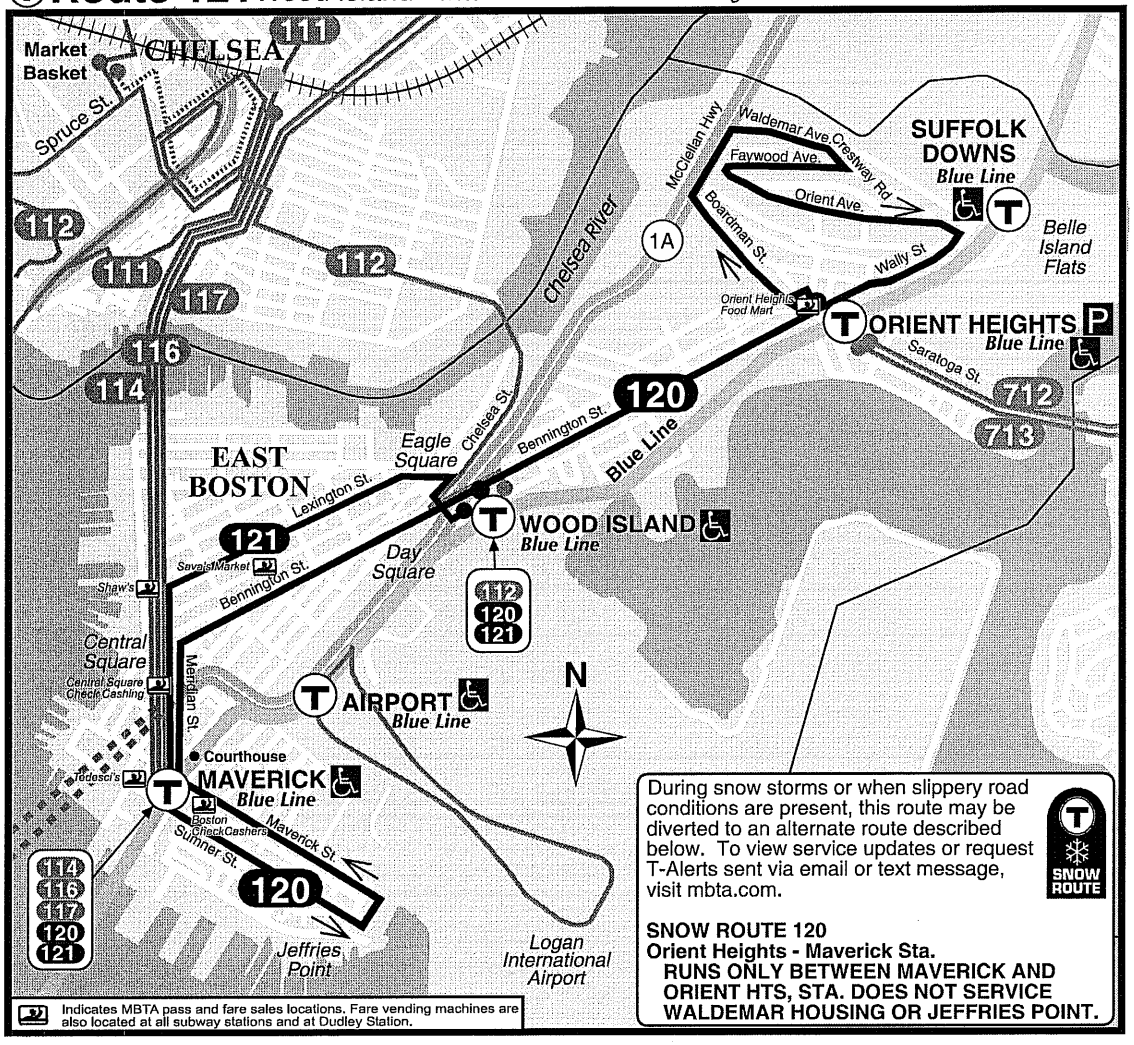
VALID PASSES: Local Bus Pass ($48/mo.); LinkPass ($70/mo.); Senior/TAP Pass** ($28/mo.); Student Pass* ($25/mo. M-F only or $28/mo. 7 days); express bus, commuter rail, and boat passes.

* Available to students through participating middle schools and high schools.
** Available to Medicare cardholders, seniors 65+ and persons with disabilities.

Fall 2013 Holidays

Oct. 14: See Sat. Sept. 2, Nov. 28, Dec. 25: See Sun. Nov. 11: See Weekday

Route 120 *Orient Heights - Maverick Station* *via Bennington St., Jeffries Pt., & Waldemar Loop*
Route 121 *Wood Island - Maverick Station* *via Lexington St.*



120 121

FALL August 31, 2013 - December 27, 2013

Orient Heights* - Maverick Sta.
via Bennington St.

Wood Island - Maverick Sta.
via Lexington St.

Serving: Waldemar Loop, Day Square, Eagle Square, Central Square East Boston, Jeffries Point and connections to the Blue Line

Arrive times are approximate, subject to traffic.

Customer Service/Travel Info 617-222-3200
Toll Free.....1-800-392-6100
Hearing Impaired (TTY).....617-222-5146

For more schedule or travel information, visit:
www.mbta.com

Massachusetts Bay Transportation Authority

massDOT
Massachusetts Department of Transportation

120 WEEKDAY

INBOUND			OUTBOUND		
Leave Orient Heights	Arrive Maverick To: Jeffries Point	Arrive Maverick Station	Leave Maverick Station	Arrive Orient Hts. To: Waldemar	Arrive Orient Heights
5:25	5:44	5:46	5:50A	6:01A	6:14A
5:50	6:09	6:11	.....	ds 6:25	6:35
6:15	6:34	6:36	6:15	6:26	6:39
6:35	6:54	6:56	6:40	6:51	7:05
s 6:47	.....	7:13	s 7:00	.....	7:28
6:51	7:10	7:12	7:05	7:19	7:34
7:07	7:26	7:28	7:21	7:35	7:50
7:23	7:42	7:44	7:37	7:51	8:06
7:39	7:58	8:00	7:53	8:07	8:22
7:55	8:14	8:16	8:09	8:23	8:38
8:11	8:30	8:32	8:25	8:39	8:54
8:27	8:46	8:48	8:41	8:55	9:07
8:43	9:02	9:04	8:57	9:10	9:21
9:00	9:21	9:23	9:13	9:27	9:38
9:20	9:41	9:43	9:30	9:44	9:55
Every	*20 Mins.*	*Until*	*Every*	*20 Mins.*	*Until*
11:20	11:42	11:44	11:30	11:44	11:55
11:40	**12:02P**	**12:04P**	11:50	**12:04P**	**12:15P**
12:00N	**12:22P**	**12:24P**	**12:10P**	**12:24P**	**12:35P**
12:20P	**12:42**	**12:44**	**12:30**	**12:44**	**12:55**
12:40	**1:02**	**1:04**	**12:50**	**1:04**	**1:15**
1:00	**1:22**	**1:24**	**1:10**	**1:24**	**1:35**
1:20	**1:42**	**1:44**	**1:30**	**1:44**	**1:55**
1:40	**2:02**	**2:04**	**1:50**	**2:04**	**2:15**
2:00	**2:22**	**2:24**	**2:10**	**2:24**	**2:36**
2:20	**2:42**	**2:44**	**bs 2:20**	**2:27**	**2:39**
2:45	**3:07**	**3:09**	**2:30**	**2:48**	**3:00**
3:10	**3:32**	**3:34**	**2:55**	**3:09**	**3:21**
3:35	**3:57**	**3:59**	**3:20**	**3:38**	**3:52**
4:00	**4:22**	**4:24**	**3:45**	**4:03**	**4:17**
4:25	**4:47**	**4:49**	**4:10**	**4:28**	**4:40**
4:50	**5:10**	**5:13**	**4:35**	**4:51**	**5:03**
5:15	**5:33**	**5:36**	**5:00**	**5:16**	**5:28**
5:40	**5:58**	**6:01**	**5:25**	**5:41**	**5:53**
6:05	**6:23**	**6:26**	**5:50**	**6:06**	**6:18**
6:30	**6:48**	**6:51**	**6:15**	**6:31**	**6:43**
6:55	**7:13**	**7:16**	**6:40**	**6:56**	**7:08**
7:20	**7:38**	**7:41**	**7:05**	**7:21**	**7:33**
8:00	**8:16**	**8:20**	**7:30**	**7:46**	**7:58**
9:00	**9:15**	**9:17**	**8:30**	**8:41**	**8:52**
10:00	**10:15**	**10:17**	**9:30**	**9:41**	**9:52**
11:00	**11:15**	**11:17**	**10:30**	**10:41**	**10:52**
11:50	12:05A	12:07A	**11:25**	**11:36**	**11:47**
12:35A	12:50	12:52	12:10A	12:21A	12:32A
			w12:56	1:07	1:18

Route 120
Orient Heights - Maverick Station

121 WEEKDAY

INBOUND			OUTBOUND		
Leave Wood Island	Lv/Arrive Eagle Square	Arrive Maverick Square	Leave Maverick Square	Arrive Eagle Square	Arrive Wood Island
6:00A	6:02A	6:10A	6:15A	6:20A	6:24A
6:30	6:32	6:40	6:45	6:50	6:54
7:00	7:02	7:12	7:15	7:20	7:24
7:30	7:32	7:40	7:45	7:50	7:54
8:00	8:02	8:10	8:15	8:20	8:24
8:30	8:32	8:40	8:45	8:50	8:53
.....	**3:33P**	**3:41P**	**3:20P**	**3:28P**	.....
.....	**3:58**	**4:06**	**3:45**	**3:53**	.....
.....	**4:23**	**4:31**	**4:10**	**4:19**	.....
.....	**4:48**	**4:56**	**4:35**	**4:43**	.....
.....	**5:12**	**5:21**	**5:00**	**5:08**	.....
.....	**5:38**	**5:46**	**5:25**	**5:33**	.....
.....	**6:02**	**6:10**	**5:50**	**5:58**	.....
.....	**6:26**	**6:34**	**6:14**	**6:22**	.....
			6:38	**6:46**	.....

120 SATURDAY

INBOUND			OUTBOUND		
Leave Orient Heights	Arrive Maverick To: Jeffries Point	Arrive Maverick Station	Leave Maverick Station	Arrive Orient Hts. To: Waldemar	Arrive Orient Heights
5:25A	5:38A	5:43A	5:47A	5:56A	6:10A
6:15	6:28	6:33	6:40	6:49	7:03
7:05	7:18	7:23	7:30	7:39	7:53
7:30	7:43	7:48	8:00	8:10	8:27
8:00	8:14	8:20	8:30	8:40	8:57
8:30	8:44	8:50	9:00	9:10	9:27
9:00	9:14	9:20	9:30	9:40	9:57
9:30	9:44	9:50	10:00	10:10	10:27
10:00	10:17	10:25	10:30	10:40	10:57
10:30	10:47	10:55	11:00	11:14	11:30
11:00	11:17	11:25	11:30	11:44	**12:00N**
11:30	11:47	11:55			
12:00N	**12:17P**	**12:25P**	**12:00N**	**12:14P**	**12:30P**
Every	***30 Mins.***	***Until***	***Every***	***30 Mins.***	***Until***
3:00	**3:17**	**3:22**	**3:00**	**3:14**	**3:30**
3:30	**3:47**	**3:52**	**3:30**	**3:44**	**4:00**
4:00	**4:17**	**4:22**	**4:00**	**4:14**	**4:30**
4:30	**4:47**	**4:52**	**4:30**	**4:44**	**5:00**
5:00	**5:17**	**5:22**	**5:00**	**5:14**	**5:30**
5:30	**5:47**	**5:52**	**5:30**	**5:44**	**6:00**
6:00	**6:17**	**6:22**	**6:00**	**6:11**	**6:28**
7:00	**7:17**	**7:22**	**6:30**	**6:41**	**6:58**
8:00	**8:17**	**8:22**	**7:30**	**7:41**	**7:58**
9:00	**9:17**	**9:22**	**8:30**	**8:41**	**8:58**
10:00	**10:17**	**10:22**	**9:30**	**9:41**	**9:58**
11:00	**11:17**	**11:22**	**10:30**	**10:40**	**10:51**
11:45	12:02A	12:07A	**11:22**	**11:32**	**11:43**
12:30A	12:47	12:52	12:07A	12:17A	12:28A
			w 12:56	1:06	1:17

Route 121
Wood Island - Maverick Station

120 SUNDAY

INBOUND			OUTBOUND		
Leave Orient Heights	Arrive Maverick To: Jeffries Point	Arrive Maverick Station	Leave Maverick Station	Arrive Orient Hts. To: Waldemar	Arrive Orient Heights
6:00A	6:13A	6:18A	6:25A	6:34A	6:49A
6:50	7:03	7:08	7:15	7:24	7:39
7:40	7:53	7:58	8:05	8:14	8:29
8:30	8:43	8:48	8:55	9:04	9:19
9:20	9:33	9:38	9:45	9:54	10:09
10:10	10:23	10:28	10:35	10:44	10:59
11:00	11:13	11:18	11:25	11:34	11:49
11:50	**12:03P**	**12:08P**			
12:40P	**12:53P**	**12:58P**	**12:15P**	**12:24P**	**12:39P**
1:30	**1:44**	**1:50**	**1:05**	**1:15**	**1:27**
2:20	**2:34**	**2:40**	**1:55**	**2:05**	**2:17**
3:10	**3:26**	**3:33**	**2:45**	**2:55**	**3:07**
4:00	**4:13**	**4:18**	**3:35**	**3:45**	**3:57**
4:50	**5:03**	**5:08**	**4:25**	**4:35**	**4:47**
5:40	**5:53**	**5:58**	**5:15**	**5:25**	**5:37**
6:30	**6:43**	**6:48**	**6:05**	**6:15**	**6:27**
7:20	**7:32**	**7:37**	**6:55**	**7:05**	**7:17**
8:10	**8:22**	**8:27**	**7:45**	**7:55**	**8:08**
9:00	**9:12**	**9:17**	**8:35**	**8:45**	**8:59**
9:50	**10:02**	**10:07**	**9:25**	**9:35**	**9:49**
10:40	**10:52**	**10:57**	**10:15**	**10:25**	**10:39**
11:30	**11:42**	**11:47**	**11:05**	**11:15**	**11:29**
12:20A	12:32A	12:37A	**11:55**	12:05A	12:19A
			w 12:56A	1:06	1:20

b - Leaves from Bennington St. at Brooks St.
d - Via Waldemar Loop.
s - Does NOT run during school vacation.
w - Waits for last train to arrive at Maverick Sta.

***Note:** Orient Heights station will be closed starting March 23, with Blue Line trains passing through but not stopping. Use Wood Island or Maverick stations for connections to the Blue Line. The Route 120 will continue to use the busway at Orient Heights station during the closure.

ALL BUSES ARE ACCESSIBLE TO PERSONS WITH DISABILITIES.

FARES

Paying with...	1-bus trip	2-bus trip	Bus + subway trip
CharlieCard	$1.50	$1.50	$2.00
CharlieTicket	$2.00	$2.00	$4.50
Cash onboard	$2.00	$4.00	$4.50
Student CharlieCard*	$0.75	$0.75	$1.00
Senior/TAP CharlieCard**	$0.75	$0.75	$1.00

Children under 12 ride free when accompanied by an adult.
Blind Access CharlieCard holders ride free; if using a guide, the guide rides free.

VALID PASSES: Local Bus Pass ($48/mo.); LinkPass ($70/mo.); Senior/TAP Pass** ($28/mo.); Student Pass* ($25/mo. M-F only or $28/mo. 7 days); express bus, commuter rail, and boat passes.

* Available to students through participating middle schools and high schools.
**Available to Medicare cardholders, seniors 65+ and persons with disabilities.

Fall 2013 Holidays

Oct. 14: See Sat. Sept. 2, Nov. 28, Dec. 25: See Sun. Nov. 11: See Weekday

□ Trip Generation Methodology

Proposed Excel Academy Middle/High School
Bremen Street - East Boston, MA

Proposed Middle/High School

Students = 896 students
Staff = 105 staff

Projected Mode-Split (Staff)

Mode	# Staff
MBTA/Walk	65
Drove*	40
Total	**105**

*Limited number of on-site parking availability estimated at 40 staff-designated spaces

Existing Student Mode-Split

	Chelsea	Moore Street	Orient Heights	Average	Rounded Average
Students:					
MBTA/Walk	n/a	50%	40%	**45%**	**45%**
School Bus	n/a	15%	30%	**23%**	**25%**
Dropped Off	n/a	35%	30%	**33%**	**30%**
Total	**n/a**	**100%**	**100%**	**100%**	**100%**

*Moore Street only accounts for Boston residents for student mode-split; 100% of Chelsea students use the school bus

Projected Mode-Split - High School (Students)

	East Boston	Chelsea	Other
Students:			
MBTA/Walk	80%	90%	80%
School Bus	0%	0%	0%
Dropped Off	20%	10%	20%
Total	**100%**	**100%**	**100%**

*Other mode-split projections assume the same splits for Chelsea

Projected Mode-Split - High School (Students)

	# Students			
Students:	East Boston	Chelsea	Other	Total
MBTA/Walk	230	260	77	**567**
School Bus	0	0	0	**0**
Dropped Off	57	29	19	**105**
Total	**287**	**289**	**96**	**672**

Projected Mode-Split - Middle School (Students)

	East Boston	Chelsea	Other
Students:			
MBTA/Walk	45%	0%	80%
School Bus	25%	100%	0%
Dropped Off	30%	0%	20%
Total	**100%**	**100%**	**100%**

*East Boston mode-split assumed to be the average of the Moore St and Orient Heights mode-split
*Other mode-split assumed to be the same splits for East Boston high school students

Projected Mode-Split - Middle School (Students)

	# Students			
Students:	East Boston	Chelsea	Other	Total
MBTA/Walk	62	0	37	**99**
School Bus	35	40	0	**75**
Dropped Off	41	0	9	**50**
Total	**138**	**40**	**46**	**224**

Projected Enrollment

	Middle School	High School	***Total***	**% Student Population (Non-Chelsea)**
East Boston	138	287	***425***	75%
Chelsea	40	289	***329***	-
Other	46	96	***142***	25%
Total	**224**	**672**	***896***	**100%**

*Middle School enrollment based on a 224-student maximum and High School enrollment based on a 672-student maximum and applying the E Boston/Other origin splits from existing student origins at the Orient Heights and Moore Street schools (shown under % student population) and a Chelsea student maximum of 329 students
*Assumes a 40-student maximum from Chelsea at the middle school based on statistics provided by Excel Academy.

Proposed Excel Academy Middle/High School
Bremen Street - East Boston, MA

	# Students		
	Middle School	**High School**	**Total**
MBTA/Walk	99	567	**666**
School Bus	75	0	**75**
Dropped Off	50	105	**155**
Total	**224**	**672**	**896**

Mode	**# Staff**
MBTA/Walk	65
Drove	40
Total	**105**

Projected Peak Hour Trip Generation - Proposed Middle/High School

	Staff Vehicles	**Middle School Student Vehicles**	**High School Student Vehicles**	**School Buses**	**Total**
Weekday Morning Peak Hour:					
Entering	40	50	105	8	203
Exiting	0	50	105	8	163
Total	**40**	**100**	**210**	**16**	**366**
Weekday Afternoon Peak Hour:					
Entering	0	38	79	8	125
Exiting	30	38	79	8	155
Total	**30**	**76**	**158**	**16**	**280**

*Assumes a vehicle occupancy of 1 student per vehicle for students dropped off by parents
*Assumes 8 school buses based on data provided by Excel Academy

% During AM Peak Hour: 100%
% During PM Peak Hour: 75%

- Trip Distribution Methodology / Pick-Up Line Queuing Evaluation

Student Trip Distribution Estimates

	% of Trips by Origin			
Origin	To/From West	T/From East	To/From North	To/From South
East Boston	60%	40%	0%	0%
Chelsea	0%	0%	100%	0%
Other	0%	90%	0%	10%

Projected Student Population - Middle/High School (Students)

	# Students			
Students:	East Boston	Chelsea	Other	Total
Total Dropped Off	98	29	28	155

	% of Trips based on Student Population Density			
Origin	To/From West	T/From East	To/From North	To/From South
East Boston	38%	25%	0%	0%
Chelsea	0%	0%	19%	0%
Other	0%	16%	0%	2%
Total	38%	42%	19%	2%

Route	%	
Bennington Street (To/From East)	45%	(Includes To/From East & To/From South as shown above)
Chelsea Street (To/From North)	20%	(Consists of To/From North as shown above)
Chelsea Street (To/From South)	5%	(Part of To/From West as shown above)
Bremen Street (To/From South)	5%	(Part of To/From West as shown above)
Prescott Street (To/From West)	25%	(Part of To/From West as shown above)

Staff Distribution (Journey-to-Work Distribution)

Residence Town Name	Workplace Town Name	All Workers	% of Total	% of Total Rounded
Boston	East Boston, MA	6	9.7%	10%
Cambridge	East Boston, MA	6	9.7%	10%
Somerville	East Boston, MA	6	9.7%	10%
Dorchester	East Boston, MA	5	8.1%	9%
Allston	East Boston, MA	3	4.8%	5%
Brookline	East Boston, MA	3	4.8%	5%
Jamaica Plain	East Boston, MA	3	4.8%	5%
Revere	East Boston, MA	3	4.8%	5%
Roxbury	East Boston, MA	3	4.8%	5%
Malden	East Boston, MA	2	3.2%	3%
Newton	East Boston, MA	2	3.2%	3%
Abington	East Boston, MA	1	1.6%	1.5%
Arlington	East Boston, MA	1	1.6%	1.5%
Beverly	East Boston, MA	1	1.6%	1.5%
Brighton	East Boston, MA	1	1.6%	1.5%
Charlestown	East Boston, MA	1	1.6%	1.5%
Chestnut Hill	East Boston, MA	1	1.6%	1.5%
Chicopee	East Boston, MA	1	1.6%	1.5%
Concord	East Boston, MA	1	1.6%	1.5%
Hyde Park	East Boston, MA	1	1.6%	1.5%
Lynn	East Boston, MA	1	1.6%	1.5%
Lynnfield	East Boston, MA	1	1.6%	1.5%
Providence, RI	East Boston, MA	1	1.6%	1.5%
Reading	East Boston, MA	1	1.6%	1.5%
Rowley	East Boston, MA	1	1.6%	1.5%
Salem	East Boston, MA	1	1.6%	1.5%
Wakefield	East Boston, MA	1	1.6%	1.5%
Weymouth	East Boston, MA	1	1.6%	1.5%
Winchester	East Boston, MA	1	1.6%	1.5%
Winthrop	East Boston, MA	1	1.6%	1.5%
Worcester	East Boston, MA	1	1.6%	1.5%
	Total	**62**	**100.00%**	**100%**

	To/From Routes									
	Bennington Street (From North)		Bennington Street (From South)		Chelsea Street (From North)		Chelsea Street (From South)		Bremen Street (From South)	Total
Workplace										
Boston	90%	9.0%		0.0%		0.0%	10%	1.0%	0.0%	10.0%
Cambridge	75%	7.5%		0.0%		0.0%	15%	1.5%	10% 1.0%	10.0%
Somerville	75%	7.5%		0.0%		0.0%	15%	1.5%	10% 1.0%	10.0%
Dorchester	100%	9.0%		0.0%		0.0%		0.0%	0.0%	9.0%
Allston	90%	4.5%		0.0%		0.0%	10%	0.5%	3% 0.2%	5.2%
Brookline	75%	3.8%		0.0%		0.0%	15%	0.8%	10% 0.5%	5.0%
Jamaica Plain	90%	4.5%		0.0%		0.0%	10%	0.5%	0.0%	5.0%
Revere	50%	2.5%		0.0%	50%	2.5%		0.0%	0.0%	5.0%
Roxbury	90%	4.5%		0.0%		0.0%	10%	0.5%	0.0%	5.0%
Malden	40%	1.2%		0.0%	50%	1.5%	10%	0.3%	0.0%	3.0%
Newton	90%	2.7%		0.0%		0.0%	10%	0.3%	0.0%	3.0%
Abington	100%	1.5%		0.0%		0.0%		0.0%	0.0%	1.5%
Arlington	75%	1.1%		0.0%		0.0%	15%	0.2%	10% 0.2%	1.5%
Beverly	40%	0.6%		0.0%	50%	0.8%	10%	0.2%	0.0%	1.5%
Brighton	90%	1.4%		0.0%		0.0%	10%	0.2%	0.0%	1.5%
Charlestown	75%	1.1%		0.0%		0.0%	15%	0.2%	10% 0.2%	1.5%
Chestnut Hill	90%	1.4%		0.0%		0.0%	10%	0.2%	0.0%	1.5%
Chicopee	100%	1.5%		0.0%		0.0%		0.0%	0.0%	1.5%
Concord	90%	1.4%		0.0%		0.0%	10%	0.2%	0.0%	1.5%
Hyde Park	100%	1.5%		0.0%		0.0%		0.0%	0.0%	1.5%
Lynn	100%	1.5%		0.0%		0.0%		0.0%	0.0%	1.5%
Lynnfield	40%	0.6%		0.0%	50%	0.8%	10%	0.2%	0.0%	1.5%
Providence, RI	100%	1.5%		0.0%		0.0%		0.0%	0.0%	1.5%
Reading	75%	1.1%		0.0%		0.0%	15%	0.2%	10% 0.2%	1.5%
Rowley		0.0%		0.0%	100%	1.5%		0.0%	0.0%	1.5%
Salem	50%	0.8%		0.0%	50%	0.8%		0.0%	0.0%	1.5%
Wakefield	40%	0.6%		0.0%	50%	0.8%	10%	0.2%	0.0%	1.5%
Weymouth	100%	1.5%		0.0%		0.0%		0.0%	0.0%	1.5%
Winchester	75%	1.1%		0.0%		0.0%	15%	0.2%	10% 0.2%	1.5%
Winthrop	100%	1.5%		0.0%		0.0%		0.0%	0.0%	1.5%
Worcester	100%	1.5%		0.0%		0.0%		0.0%	0.0%	1.5%
		79.8%		0.0%		8.5%		8.7%	3.3%	100%

Source: Excel Academy Employee Directory as of October 9, 2013 (excludes east boston residents are not expected to drive to the site)

Proposed Excel Academy Middle/High School
Bremen Street - East Boston, MA

On-Site Vehicle Queuing in Pick-up Line

	Total Students	Parent Pick-up	25% Arrive Prior to Dismissal and Form Queue
3:40 PM Dismissal	224	38	10
4:30 PM Dismissal	448	79	20
5:00 PM Dismissal	224	38	10

Note: An average of 17 percent of Middle School and High School students are expected to be picked up by private vehicle. Assumes 1 student per vehicle.

□ Capacity Analyses

LEVEL OF SERVICE METHODOLOGY

Capacity analysis of intersections is developed using the Synchro® computer software, which implements the methods of the 2010 Highway Capacity Manual (HCM). The resulting analysis presents a level-of-service (LOS) designation for individual intersection movements and (for signalized intersections) for the entire intersection. The LOS is a letter designation that provides a qualitative measure of operating conditions based on several factors including roadway geometry, speeds, ambient traffic volumes, traffic controls, and driver characteristics. Since the LOS of a traffic facility is a function of the traffic flows placed upon it, such a facility may operate at a wide range of LOS, depending on the time of day, day of week, or period of year. A range of six levels of service are defined on the basis of average delay, ranging from LOS A (the least delay) to LOS F (delays greater than 50 seconds for unsignalized movements, and greater than 80 seconds for signalized movements).

Signalized Intersection Performance Measures

The six LOS designations for signalized intersections may be described as follows:

- *LOS A* describes operations with low control delay; most vehicles do not stop at all.
- *LOS B* describes operations with relatively low control delay. However, more vehicles stop than LOS A.
- *LOS C* describes operations with higher control delays. Individual cycle failures may begin to appear. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.
- *LOS D* describes operations with control delay in the range where the influence of congestion becomes more noticeable. Many vehicles stop and individual cycle failures are noticeable.
- *LOS E* describes operations with high control delay values. Individual cycle failures are frequent occurrences.
- *LOS F* describes operations with high control delay values that often occur with over-saturation. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

The LOS for signalized intersections are calculated using the operational analysis methodology of the 2010 *Highway Capacity Manual*.[1] This method assesses the effects of signal type, timing, phasing, and progression; vehicle mix; and geometrics on delay. LOS designations are based on the criterion of control or signal delay per vehicle. Control or signal delay is a measure of driver discomfort, frustration, and fuel consumption, and includes initial deceleration delay approaching the traffic signal, queue move-up time, stopped delay and final acceleration delay. **Table A1** summarizes the relationship between LOS and control delay. The tabulated control delay criterion may be applied in assigning LOS designations to individual lane groups, to individual intersection approaches, or to entire intersections.

Table A1
LEVEL-OF-SERVICE CRITERIA
FOR SIGNALIZED INTERSECTIONS[1]

Level of Service	Control (Signal) Delay per Vehicle (Seconds)
A	≤10.0
B	10.1 to 20.0
C	20.1 to 35.0
D	35.1 to 55.0
E	55.1 to 80.0
F	>80.0

[1]Source: *Highway Capacity Manual 2010;* Transportation Research Board; Washington, DC; 2010.

[1]*Highway Capacity Manual* 2010; Transportation Research Board; Washington, DC; 2010.

Unsignalized Intersection Performance Measures

The six LOS designations for unsignalized intersections may be described as follows:

- *LOS A* represents a condition with little or no control delay to minor street traffic.
- *LOS B* represents a condition with short control delays to minor street traffic.
- *LOS C* represents a condition with average control delays to minor street traffic.
- *LOS D* represents a condition with long control delays to minor street traffic.
- *LOS E* represents operating conditions at or near capacity level, with very long control delays to minor street traffic.
- *LOS F* represents a condition where minor street demand volume exceeds capacity of an approach lane, with extreme control delays resulting.

The LOS designations of unsignalized intersections are determined by application of a procedure described in the 2010 *Highway Capacity Manual.*[2] LOS is measured in terms of average control delay. Mathematically, control delay is a function of the capacity and degree of saturation of the lane group and/or approach under study and is a quantification of motorist delay associated with traffic control devices such as traffic signals and STOP signs. Control delay includes the effects of initial deceleration delay approaching a STOP sign, stopped delay, queue move-up time, and final acceleration delay from a stopped condition. Definitions for LOS at unsignalized intersections are also given in the *Highway Capacity Manual 2010*. **Table A2** summarizes the relationship between LOS and average control delay.

Table A2
LEVEL-OF-SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS[1]

Average Control Delay (seconds per vehicle)	Level of Service	
	v/c ≤ 1	v/c > 1
≤ 10.0	A	F
10.1 to 15.0	B	F
15.1 to 25.0	C	F
25.1 to 35.0	D	F
35.1 to 50.0	E	F
>50.0	F	F

[1]Source: *Highway Capacity Manual 2010,* Transportation Research Board; Washington, DC; 2010.

[2] ibid

Intersection	
Intersection Delay, s/veh	10.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	12	0	27	199	12	46	6	209	0	0	497	4
Conflicting Peds, #/hr	21	0	11	11	0	21	51	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-3	-	-	2	-	-	2	-	-	-2	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	0	0	0	13	8	15	0	5	0	0	4	0
Mvmt Flow	13	0	29	214	13	49	6	225	0	0	534	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	848	817	609	831	819	246	560	0	0	246	0	0
Stage 1	558	558	-	259	259	-	-	-	-	-	-	-
Stage 2	290	259	-	572	560	-	-	-	-	-	-	-
Follow-up Headway	3.5	4	3.3	3.617	4.072	3.435	2.2	-	-	2.2	-	-
Pot Capacity-1 Maneuver	327	359	525	252	277	752	1021	-	-	1332	-	-
Stage 1	568	565	-	702	663	-	-	-	-	-	-	-
Stage 2	758	728	-	456	471	-	-	-	-	-	-	-
Time blocked-Platoon, %								-	-		-	-
Mov Capacity-1 Maneuver	285	341	484	217	263	736	963	-	-	1332	-	-
Mov Capacity-2 Maneuver	285	341	-	217	263	-	-	-	-	-	-	-
Stage 1	551	552	-	682	644	-	-	-	-	-	-	-
Stage 2	688	707	-	404	460	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.1	37.9	0.2	0
HCM LOS	C	E		

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	963	-	-	398	217	300	1332	-	-
HCM Lane V/C Ratio	0.007	-	-	0.105	0.657	0.446	-	-	-
HCM Control Delay (s)	8.764	0	-	15.1	48.7	26.3	0	-	-
HCM Lane LOS	A	A		C	E	D	A		
HCM 95th %tile Q(veh)	0.02	-	-	0.351	4.019	2.183	0	-	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection

Intersection Delay, s/veh 4.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	301	0	391	232	1	102
Conflicting Peds, #/hr	0	0	10	0	2	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	-3	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	0	2	8	0	8
Mvmt Flow	314	0	407	242	1	106

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	316	0	1372	169
Stage 1	-	-	-	-	316	-
Stage 2	-	-	-	-	1056	-
Follow-up Headway	-	-	2.22	-	3.5	3.376
Pot Capacity-1 Maneuver	-	-	1241	-	151	829
Stage 1	-	-	-	-	718	-
Stage 2	-	-	-	-	338	-
Time blocked-Platoon, %	-	-		-		
Mov Capacity-1 Maneuver	-	-	1229	-	93	820
Mov Capacity-2 Maneuver	-	-	-	-	93	-
Stage 1	-	-	-	-	717	-
Stage 2	-	-	-	-	209	-

Approach	EB	WB	NB
HCM Control Delay, s	0	5.9	10.5
HCM LOS			B

Minor Lane / Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	762	-	-	1229	-
HCM Lane V/C Ratio	0.141	-	-	0.331	-
HCM Control Delay (s)	10.5	-	-	9.374	0
HCM Lane LOS	B			A	A
HCM 95th %tile Q(veh)	0.489	-	-	1.466	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	10.1
Intersection LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	4	19	13	111	368	14
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles, %	0	0	11	7	2	0
Mvmt Flow	4	21	14	122	404	15
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.8	8.5	10.8
HCM LOS	A	A	B

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	10%	17%	0%
Vol Thru, %	90%	0%	96%
Vol Right, %	0%	83%	4%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	124	23	382
LT Vol	111	0	368
Through Vol	0	19	14
RT Vol	13	4	0
Lane Flow Rate	136	25	420
Geometry Grp	1	1	1
Degree of Util (X)	0.173	0.033	0.473
Departure Headway (Hd)	4.57	4.634	4.057
Convergence, Y/N	Yes	Yes	Yes
Cap	789	776	877
Service Time	2.574	2.64	2.124
HCM Lane V/C Ratio	0.172	0.032	0.479
HCM Control Delay	8.5	7.8	10.8
HCM Lane LOS	A	A	B
HCM 95th-tile Q	0.6	0.1	2.6

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	157	3	13	1	8	18	24	242	5	15	307	261
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	16	16	12	12	12	16	16	16
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.876			0.912			0.998			0.940	
Flt Protected	0.950				0.998			0.996			0.999	
Satd. Flow (prot)	1547	1498	0	0	1696	0	0	1670	0	0	1777	0
Flt Permitted	0.738				0.995			0.928			0.990	
Satd. Flow (perm)	1202	1498	0	0	1690	0	0	1556	0	0	1761	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			19			1			53	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		125			230			65			325	
Travel Time (s)		2.8			5.2			1.5			7.4	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	5%	0%	0%	0%	13%	0%	0%	2%	0%	0%	2%	3%
Adj. Flow (vph)	167	3	14	1	9	19	26	257	5	16	327	278
Shared Lane Traffic (%)												
Lane Group Flow (vph)	167	17	0	0	29	0	0	288	0	0	621	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.14	1.14	1.14	0.97	0.97	0.97	1.14	1.14	1.14	0.97	0.97	0.97
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		3			3			1			1	
Permitted Phases	3			3			1			1		
Detector Phase	3	3		3	3		1	1		1	1	
Switch Phase												

Lane Group	ø2
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	2
Permitted Phases	
Detector Phase	
Switch Phase	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	8.0	8.0		8.0	8.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	15.0	15.0		15.0	15.0		15.0	15.0		15.0	15.0	
Total Split (s)	32.0	32.0		32.0	32.0		30.0	30.0		30.0	30.0	
Total Split (%)	40.0%	40.0%		40.0%	40.0%		37.5%	37.5%		37.5%	37.5%	
Maximum Green (s)	27.0	27.0		27.0	27.0		25.0	25.0		25.0	25.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0			0.0			0.0			0.0	
Total Lost Time (s)	5.0	5.0			5.0			5.0			5.0	
Lead/Lag							Lead	Lead		Lead	Lead	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	15.6	15.6			15.6			43.6			43.6	
Actuated g/C Ratio	0.20	0.20			0.20			0.54			0.54	
v/c Ratio	0.72	0.06			0.08			0.34			0.63	
Control Delay	46.1	13.0			13.6			15.8			20.2	
Queue Delay	0.0	0.0			0.0			0.0			0.0	
Total Delay	46.1	13.0			13.6			15.8			20.2	
LOS	D	B			B			B			C	
Approach Delay		43.1			13.6			15.8			20.2	
Approach LOS		D			B			B			C	
90th %ile Green (s)	22.9	22.9		22.9	22.9		29.1	29.1		29.1	29.1	
90th %ile Term Code	Gap	Gap		Gap	Gap		Coord	Coord		Coord	Coord	
70th %ile Green (s)	18.7	18.7		18.7	18.7		33.3	33.3		33.3	33.3	
70th %ile Term Code	Gap	Gap		Gap	Gap		Coord	Coord		Coord	Coord	
50th %ile Green (s)	15.6	15.6		15.6	15.6		36.4	36.4		36.4	36.4	
50th %ile Term Code	Gap	Gap		Gap	Gap		Coord	Coord		Coord	Coord	
30th %ile Green (s)	12.5	12.5		12.5	12.5		57.5	57.5		57.5	57.5	
30th %ile Term Code	Gap	Gap		Gap	Gap		Coord	Coord		Coord	Coord	
10th %ile Green (s)	8.1	8.1		8.1	8.1		61.9	61.9		61.9	61.9	
10th %ile Term Code	Gap	Gap		Gap	Gap		Coord	Coord		Coord	Coord	
Queue Length 50th (ft)	79	1			4			92			226	
Queue Length 95th (ft)	129	15			22			184			#480	
Internal Link Dist (ft)		45			150			1			245	
Turn Bay Length (ft)												
Base Capacity (vph)	405	514			582			849			984	
Starvation Cap Reductn	0	0			0			0			0	
Spillback Cap Reductn	0	0			0			0			0	
Storage Cap Reductn	0	0			0			0			0	
Reduced v/c Ratio	0.41	0.03			0.05			0.34			0.63	

Intersection Summary

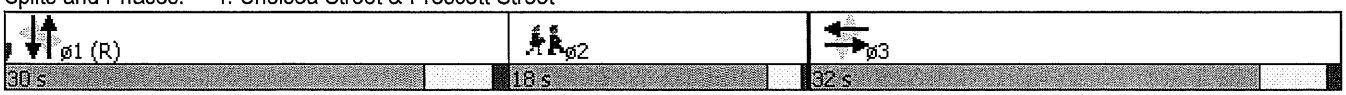
Area Type: CBD
Cycle Length: 80
Actuated Cycle Length: 80

Lane Group	ø2
Minimum Initial (s)	4.0
Minimum Split (s)	18.0
Total Split (s)	18.0
Total Split (%)	23%
Maximum Green (s)	15.5
Yellow Time (s)	2.0
All-Red Time (s)	0.5
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lag
Lead-Lag Optimize?	Yes
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	8.0
Flash Dont Walk (s)	7.5
Pedestrian Calls (#/hr)	45
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
90th %ile Green (s)	15.5
90th %ile Term Code	Ped
70th %ile Green (s)	15.5
70th %ile Term Code	Ped
50th %ile Green (s)	15.5
50th %ile Term Code	Ped
30th %ile Green (s)	0.0
30th %ile Term Code	Skip
10th %ile Green (s)	0.0
10th %ile Term Code	Skip
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

Offset: 0 (0%), Referenced to phase 1:NBSB, Start of Green, Master Intersection
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.72
Intersection Signal Delay: 22.6 Intersection LOS: C
Intersection Capacity Utilization 64.3% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 4: Chelsea Street & Prescott Street



Intersection	
Intersection Delay, s/veh	18.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	6	0	14	207	14	152	11	446	0	0	297	10
Conflicting Peds, #/hr	39	0	7	7	0	39	60	0	0	0	0	60
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-3	-	-	2	-	-	2	-	-	-2	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	0	0	0	3	0	2	0	1	0	0	3	0
Mvmt Flow	6	0	15	223	15	163	12	480	0	0	319	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	995	906	424	913	911	579	369	0	0	519	0	0
Stage 1	364	364	-	542	542	-	-	-	-	-	-	-
Stage 2	631	542	-	371	369	-	-	-	-	-	-	-
Follow-up Headway	3.5	4	3.3	3.527	4	3.318	2.2	-	-	2.2	-	-
Pot Capacity-1 Maneuver	266	323	657	229	250	499	1201	-	-	1057	-	-
Stage 1	700	667	-	492	493	-	-	-	-	-	-	-
Stage 2	525	573	-	621	599	-	-	-	-	-	-	-
Time blocked-Platoon, %								-	-		-	-
Mov Capacity-1 Maneuver	141	292	587	# 198	226	447	1121	-	-	987	-	-
Mov Capacity-2 Maneuver	141	292	-	# 198	226	-	-	-	-	-	-	-
Stage 1	660	638	-	465	466	-	-	-	-	-	-	-
Stage 2	296	541	-	565	573	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	17.9	55.6	0.2	0
HCM LOS	C	F		

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1121	-	-	301	198	313	987	-	-
HCM Lane V/C Ratio	0.011	-	-	0.071	0.749	0.807	-	-	-
HCM Control Delay (s)	8.246	0	-	17.9	63.3	51	0	-	-
HCM Lane LOS	A	A		C	F	F	A		
HCM 95th %tile Q(veh)	0.032	-	-	0.229	4.978	6.669	0	-	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection

Intersection Delay, s/veh 5.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	338	0	234	311	1	325
Conflicting Peds, #/hr	0	10	10	0	5	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	-3	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	0	1	2	0	1
Mvmt Flow	360	0	249	331	1	346

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	365	0	1194	195
Stage 1	-	-	-	-	365	-
Stage 2	-	-	-	-	829	-
Follow-up Headway	-	-	2.21	-	3.5	3.3095
Pot Capacity-1 Maneuver	-	-	1197	-	195	817
Stage 1	-	-	-	-	679	-
Stage 2	-	-	-	-	432	-
Time blocked-Platoon, %	-	-		-		
Mov Capacity-1 Maneuver	-	-	1185	-	143	806
Mov Capacity-2 Maneuver	-	-	-	-	143	-
Stage 1	-	-	-	-	676	-
Stage 2	-	-	-	-	319	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.8	13
HCM LOS			B

Minor Lane / Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	795	-	-	1185	-
HCM Lane V/C Ratio	0.436	-	-	0.21	-
HCM Control Delay (s)	13	-	-	8.844	0
HCM Lane LOS	B			A	A
HCM 95th %tile Q(veh)	2.232	-	-	0.792	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	9.9
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	10	5	30	319	229	15
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles, %	0	0	0	1	0	0
Mvmt Flow	11	5	33	351	252	16
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	8.3	10.5	9.2
HCM LOS	A	B	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	9%	67%	0%
Vol Thru, %	91%	0%	94%
Vol Right, %	0%	33%	6%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	349	15	244
LT Vol	319	0	229
Through Vol	0	5	15
RT Vol	30	10	0
Lane Flow Rate	384	16	268
Geometry Grp	1	1	1
Degree of Util (X)	0.442	0.024	0.311
Departure Headway (Hd)	4.146	5.209	4.283
Convergence, Y/N	Yes	Yes	Yes
Cap	859	691	845
Service Time	2.227	3.209	2.283
HCM Lane V/C Ratio	0.447	0.023	0.317
HCM Control Delay	10.5	8.3	9.2
HCM Lane LOS	B	A	A
HCM 95th-tile Q	2.3	0.1	1.3

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	327	7	13	8	12	25	45	476	2	6	248	212
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	16	16	12	12	12	16	16	16
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.905			0.926						0.939	
Flt Protected	0.950				0.991			0.996			0.999	
Satd. Flow (prot)	1577	1548	0	0	1778	0	0	1703	0	0	1775	0
Flt Permitted	0.725				0.968			0.926			0.993	
Satd. Flow (perm)	1204	1548	0	0	1737	0	0	1583	0	0	1764	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			27						54	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		125			230			65			325	
Travel Time (s)		2.8			5.2			1.5			7.4	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	3%
Adj. Flow (vph)	359	8	14	9	13	27	49	523	2	7	273	233
Shared Lane Traffic (%)												
Lane Group Flow (vph)	359	22	0	0	49	0	0	574	0	0	513	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.14	1.14	1.14	0.97	0.97	0.97	1.14	1.14	1.14	0.97	0.97	0.97
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		3			3			1			1	
Permitted Phases	3			3			1			1		
Detector Phase	3	3		3	3		1	1		1	1	
Switch Phase												

Lane Group	ø2
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	2
Permitted Phases	
Detector Phase	
Switch Phase	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	8.0	8.0		8.0	8.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	15.0	15.0		15.0	15.0		15.0	15.0		15.0	15.0	
Total Split (s)	32.0	32.0		32.0	32.0		40.0	40.0		40.0	40.0	
Total Split (%)	35.6%	35.6%		35.6%	35.6%		44.4%	44.4%		44.4%	44.4%	
Maximum Green (s)	27.0	27.0		27.0	27.0		35.0	35.0		35.0	35.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0			0.0			0.0			0.0	
Total Lost Time (s)	5.0	5.0			5.0			5.0			5.0	
Lead/Lag							Lead	Lead		Lead	Lead	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	28.9	28.9			28.9			40.3			40.3	
Actuated g/C Ratio	0.32	0.32			0.32			0.45			0.45	
v/c Ratio	0.93	0.04			0.09			0.81			0.63	
Control Delay	63.8	14.2			13.5			34.9			22.7	
Queue Delay	0.0	0.0			0.0			0.0			0.0	
Total Delay	63.8	14.2			13.5			34.9			22.7	
LOS	E	B			B			C			C	
Approach Delay		60.9			13.5			34.9			22.7	
Approach LOS		E			B			C			C	
90th %ile Green (s)	27.0	27.0		27.0	27.0		35.0	35.0		35.0	35.0	
90th %ile Term Code	Max	Max		Max	Max		Coord	Coord		Coord	Coord	
70th %ile Green (s)	27.0	27.0		27.0	27.0		35.0	35.0		35.0	35.0	
70th %ile Term Code	Max	Max		Max	Max		Coord	Coord		Coord	Coord	
50th %ile Green (s)	27.0	27.0		27.0	27.0		35.0	35.0		35.0	35.0	
50th %ile Term Code	Max	Max		Max	Max		Coord	Coord		Coord	Coord	
30th %ile Green (s)	33.2	33.2		33.2	33.2		46.8	46.8		46.8	46.8	
30th %ile Term Code	Gap	Gap		Gap	Gap		Coord	Coord		Coord	Coord	
10th %ile Green (s)	30.2	30.2		30.2	30.2		49.8	49.8		49.8	49.8	
10th %ile Term Code	Gap	Gap		Gap	Gap		Coord	Coord		Coord	Coord	
Queue Length 50th (ft)	203	3			9			306			217	
Queue Length 95th (ft)	#382	21			35			#518			338	
Internal Link Dist (ft)		45			150			1			245	
Turn Bay Length (ft)												
Base Capacity (vph)	386	506			575			709			820	
Starvation Cap Reductn	0	0			0			0			0	
Spillback Cap Reductn	0	0			0			0			0	
Storage Cap Reductn	0	0			0			0			0	
Reduced v/c Ratio	0.93	0.04			0.09			0.81			0.63	

Intersection Summary

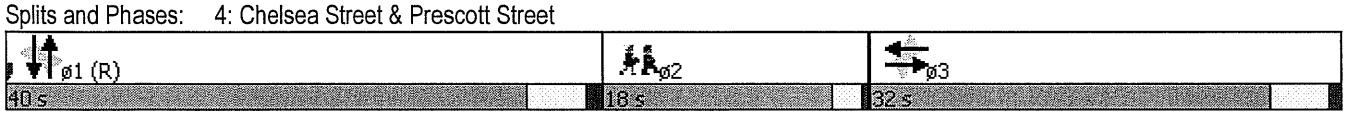
Area Type: CBD
Cycle Length: 90
Actuated Cycle Length: 90

Lane Group	ø2
Minimum Initial (s)	4.0
Minimum Split (s)	18.0
Total Split (s)	18.0
Total Split (%)	20%
Maximum Green (s)	15.5
Yellow Time (s)	2.0
All-Red Time (s)	0.5
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lag
Lead-Lag Optimize?	Yes
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	8.0
Flash Dont Walk (s)	7.5
Pedestrian Calls (#/hr)	45
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
90th %ile Green (s)	15.5
90th %ile Term Code	Ped
70th %ile Green (s)	15.5
70th %ile Term Code	Ped
50th %ile Green (s)	15.5
50th %ile Term Code	Ped
30th %ile Green (s)	0.0
30th %ile Term Code	Skip
10th %ile Green (s)	0.0
10th %ile Term Code	Skip
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

Offset: 0 (0%), Referenced to phase 1:NBSB, Start of Green, Master Intersection
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 36.6 Intersection LOS: D
Intersection Capacity Utilization 93.8% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 4: Chelsea Street & Prescott Street



Intersection	
Intersection Delay, s/veh	10.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	12	0	27	202	12	47	6	212	0	0	503	4
Conflicting Peds, #/hr	21	0	11	11	0	21	51	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-3	-	-	2	-	-	2	-	-	-2	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	0	0	0	13	8	15	0	5	0	0	4	0
Mvmt Flow	13	0	29	217	13	51	6	228	0	0	541	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	858	826	615	841	828	249	566	0	0	249	0	0
Stage 1	564	564	-	262	262	-	-	-	-	-	-	-
Stage 2	294	262	-	579	566	-	-	-	-	-	-	-
Follow-up Headway	3.5	4	3.3	3.617	4.072	3.435	2.2	-	-	2.2	-	-
Pot Capacity-1 Maneuver	322	355	521	248	273	749	1016	-	-	1328	-	-
Stage 1	564	562	-	699	661	-	-	-	-	-	-	-
Stage 2	755	726	-	452	468	-	-	-	-	-	-	-
Time blocked-Platoon, %								-	-		-	-
Mov Capacity-1 Maneuver	280	337	480	# 214	259	733	958	-	-	1328	-	-
Mov Capacity-2 Maneuver	280	337	-	# 214	259	-	-	-	-	-	-	-
Stage 1	547	549	-	679	642	-	-	-	-	-	-	-
Stage 2	684	705	-	401	457	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.2	39.4	0.2	0
HCM LOS	C	E		

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	958	-	-	394	214	297	1328	-	-
HCM Lane V/C Ratio	0.007	-	-	0.106	0.677	0.457	-	-	-
HCM Control Delay (s)	8.783	0	-	15.2	51.1	26.9	0	-	-
HCM Lane LOS	A	A		C	F	D	A		
HCM 95th %tile Q(veh)	0.02	-	-	0.354	4.219	2.272	0	-	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection

Intersection Delay, s/veh 4.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	305	0	396	235	1	103
Conflicting Peds, #/hr	0	0	10	0	2	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	-3	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	0	2	8	0	8
Mvmt Flow	318	0	412	245	1	107

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	320	0	1390	171
Stage 1	-	-	-	-	320	-
Stage 2	-	-	-	-	1070	-
Follow-up Headway	-	-	2.22	-	3.5	3.376
Pot Capacity-1 Maneuver	-	-	1237	-	147	827
Stage 1	-	-	-	-	715	-
Stage 2	-	-	-	-	332	-
Time blocked-Platoon, %	-	-		-		
Mov Capacity-1 Maneuver	-	-	1225	-	90	818
Mov Capacity-2 Maneuver	-	-	-	-	90	-
Stage 1	-	-	-	-	714	-
Stage 2	-	-	-	-	203	-

Approach	EB	WB	NB
HCM Control Delay, s	0	5.9	10.5
HCM LOS			B

Minor Lane / Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	759	-	-	1225	-
HCM Lane V/C Ratio	0.143	-	-	0.337	-
HCM Control Delay (s)	10.5	-	-	9.423	0
HCM Lane LOS	B			A	A
HCM 95th %tile Q(veh)	0.496	-	-	1.501	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	10.2
Intersection LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	4	19	13	112	373	14
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles, %	0	0	11	7	2	0
Mvmt Flow	4	21	14	123	410	15
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.8	8.5	10.9
HCM LOS	A	A	B

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	10%	17%	0%
Vol Thru, %	90%	0%	96%
Vol Right, %	0%	83%	4%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	125	23	387
LT Vol	112	0	373
Through Vol	0	19	14
RT Vol	13	4	0
Lane Flow Rate	137	25	425
Geometry Grp	1	1	1
Degree of Util (X)	0.175	0.033	0.479
Departure Headway (Hd)	4.575	4.648	4.058
Convergence, Y/N	Yes	Yes	Yes
Cap	788	774	880
Service Time	2.579	2.654	2.126
HCM Lane V/C Ratio	0.174	0.032	0.483
HCM Control Delay	8.5	7.8	10.9
HCM Lane LOS	A	A	B
HCM 95th-tile Q	0.6	0.1	2.6

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	159	3	13	1	8	18	24	245	5	15	311	265
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	16	16	12	12	12	16	16	16
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.876			0.912			0.998			0.939	
Flt Protected	0.950				0.998			0.996			0.999	
Satd. Flow (prot)	1547	1498	0	0	1696	0	0	1670	0	0	1775	0
Flt Permitted	0.738				0.995			0.928			0.990	
Satd. Flow (perm)	1202	1498	0	0	1690	0	0	1556	0	0	1759	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			19			1			53	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		125			230			65			325	
Travel Time (s)		2.8			5.2			1.5			7.4	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	5%	0%	0%	0%	13%	0%	0%	2%	0%	0%	2%	3%
Adj. Flow (vph)	169	3	14	1	9	19	26	261	5	16	331	282
Shared Lane Traffic (%)												
Lane Group Flow (vph)	169	17	0	0	29	0	0	292	0	0	629	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.14	1.14	1.14	0.97	0.97	0.97	1.14	1.14	1.14	0.97	0.97	0.97
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		3			3			1			1	
Permitted Phases	3			3			1			1		
Detector Phase	3	3		3	3		1	1		1	1	
Switch Phase												

Lane Group	ø2
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	2
Permitted Phases	
Detector Phase	
Switch Phase	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	8.0	8.0		8.0	8.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	15.0	15.0		15.0	15.0		15.0	15.0		15.0	15.0	
Total Split (s)	32.0	32.0		32.0	32.0		30.0	30.0		30.0	30.0	
Total Split (%)	40.0%	40.0%		40.0%	40.0%		37.5%	37.5%		37.5%	37.5%	
Maximum Green (s)	27.0	27.0		27.0	27.0		25.0	25.0		25.0	25.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0			0.0			0.0			0.0	
Total Lost Time (s)	5.0	5.0			5.0			5.0			5.0	
Lead/Lag							Lead	Lead		Lead	Lead	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	15.7	15.7			15.7			43.5			43.5	
Actuated g/C Ratio	0.20	0.20			0.20			0.54			0.54	
v/c Ratio	0.72	0.06			0.08			0.35			0.64	
Control Delay	46.1	12.9			13.6			15.9			20.6	
Queue Delay	0.0	0.0			0.0			0.0			0.0	
Total Delay	46.1	12.9			13.6			15.9			20.6	
LOS	D	B			B			B			C	
Approach Delay		43.1			13.6			15.9			20.6	
Approach LOS		D			B			B			C	
90th %ile Green (s)	23.1	23.1		23.1	23.1		28.9	28.9		28.9	28.9	
90th %ile Term Code	Gap	Gap		Gap	Gap		Coord	Coord		Coord	Coord	
70th %ile Green (s)	18.8	18.8		18.8	18.8		33.2	33.2		33.2	33.2	
70th %ile Term Code	Gap	Gap		Gap	Gap		Coord	Coord		Coord	Coord	
50th %ile Green (s)	15.7	15.7		15.7	15.7		36.3	36.3		36.3	36.3	
50th %ile Term Code	Gap	Gap		Gap	Gap		Coord	Coord		Coord	Coord	
30th %ile Green (s)	12.6	12.6		12.6	12.6		57.4	57.4		57.4	57.4	
30th %ile Term Code	Gap	Gap		Gap	Gap		Coord	Coord		Coord	Coord	
10th %ile Green (s)	8.2	8.2		8.2	8.2		61.8	61.8		61.8	61.8	
10th %ile Term Code	Gap	Gap		Gap	Gap		Coord	Coord		Coord	Coord	
Queue Length 50th (ft)	80	1			4			94			231	
Queue Length 95th (ft)	130	15			22			187			#493	
Internal Link Dist (ft)		45			150			1			245	
Turn Bay Length (ft)												
Base Capacity (vph)	405	514			582			846			981	
Starvation Cap Reductn	0	0			0			0			0	
Spillback Cap Reductn	0	0			0			0			0	
Storage Cap Reductn	0	0			0			0			0	
Reduced v/c Ratio	0.42	0.03			0.05			0.35			0.64	

Intersection Summary

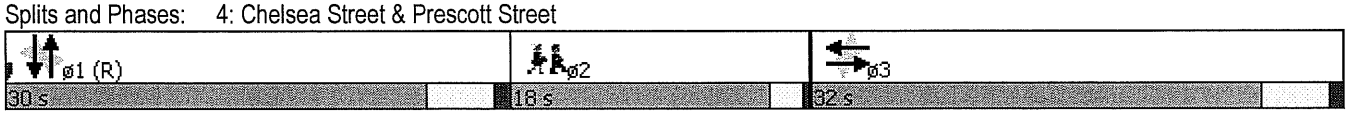
Area Type: CBD
Cycle Length: 80
Actuated Cycle Length: 80

Lane Group	ø2
Minimum Initial (s)	4.0
Minimum Split (s)	18.0
Total Split (s)	18.0
Total Split (%)	23%
Maximum Green (s)	15.5
Yellow Time (s)	2.0
All-Red Time (s)	0.5
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lag
Lead-Lag Optimize?	Yes
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	8.0
Flash Dont Walk (s)	7.5
Pedestrian Calls (#/hr)	45
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
90th %ile Green (s)	15.5
90th %ile Term Code	Ped
70th %ile Green (s)	15.5
70th %ile Term Code	Ped
50th %ile Green (s)	15.5
50th %ile Term Code	Ped
30th %ile Green (s)	0.0
30th %ile Term Code	Skip
10th %ile Green (s)	0.0
10th %ile Term Code	Skip
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

Offset: 0 (0%), Referenced to phase 1:NBSB, Start of Green, Master Intersection
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.72
Intersection Signal Delay: 22.9 Intersection LOS: C
Intersection Capacity Utilization 65.0% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 4: Chelsea Street & Prescott Street



Intersection	
Intersection Delay, s/veh	19.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	6	0	14	210	14	154	11	452	0	0	301	10
Conflicting Peds, #/hr	39	0	7	7	0	39	60	0	0	0	0	60
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-3	-	-	2	-	-	2	-	-	-2	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	0	0	0	3	0	2	0	1	0	0	3	0
Mvmt Flow	6	0	15	226	15	166	12	486	0	0	324	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1007	917	428	925	922	585	373	0	0	525	0	0
Stage 1	368	368	-	549	549	-	-	-	-	-	-	-
Stage 2	639	549	-	376	373	-	-	-	-	-	-	-
Follow-up Headway	3.5	4	3.3	3.527	4	3.318	2.2	-	-	2.2	-	-
Pot Capacity-1 Maneuver	262	319	654	# 224	246	495	1197	-	-	1052	-	-
Stage 1	697	664	-	488	489	-	-	-	-	-	-	-
Stage 2	520	569	-	617	597	-	-	-	-	-	-	-
Time blocked-Platoon, %								-	-		-	-
Mov Capacity-1 Maneuver	137	288	584	# 193	222	443	1117	-	-	982	-	-
Mov Capacity-2 Maneuver	137	288	-	# 193	222	-	-	-	-	-	-	-
Stage 1	657	635	-	461	462	-	-	-	-	-	-	-
Stage 2	290	538	-	561	571	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	18.2	60.1	0.2	0
HCM LOS	C	F		

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1117	-	-	295	193	308	982	-	-
HCM Lane V/C Ratio	0.011	-	-	0.073	0.78	0.831	-	-	-
HCM Control Delay (s)	8.257	0	-	18.2	69	54.9	0	-	-
HCM Lane LOS	A	A		C	F	F	A		
HCM 95th %tile Q(veh)	0.032	-	-	0.234	5.314	7.068	0	-	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	5.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	342	0	237	315	1	329
Conflicting Peds, #/hr	0	10	10	0	5	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	-3	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	0	1	2	0	1
Mvmt Flow	364	0	252	335	1	350

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	369	0	1208	197
Stage 1	-	-	-	-	369	-
Stage 2	-	-	-	-	839	-
Follow-up Headway	-	-	2.21	-	3.5	3.3095
Pot Capacity-1 Maneuver	-	-	1193	-	191	815
Stage 1	-	-	-	-	675	-
Stage 2	-	-	-	-	427	-
Time blocked-Platoon, %	-	-		-		
Mov Capacity-1 Maneuver	-	-	1181	-	139	804
Mov Capacity-2 Maneuver	-	-	-	-	139	-
Stage 1	-	-	-	-	672	-
Stage 2	-	-	-	-	313	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.8	13.1
HCM LOS			B

Minor Lane / Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	793	-	-	1181	-
HCM Lane V/C Ratio	0.443	-	-	0.213	-
HCM Control Delay (s)	13.1	-	-	8.874	0
HCM Lane LOS	B			A	A
HCM 95th %tile Q(veh)	2.288	-	-	0.809	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	10
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	10	5	30	323	232	15
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles, %	0	0	0	1	0	0
Mvmt Flow	11	5	33	355	255	16
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	8.4	10.6	9.3
HCM LOS	A	B	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	8%	67%	0%
Vol Thru, %	92%	0%	94%
Vol Right, %	0%	33%	6%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	353	15	247
LT Vol	323	0	232
Through Vol	0	5	15
RT Vol	30	10	0
Lane Flow Rate	388	16	271
Geometry Grp	1	1	1
Degree of Util (X)	0.447	0.024	0.323
Departure Headway (Hd)	4.149	5.225	4.285
Convergence, Y/N	Yes	Yes	Yes
Cap	857	688	844
Service Time	2.237	3.238	2.287
HCM Lane V/C Ratio	0.453	0.023	0.321
HCM Control Delay	10.6	8.4	9.3
HCM Lane LOS	B	A	A
HCM 95th-tile Q	2.3	0.1	1.4

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	331	7	13	8	12	25	46	482	2	6	251	215
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	16	16	12	12	12	16	16	16
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.905			0.926						0.939	
Flt Protected	0.950				0.991			0.996			0.999	
Satd. Flow (prot)	1577	1548	0	0	1778	0	0	1703	0	0	1775	0
Flt Permitted	0.725				0.968			0.919			0.993	
Satd. Flow (perm)	1204	1548	0	0	1737	0	0	1571	0	0	1764	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			27						55	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		125			230			65			325	
Travel Time (s)		2.8			5.2			1.5			7.4	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	3%
Adj. Flow (vph)	364	8	14	9	13	27	51	530	2	7	276	236
Shared Lane Traffic (%)												
Lane Group Flow (vph)	364	22	0	0	49	0	0	583	0	0	519	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.14	1.14	1.14	0.97	0.97	0.97	1.14	1.14	1.14	0.97	0.97	0.97
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		3			3			1			1	
Permitted Phases	3			3			1			1		
Detector Phase	3	3		3	3		1	1		1	1	
Switch Phase												

Lane Group	ø2
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	2
Permitted Phases	
Detector Phase	
Switch Phase	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	8.0	8.0		8.0	8.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	15.0	15.0		15.0	15.0		15.0	15.0		15.0	15.0	
Total Split (s)	32.0	32.0		32.0	32.0		40.0	40.0		40.0	40.0	
Total Split (%)	35.6%	35.6%		35.6%	35.6%		44.4%	44.4%		44.4%	44.4%	
Maximum Green (s)	27.0	27.0		27.0	27.0		35.0	35.0		35.0	35.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0			0.0			0.0			0.0	
Total Lost Time (s)	5.0	5.0			5.0			5.0			5.0	
Lead/Lag							Lead	Lead		Lead	Lead	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	29.4	29.4			29.4			39.8			39.8	
Actuated g/C Ratio	0.33	0.33			0.33			0.44			0.44	
v/c Ratio	0.93	0.04			0.08			0.84			0.64	
Control Delay	62.6	14.1			13.5			37.6			23.2	
Queue Delay	0.0	0.0			0.0			0.0			0.0	
Total Delay	62.6	14.1			13.5			37.6			23.2	
LOS	E	B			B			D			C	
Approach Delay		59.8			13.5			37.6			23.2	
Approach LOS		E			B			D			C	
90th %ile Green (s)	27.0	27.0		27.0	27.0		35.0	35.0		35.0	35.0	
90th %ile Term Code	Max	Max		Max	Max		Coord	Coord		Coord	Coord	
70th %ile Green (s)	27.0	27.0		27.0	27.0		35.0	35.0		35.0	35.0	
70th %ile Term Code	Max	Max		Max	Max		Coord	Coord		Coord	Coord	
50th %ile Green (s)	27.0	27.0		27.0	27.0		35.0	35.0		35.0	35.0	
50th %ile Term Code	Max	Max		Max	Max		Coord	Coord		Coord	Coord	
30th %ile Green (s)	34.1	34.1		34.1	34.1		45.9	45.9		45.9	45.9	
30th %ile Term Code	Gap	Gap		Gap	Gap		Coord	Coord		Coord	Coord	
10th %ile Green (s)	32.0	32.0		32.0	32.0		48.0	48.0		48.0	48.0	
10th %ile Term Code	Gap	Gap		Gap	Gap		Coord	Coord		Coord	Coord	
Queue Length 50th (ft)	~209	3			9			316			220	
Queue Length 95th (ft)	#389	21			35			#533			343	
Internal Link Dist (ft)		45			150			1			245	
Turn Bay Length (ft)												
Base Capacity (vph)	393	515			586			694			810	
Starvation Cap Reductn	0	0			0			0			0	
Spillback Cap Reductn	0	0			0			0			0	
Storage Cap Reductn	0	0			0			0			0	
Reduced v/c Ratio	0.93	0.04			0.08			0.84			0.64	

Intersection Summary

Area Type: CBD
Cycle Length: 90
Actuated Cycle Length: 90

Lane Group	ø2
Minimum Initial (s)	4.0
Minimum Split (s)	18.0
Total Split (s)	18.0
Total Split (%)	20%
Maximum Green (s)	15.5
Yellow Time (s)	2.0
All-Red Time (s)	0.5
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lag
Lead-Lag Optimize?	Yes
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	8.0
Flash Dont Walk (s)	7.5
Pedestrian Calls (#/hr)	45
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
90th %ile Green (s)	15.5
90th %ile Term Code	Ped
70th %ile Green (s)	15.5
70th %ile Term Code	Ped
50th %ile Green (s)	15.5
50th %ile Term Code	Ped
30th %ile Green (s)	0.0
30th %ile Term Code	Skip
10th %ile Green (s)	0.0
10th %ile Term Code	Skip
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	

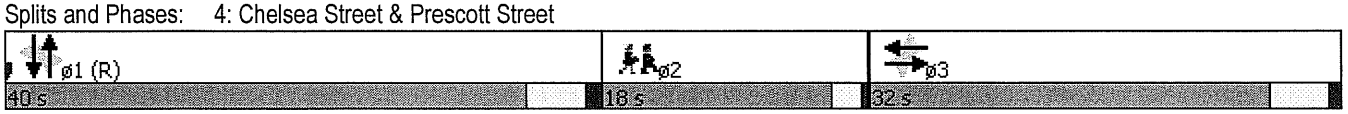
Intersection Summary

Offset: 0 (0%), Referenced to phase 1:NBSB, Start of Green, Master Intersection
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 37.6 Intersection LOS: D
Intersection Capacity Utilization 95.1% 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: 4: Chelsea Street & Prescott Street



Intersection	
Intersection Delay, s/veh	12.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	12	0	27	209	12	79	6	212	0	0	538	4
Conflicting Peds, #/hr	21	0	11	11	0	21	51	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-3	-	-	2	-	-	2	-	-	-2	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	0	0	0	13	8	15	0	5	0	0	4	0
Mvmt Flow	13	0	29	225	13	85	6	228	0	0	578	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	913	864	653	878	866	249	604	0	0	249	0	0
Stage 1	602	602	-	262	262	-	-	-	-	-	-	-
Stage 2	311	262	-	616	604	-	-	-	-	-	-	-
Follow-up Headway	3.5	4	3.3	3.617	4.072	3.435	2.2	-	-	2.2	-	-
Pot Capacity-1 Maneuver	298	340	497	233	259	749	984	-	-	1328	-	-
Stage 1	542	544	-	699	661	-	-	-	-	-	-	-
Stage 2	741	726	-	429	447	-	-	-	-	-	-	-
Time blocked-Platoon, %								-	-		-	-
Mov Capacity-1 Maneuver	246	323	458	# 200	246	733	928	-	-	1328	-	-
Mov Capacity-2 Maneuver	246	323	-	# 200	246	-	-	-	-	-	-	-
Stage 1	526	531	-	679	642	-	-	-	-	-	-	-
Stage 2	637	705	-	379	437	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.2	44.7	0.2	0
HCM LOS	C	E		

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	928	-	-	362	200	318	1328	-	-
HCM Lane V/C Ratio	0.007	-	-	0.116	0.749	0.543	-	-	-
HCM Control Delay (s)	8.906	0	-	16.2	62.7	29	0	-	-
HCM Lane LOS	A	A		C	F	D	A		
HCM 95th %tile Q(veh)	0.021	-	-	0.389	4.989	3.055	0	-	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	5.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	305	0	497	238	1	175
Conflicting Peds, #/hr	0	0	10	0	2	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	-3	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	0	2	8	0	8
Mvmt Flow	318	0	518	248	1	182

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	320	0	1603	171
Stage 1	-	-	-	-	320	-
Stage 2	-	-	-	-	1283	-
Follow-up Headway	-	-	2.22	-	3.5	3.376
Pot Capacity-1 Maneuver	-	-	1237	-	107	827
Stage 1	-	-	-	-	715	-
Stage 2	-	-	-	-	263	-
Time blocked-Platoon, %	-	-		-		
Mov Capacity-1 Maneuver	-	-	1225	-	54	818
Mov Capacity-2 Maneuver	-	-	-	-	54	-
Stage 1	-	-	-	-	714	-
Stage 2	-	-	-	-	134	-

Approach	EB	WB	NB
HCM Control Delay, s	0	6.8	11.3
HCM LOS			B

Minor Lane / Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	757	-	-	1225	-
HCM Lane V/C Ratio	0.242	-	-	0.423	-
HCM Control Delay (s)	11.3	-	-	10.072	0
HCM Lane LOS	B			B	A
HCM 95th %tile Q(veh)	0.946	-	-	2.144	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	12.1
Intersection LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	96	19	13	122	381	61
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles, %	0	0	11	7	2	0
Mvmt Flow	105	21	14	134	419	67
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	9.7	9.3	13.6
HCM LOS	A	A	B

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	10%	83%	0%
Vol Thru, %	90%	0%	86%
Vol Right, %	0%	17%	14%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	135	115	442
LT Vol	122	0	381
Through Vol	0	19	61
RT Vol	13	96	0
Lane Flow Rate	148	126	486
Geometry Grp	1	1	1
Degree of Util (X)	0.205	0.189	0.59
Departure Headway (Hd)	4.97	5.376	4.376
Convergence, Y/N	Yes	Yes	Yes
Cap	720	663	826
Service Time	3.02	3.439	2.411
HCM Lane V/C Ratio	0.206	0.19	0.588
HCM Control Delay	9.3	9.7	13.6
HCM Lane LOS	A	A	B
HCM 95th-tile Q	0.8	0.7	3.9

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	159	44	13	9	47	18	24	245	18	53	313	267
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	16	16	12	12	12	16	16	16
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.966			0.968			0.992			0.943	
Flt Protected	0.950				0.994			0.996			0.996	
Satd. Flow (prot)	1547	1591	0	0	1841	0	0	1655	0	0	1753	0
Flt Permitted	0.783				0.967			0.926			0.948	
Satd. Flow (perm)	1275	1591	0	0	1791	0	0	1539	0	0	1668	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			19			4			48	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		125			230			65			325	
Travel Time (s)		2.8			5.2			1.5			7.4	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	5%	5%	0%	0%	2%	0%	0%	2%	6%	8%	3%	4%
Adj. Flow (vph)	169	47	14	10	50	19	26	261	19	56	333	284
Shared Lane Traffic (%)												
Lane Group Flow (vph)	169	61	0	0	79	0	0	306	0	0	673	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.14	1.14	1.14	0.97	0.97	0.97	1.14	1.14	1.14	0.97	0.97	0.97
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		3			3			1			1	
Permitted Phases	3			3			1			1		
Detector Phase	3	3		3	3		1	1		1	1	
Switch Phase												

Lane Group	ø2
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	2
Permitted Phases	
Detector Phase	
Switch Phase	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	8.0	8.0		8.0	8.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	15.0	15.0		15.0	15.0		15.0	15.0		15.0	15.0	
Total Split (s)	32.0	32.0		32.0	32.0		30.0	30.0		30.0	30.0	
Total Split (%)	40.0%	40.0%		40.0%	40.0%		37.5%	37.5%		37.5%	37.5%	
Maximum Green (s)	27.0	27.0		27.0	27.0		25.0	25.0		25.0	25.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0			0.0			0.0			0.0	
Total Lost Time (s)	5.0	5.0			5.0			5.0			5.0	
Lead/Lag							Lead	Lead		Lead	Lead	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	16.2	16.2			16.2			43.0			43.0	
Actuated g/C Ratio	0.20	0.20			0.20			0.54			0.54	
v/c Ratio	0.66	0.18			0.21			0.37			0.73	
Control Delay	40.4	20.4			20.2			16.6			25.0	
Queue Delay	0.0	0.0			0.0			0.0			0.0	
Total Delay	40.4	20.4			20.2			16.6			25.0	
LOS	D	C			C			B			C	
Approach Delay		35.1			20.2			16.6			25.0	
Approach LOS		D			C			B			C	
90th %ile Green (s)	23.9	23.9		23.9	23.9		28.1	28.1		28.1	28.1	
90th %ile Term Code	Gap	Gap		Gap	Gap		Coord	Coord		Coord	Coord	
70th %ile Green (s)	19.5	19.5		19.5	19.5		32.5	32.5		32.5	32.5	
70th %ile Term Code	Gap	Gap		Gap	Gap		Coord	Coord		Coord	Coord	
50th %ile Green (s)	16.3	16.3		16.3	16.3		35.7	35.7		35.7	35.7	
50th %ile Term Code	Gap	Gap		Gap	Gap		Coord	Coord		Coord	Coord	
30th %ile Green (s)	13.0	13.0		13.0	13.0		57.0	57.0		57.0	57.0	
30th %ile Term Code	Gap	Gap		Gap	Gap		Coord	Coord		Coord	Coord	
10th %ile Green (s)	8.3	8.3		8.3	8.3		61.7	61.7		61.7	61.7	
10th %ile Term Code	Gap	Gap		Gap	Gap		Coord	Coord		Coord	Coord	
Queue Length 50th (ft)	78	19			25			100			276	
Queue Length 95th (ft)	125	44			53			200			#575	
Internal Link Dist (ft)		45			150			1			245	
Turn Bay Length (ft)												
Base Capacity (vph)	430	546			617			828			918	
Starvation Cap Reductn	0	0			0			0			0	
Spillback Cap Reductn	0	0			0			0			0	
Storage Cap Reductn	0	0			0			0			0	
Reduced v/c Ratio	0.39	0.11			0.13			0.37			0.73	

Intersection Summary

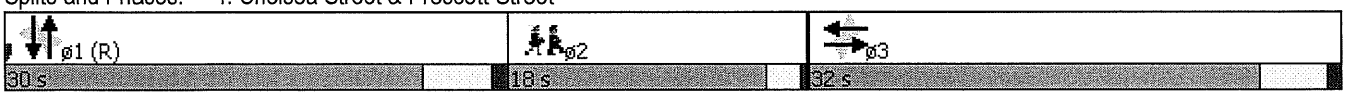
Area Type: CBD
Cycle Length: 80
Actuated Cycle Length: 80

Lane Group	ø2
Minimum Initial (s)	4.0
Minimum Split (s)	18.0
Total Split (s)	18.0
Total Split (%)	23%
Maximum Green (s)	15.5
Yellow Time (s)	2.0
All-Red Time (s)	0.5
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lag
Lead-Lag Optimize?	Yes
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	8.0
Flash Dont Walk (s)	7.5
Pedestrian Calls (#/hr)	45
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
90th %ile Green (s)	15.5
90th %ile Term Code	Ped
70th %ile Green (s)	15.5
70th %ile Term Code	Ped
50th %ile Green (s)	15.5
50th %ile Term Code	Ped
30th %ile Green (s)	0.0
30th %ile Term Code	Skip
10th %ile Green (s)	0.0
10th %ile Term Code	Skip
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

Offset: 0 (0%), Referenced to phase 1:NBSB, Start of Green, Master Intersection
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 24.5 Intersection LOS: C
Intersection Capacity Utilization 76.8% 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: 4: Chelsea Street & Prescott Street



Intersection	
Intersection Delay, s/veh	3.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	55	100	124	94	101	387
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	7	0	0	2
Mvmt Flow	60	109	135	102	110	421

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	826	186	0	0	237	0
Stage 1	186	-	-	-	-	-
Stage 2	640	-	-	-	-	-
Follow-up Headway	3.5	3.3	-	-	2.2	-
Pot Capacity-1 Maneuver	345	861	-	-	1342	-
Stage 1	851	-	-	-	-	-
Stage 2	529	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	308	861	-	-	1342	-
Mov Capacity-2 Maneuver	308	-	-	-	-	-
Stage 1	851	-	-	-	-	-
Stage 2	472	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15	0	1.6
HCM LOS	C		

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	526	1342	-
HCM Lane V/C Ratio	-	-	0.32	0.082	-
HCM Control Delay (s)	-	-	15	7.921	0
HCM Lane LOS			C	A	A
HCM 95th %tile Q(veh)	-	-	1.372	0.267	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	25.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	6	0	14	217	14	180	11	452	0	0	325	10
Conflicting Peds, #/hr	39	0	7	7	0	39	60	0	0	0	0	60
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-3	-	-	2	-	-	2	-	-	-2	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	0	0	0	3	0	2	0	1	0	0	3	0
Mvmt Flow	6	0	15	233	15	194	12	486	0	0	349	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1047	943	454	950	948	585	399	0	0	525	0	0
Stage 1	394	394	-	549	549	-	-	-	-	-	-	-
Stage 2	653	549	-	401	399	-	-	-	-	-	-	-
Follow-up Headway	3.5	4	3.3	3.527	4	3.318	2.2	-	-	2.2	-	-
Pot Capacity-1 Maneuver	248	310	634	# 215	237	495	1171	-	-	1052	-	-
Stage 1	678	650	-	488	489	-	-	-	-	-	-	-
Stage 2	512	569	-	596	579	-	-	-	-	-	-	-
Time blocked-Platoon, %								-	-		-	-
Mov Capacity-1 Maneuver	117	280	566	# 185	214	443	1093	-	-	982	-	-
Mov Capacity-2 Maneuver	117	280	-	# 185	214	-	-	-	-	-	-	-
Stage 1	639	622	-	461	462	-	-	-	-	-	-	-
Stage 2	256	538	-	541	554	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	19.9	75.2	0.2	0
HCM LOS	C	F		

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1093	-	-	263	185	309	982	-	-
HCM Lane V/C Ratio	0.011	-	-	0.082	0.841	0.927	-	-	-
HCM Control Delay (s)	8.33	0	-	19.9	81.6	71.8	0	-	-
HCM Lane LOS	A	A		C	F	F	A		
HCM 95th %tile Q(veh)	0.033	-	-	0.265	6.016	9.045	0	-	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	6.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	342	0	290	318	1	409
Conflicting Peds, #/hr	0	10	10	0	5	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	-3	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	0	1	2	0	1
Mvmt Flow	364	0	309	338	1	435

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	369	0	1324	197
Stage 1	-	-	-	-	369	-
Stage 2	-	-	-	-	955	-
Follow-up Headway	-	-	2.21	-	3.5	3.3095
Pot Capacity-1 Maneuver	-	-	1193	-	161	815
Stage 1	-	-	-	-	675	-
Stage 2	-	-	-	-	377	-
Time blocked-Platoon, %	-	-		-		
Mov Capacity-1 Maneuver	-	-	1181	-	108	804
Mov Capacity-2 Maneuver	-	-	-	-	108	-
Stage 1	-	-	-	-	672	-
Stage 2	-	-	-	-	254	-

Approach	EB	WB	NB
HCM Control Delay, s	0	4.4	15
HCM LOS			C

Minor Lane / Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	792	-	-	1181	-
HCM Lane V/C Ratio	0.551	-	-	0.261	-
HCM Control Delay (s)	15	-	-	9.123	0
HCM Lane LOS	C			A	A
HCM 95th %tile Q(veh)	3.415	-	-	1.051	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	11.1
Intersection LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	75	5	30	330	239	53
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles, %	0	0	0	1	0	0
Mvmt Flow	82	5	33	363	263	58
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	9.6	11.9	10.4
HCM LOS	A	B	B

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	8%	94%	0%
Vol Thru, %	92%	0%	82%
Vol Right, %	0%	6%	18%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	360	80	292
LT Vol	330	0	239
Through Vol	0	5	53
RT Vol	30	75	0
Lane Flow Rate	396	88	321
Geometry Grp	1	1	1
Degree of Util (X)	0.495	0.137	0.398
Departure Headway (Hd)	4.505	5.595	4.463
Convergence, Y/N	Yes	Yes	Yes
Cap	799	637	805
Service Time	2.542	3.662	2.501
HCM Lane V/C Ratio	0.496	0.138	0.399
HCM Control Delay	11.9	9.6	10.4
HCM Lane LOS	B	A	B
HCM 95th-tile Q	2.8	0.5	1.9

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	331	38	13	17	41	25	46	482	9	33	253	217
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	16	16	12	12	12	16	16	16
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.962			0.960			0.998			0.942	
Flt Protected	0.950				0.990			0.996			0.997	
Satd. Flow (prot)	1577	1586	0	0	1842	0	0	1697	0	0	1773	0
Flt Permitted	0.737				0.948			0.916			0.943	
Satd. Flow (perm)	1224	1586	0	0	1764	0	0	1560	0	0	1677	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			24			1			50	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		125			230			65			325	
Travel Time (s)		2.8			5.2			1.5			7.4	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	3%	5%	0%	0%	0%	0%	0%	0%	11%	12%	2%	2%
Adj. Flow (vph)	364	42	14	19	45	27	51	530	10	36	278	238
Shared Lane Traffic (%)												
Lane Group Flow (vph)	364	56	0	0	91	0	0	591	0	0	552	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.14	1.14	1.14	0.97	0.97	0.97	1.14	1.14	1.14	0.97	0.97	0.97
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		3			3			1			1	
Permitted Phases	3			3			1			1		
Detector Phase	3	3		3	3		1	1		1	1	
Switch Phase												

Lane Group	ø2
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	2
Permitted Phases	
Detector Phase	
Switch Phase	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	8.0	8.0		8.0	8.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	15.0	15.0		15.0	15.0		15.0	15.0		15.0	15.0	
Total Split (s)	32.0	32.0		32.0	32.0		40.0	40.0		40.0	40.0	
Total Split (%)	35.6%	35.6%		35.6%	35.6%		44.4%	44.4%		44.4%	44.4%	
Maximum Green (s)	27.0	27.0		27.0	27.0		35.0	35.0		35.0	35.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0			0.0			0.0			0.0	
Total Lost Time (s)	5.0	5.0			5.0			5.0			5.0	
Lead/Lag							Lead	Lead		Lead	Lead	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	28.9	28.9			28.9			40.3			40.3	
Actuated g/C Ratio	0.32	0.32			0.32			0.45			0.45	
v/c Ratio	0.93	0.11			0.16			0.85			0.71	
Control Delay	63.0	18.8			18.0			37.9			26.3	
Queue Delay	0.0	0.0			0.0			0.0			0.0	
Total Delay	63.0	18.8			18.0			37.9			26.3	
LOS	E	B			B			D			C	
Approach Delay		57.1			18.0			37.9			26.3	
Approach LOS		E			B			D			C	
90th %ile Green (s)	27.0	27.0		27.0	27.0		35.0	35.0		35.0	35.0	
90th %ile Term Code	Max	Max		Max	Max		Coord	Coord		Coord	Coord	
70th %ile Green (s)	27.0	27.0		27.0	27.0		35.0	35.0		35.0	35.0	
70th %ile Term Code	Max	Max		Max	Max		Coord	Coord		Coord	Coord	
50th %ile Green (s)	27.0	27.0		27.0	27.0		35.0	35.0		35.0	35.0	
50th %ile Term Code	Max	Max		Max	Max		Coord	Coord		Coord	Coord	
30th %ile Green (s)	33.2	33.2		33.2	33.2		46.8	46.8		46.8	46.8	
30th %ile Term Code	Gap	Gap		Gap	Gap		Coord	Coord		Coord	Coord	
10th %ile Green (s)	30.2	30.2		30.2	30.2		49.8	49.8		49.8	49.8	
10th %ile Term Code	Gap	Gap		Gap	Gap		Coord	Coord		Coord	Coord	
Queue Length 50th (ft)	205	17			28			323			252	
Queue Length 95th (ft)	#385	45			64			#549			#430	
Internal Link Dist (ft)		45			150			1			245	
Turn Bay Length (ft)												
Base Capacity (vph)	392	518			582			699			778	
Starvation Cap Reductn	0	0			0			0			0	
Spillback Cap Reductn	0	0			0			0			0	
Storage Cap Reductn	0	0			0			0			0	
Reduced v/c Ratio	0.93	0.11			0.16			0.85			0.71	

Intersection Summary

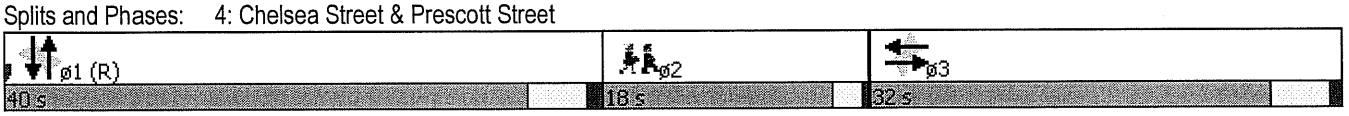
Area Type: CBD
Cycle Length: 90
Actuated Cycle Length: 90

Lane Group	ø2
Minimum Initial (s)	4.0
Minimum Split (s)	18.0
Total Split (s)	18.0
Total Split (%)	20%
Maximum Green (s)	15.5
Yellow Time (s)	2.0
All-Red Time (s)	0.5
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lag
Lead-Lag Optimize?	Yes
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	8.0
Flash Dont Walk (s)	7.5
Pedestrian Calls (#/hr)	45
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
90th %ile Green (s)	15.5
90th %ile Term Code	Ped
70th %ile Green (s)	15.5
70th %ile Term Code	Ped
50th %ile Green (s)	15.5
50th %ile Term Code	Ped
30th %ile Green (s)	0.0
30th %ile Term Code	Skip
10th %ile Green (s)	0.0
10th %ile Term Code	Skip
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

Offset: 0 (0%), Referenced to phase 1:NBSB, Start of Green, Master Intersection
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 37.8 Intersection LOS: D
Intersection Capacity Utilization 79.4% 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: 4: Chelsea Street & Prescott Street



Intersection	
Intersection Delay, s/veh	3.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	45	102	341	64	53	247
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	1	0	0	0
Mvmt Flow	49	111	371	70	58	268

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	789	405	0	0	440	0
Stage 1	405	-	-	-	-	-
Stage 2	384	-	-	-	-	-
Follow-up Headway	3.5	3.3	-	-	2.2	-
Pot Capacity-1 Maneuver	362	650	-	-	1131	-
Stage 1	678	-	-	-	-	-
Stage 2	693	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	340	650	-	-	1131	-
Mov Capacity-2 Maneuver	340	-	-	-	-	-
Stage 1	678	-	-	-	-	-
Stage 2	651	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.3	0	1.5
HCM LOS	C		

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	508	1131	-
HCM Lane V/C Ratio	-	-	0.315	0.051	-
HCM Control Delay (s)	-	-	15.3	8.354	0
HCM Lane LOS			C	A	A
HCM 95th %tile Q(veh)	-	-	1.336	0.161	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Attachment D

Air Quality Technical Appendices

AIR QUALITY APPENDIX

Introduction

This Air Quality Appendix provides modeling assumptions and backup for results presented in Section 3.2.5 of the Expanded PNF. Included within this documentation is a brief description of the methodology employed along with pertinent calculations and data used in the emissions and dispersion calculations supporting the microscale air quality analysis.

Motor Vehicle Emissions

The EPA MOBILE6.2 computer program generated motor vehicle emissions used in the garage stationary source analysis along with the mobile source CAL3QHC modeling and mesoscale analysis. The model input parameters were provided by MassDEP. Emission rates were derived for 2013 and 2018 for speed limits of 2.5, 10, 15, and 30 mph for use in the microscale analyses.

CAL3QHC

For the intersections studied, the CAL3QHC model was applied to calculate CO concentrations at sensitive receptor locations using emission rates derived in MOBILE6.2. The intersection's queue links and free flow links were input to the model along with sensitive receptors at all locations nearby each intersection. The meteorological assumptions input into the model were a 1.0 meter per second wind speed, Pasquill-Gifford Class D stability combined with a mixing height of 1,000 meters. For each direction, the full range of wind directions at 10 degree intervals was examined. In addition, a surface roughness (z_0) of 370 cm was used. 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. Emission rates for speeds of 10, 15, and 30 mph were used for right turn, left turn, and free flow links, respectively.

Excel Academy - East Boston, MA
Calculation of Microscale Modeling Emission Factors
Summary of MOBILE6 Output

Carbon Monoxide Only

Queues	Idle
Free Flow	30 mph
Right Turns	10 mph
Left Turns	15 mph

Winter	**2013**	**2018**	**Units**
Idle	46.840	42.335	g/hr
2.5 mph	18.736	16.934	g/mile
10 mph	10.195	9.284	g/mile
15 mph	9.193	8.380	g/mile
30 mph	8.237	7.521	g/mile

Note: Winter CO emission factors are higher than Summer and are conservatively used

Excel Academy Bremen Street - East Boston, MA
Background Concentrations

Background Concentrations								
POLLUTANT	AVERAGING TIME	2010	2011	2012	Units	ppm to $\mu g/m^3$ Conversion Factor	Background Concentration ($\mu g/m^3$)	Location
SO_2 [1][7][8]	1-Hour	26.9	49	15.8	ppb	2.6	127.4	Kenmore Sq., Boston
	3-Hour	0.034	0.024	0.019	ppm	2600	88.4	Kenmore Sq., Boston
	24-Hour	8.4	12.1	6	ppb	2.6	31.5	Kenmore Sq., Boston
	Annual	2.24	2.36	1.87	ppb	2.6	6.1	Kenmore Sq., Boston
PM-10	24-Hour	32	39	41	$\mu g/m^3$	1	41.0	One City Sq. Boston
	Annual	15.1	15.9	16.8	$\mu g/m^3$	1	16.8	One City Sq. Boston
PM-2.5	24-Hour [4]	24.8	23.9	20.9	$\mu g/m^3$	1	23.2	174 North St., Boston
	Annual [5]	10.03	10.32	9.47	$\mu g/m^3$	1	9.9	174 North St., Boston
NO_2 [3]	1-Hour [6]	63.5	74.9	61	ppb	1.88	140.8	Kenmore Sq., Boston
	Annual	19.1	20.36	19.1	ppb	1.88	38.3	Kenmore Sq., Boston
CO [2]	1-Hour	1.9	1.5	1.4	ppm	1140	2166	Kenmore Sq., Boston
	8-Hour	1.5	1.3	1.1	ppm	1140	1710	Kenmore Sq., Boston

Notes: From 2007-2011 MA DEP Annual Data Summaries

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

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

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

[4] Background level for 24-hour PM-2.5 is the average concentration of the 98th percentile for three years.

[5] Background level for annual PM-2.5 is the average for three years.

[6] Maximum annual 1-hr concentrations.

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

[8] The 2010 & 2011 SO_2 3-hr value is not reported. Years 2007-2009 used instead.

Due to excessive size CAL3QHC, and MOBILE6.2 input and output files are available on digital media upon request.

Attachment E

LEED Checklist

LEED 2009 for Schools New Construction and Major Renovations

Project Checklist

Excel Academy Charter School, Bremen Street, East Boston, MA

Sustainable Sites — Possible Points: 24

Y	?	N			
Y			Prereq 1	Construction Activity Pollution Prevention	
Y			Prereq 2	Environmental Site Assessment	
1			Credit 1	Site Selection	1
4			Credit 2	Development Density and Community Connectivity	4
1			Credit 3	Brownfield Redevelopment	1
4			Credit 4.1	Alternative Transportation—Public Transportation Access	4
1			Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	1
2			Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	2
2			Credit 4.4	Alternative Transportation—Parking Capacity	2
		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
		1	Credit 9	Site Master Plan	1
1			Credit 10	Joint Use of Facilities	1

Water Efficiency — Possible Points: 11

Y			Prereq 1	Water Use Reduction—20% Reduction	
4			Credit 1	Water Efficient Landscaping	2 to 4
		2	Credit 2	Innovative Wastewater Technologies	2
2	2		Credit 3	Water Use Reduction	2 to 4
1			Credit 3	Process Water Use Reduction	1

Energy and Atmosphere — Possible Points: 33

Y			Prereq 1	Fundamental Commissioning of Building Energy Systems	
Y			Prereq 2	Minimum Energy Performance	
Y			Prereq 3	Fundamental Refrigerant Management	
5	14		Credit 1	Optimize Energy Performance	1 to 19
	7		Credit 2	On-Site Renewable Energy	1 to 7
	2		Credit 3	Enhanced Commissioning	2
1			Credit 4	Enhanced Refrigerant Management	1
	1	1	Credit 5	Measurement and Verification	2
		2	Credit 6	Green Power	2

Materials and Resources — Possible Points: 13

Y			Prereq 1	Storage and Collection of Recyclables	
		2	Credit 1.1	Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 2
		1	Credit 1.2	Building Reuse—Maintain 50% of Interior Non-Structural Elements	1
2			Credit 2	Construction Waste Management	1 to 2

Materials and Resources, Continued

Y	?	N			
		2	Credit 3	Materials Reuse	1 to 2
	2		Credit 4	Recycled Content	1 to 2
		2	Credit 5	Regional Materials	1 to 2
		1	Credit 6	Rapidly Renewable Materials	1
		1	Credit 7	Certified Wood	1

Indoor Environmental Quality — Possible Points: 19

Y			Prereq 1	Minimum Indoor Air Quality Performance	
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	
Y			Prereq 3	Minimum Acoustical Performance	
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
4			Credit 4	Low-Emitting Materials	1 to 4
1			Credit 5	Indoor Chemical and 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
2	1		Credit 8.1	Daylight and Views—Daylight	1 to 3
1			Credit 8.2	Daylight and Views—Views	1
	1		Credit 9	Enhanced Acoustical Performance	1
1			Credit 10	Mold Prevention	1

Innovation and Design Process — Possible Points: 6

1			Credit 1.1	Innovation in Design: Modular Construction	1
	1		Credit 1.2	Innovation in Design: Green Advantage	1
1			Credit 1.3	Innovation in Design: Non-Mercury Lighting	1
	1		Credit 1.4	Innovation in Design: Integrated Project Delivery	1
1			Credit 2	LEED Accredited Professional	1
	1		Credit 3	The School as a Teaching Tool	1

Regional Priority Credits — Possible Points: 4

1			Credit 1.1	Regional Priority:SSc3. Brownfield Redevelopment	1
1			Credit 1.2	Regional Priority: SSc7.2. Heat Island Effect - Roof	1
	1		Credit 1.3	Regional Priority: SSc6.1. Stormwater Design-Quantity Control	1
	1		Credit 1.4	Regional Priority:EAc2. On-Site Renewable Energy	1

Total — Possible Points: 110

54	37	19

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

Attachment F

Climate Change Preparedness and Resiliency Checklist

Boston Climate Change Preparedness Questionnaire - New Construction

2. Project Information

1. Project Name and Location

Project Name : Excel Academy East Boston Middle/HighSchool
Project Address : 413 Bremen Street, East Boston, MA

2. Project Contact:

Name : Tamar Warburg
Title : Project Architect
Company : Studio G Architects
Email Address : tamarw@studiogarchitects. com
Phone Number : 617.524.5558

3. Project Contact:

Name : Steve Michener
Title : Project Manager
Company : Studio G Architects
Email Address : stevem@studiogarchitects. com
Phone Number : 617.524.5558

4. Team Description:

Owner / Developer : Excel Academy/Pacific Charter Development
Architect : Studio G Architects
Engineer (building systems) : Garcia, Galuska, De Sousa Consulting Engineers
Sustainability / LEED : Tamar Warburg, Studio G Architects
Permitting : Epsilon Associates

3. New Page

5. Is this project a:

Single building

6. At what phase is this project?

PNF Submitted

4. Phased, multi-building project

Project Identification

5. Single building project

7. Project Identification:

Project Name : Excel Academy East Boston Middle/High School
Primary Project Address : 413 Bremen Street
Additional Project Address : East Boston, MA

6. Master Plan

Project Identification

7. Institutional Master Plan

Project Identification

8. Building Classification and Description

8. Building Uses - check all appropriate uses:

Education

9. Building First Floor Uses - list all:

Classrooms, Offices, Cafeteria, Gymnasium

10. Construction Type – select most appropriate type:

Steel Frame

11. Building Size: do not include commas

Site Area (Square Feet) : 87,120
Building Area (Square Feet) : 70,270
Building Height (Feet) : 43
Number of Stories (Floors) : 3
First Floor Elevation (feet above sea level)(Boston City Base Elev.)(Ft.) : 11.5
Number of below grade levels : 0

9. Green Building

12. Which LEED Rating System(s) has or will your project use (by area for projects using multiple rating systems):

	Rating System
Primary Use	LEED 2009 for Schools
Secondary Use	
Additional Uses	

13. What are the projected LEED Rating System Outcome(s):

	Rating System
Primary Use	Silver
Secondary Use	
Additional Uses	

14. Is or will the Project Register with the US Green Building Council

No

15. Is or will the Project Seek US Green Building Council Certification:

No

10. Higher Temperatures and Heat Waves - Analysis and General Strategies

16. Analysis Sources:

List Climate Change information sources : FEMA

17. What time span of Climate Change was considered:

50 Years

18. Analysis Conditions:

What Low Temperature will be used for project planning (degrees) : 7
What High Temperature will be used for project planning (degrees) : 80

19. What Extreme Heat Event characteristics will be used for project planning:

Peak High (degrees) : Use ASHRAE 2% data
Duration (days) : Use ASHRAE 2% data
Number of events per year : Use ASHRAE 2% data

20. What measures will the project employ to reduce urban heat-island effect:

High reflective paving materials
High reflective roof materials

21. Will the project be able to manage hotter and more humid summers without increasing its electrical load; if so how?

No

22. Will the building remain operable without utility power for an extended period; if so for how long and by what strategies?

If Yes, for how long (days) and describe strategies: 1 day

11. High Temperatures and Heat Waves - Active and Passive Strategies

23. What will be the overall energy performance of the project or building (percentage above code)

20.%

24. How will project energy performance be determined

Prescriptive Path

25. What specific measures will the project employ to reduce building energy consumption

High performance lighting
EnergyStar equipment / appliances
High performance HVAC equipment
Energy recovery ventilation
Describe any added measures: High performance building envelope

26. What specific measures will the project employ to reduce building energy demands on the utilities and infrastructure

Building-wide power dimming
Describe any added measures: on-site solar photo-voltaic if budget allows

27. Will the project employ Smart Grid Infrastructure and / or Systems

No

28. Describe any non-mechanical strategies that will support building functionality and use during an extended interruption(s) of utility services and infrastructure

External shading devices
High performance building envelop
Describe any additional measures: prevailing winds oriented, operable windows

29. List the R values for building envelope elements:

Roof : 25
Walls : 20.5
Floors / Slab : 10
Foundation / Basement : 7.5
Windows : 3.22
Doors : 3.70

12. Sea-Level Rise and Storms – location analysis and description

30. Location Description:

Site Elevation - low point (feet above sea level)(Boston City Base Elev.)(Ft.) : 5
Site Elevation - high point (feet above sea level)(Boston City Base Elev.)(Ft.) : 13

31. Location Classification - is the site or building located in any of the following:

	Yes	No
Coastal Zone		X
Velocity Zone		X
Flood Zone	X	
Area Prone to Flooding		X

32. Are updates in the floodplain delineation due to climate change likely to change the classification of the site or building location:

No

33. What is the project or building proximity to nearest Coastal, Velocity or Flood Zone or Area Prone to Flooding (horizontal distance in feet)

0

13. Sea-Level Rise and Storms – analysis and general strategies

34. Analysis Sources:

List Sea-Level Rise information sources : FEMA

35. What time span of Climate Change and Rising Sea-Levels was considered:

50 Years

36. How were impacts from higher sea levels and more frequent and extreme storm events analyzed:

Sea-Level Rise (change in feet) : 1'
Frequency of Storms (number per year) : 3

14. Sea-Level Rise and Storms - Building Flood Proofing

37. Will the building remain occupiable without utility power during a period of extended inundation:

If yes, for how long (days): 1 day

38. Will the proposed ground floor be raised in response to Sea Level Rise:

If Yes, to what elevation above the 100 year flood plain (Boston City Base Elev.)(Ft.): 2' 6"

39. Will the proposed ground floor be raised in response to Sea Level Rise:

Ground Floor Elevation (height above sea level)(Boston City Base Elev.)(Ft.): 11'6"
Height above 100 Year Floor Plain (Boston City Base Elev.)(Ft.) : 1'6" above new FEMA map; 2'6" above current FEMA mapping

40. Will lower building levels be constructed in a manner to prevent water penetration:

If yes, what is the Flood Proof Elevation (height above 100 Year Floorplain) (Boston City Base Elev.)(Ft.) : 11' 6"

41. Describe measures and strategies intended to ensure the integrity of critical building systems during a flood or severe storm event:

All systems located above 1st Floor
Water tight utility conduits
Waste water back flow prevention
Storm water back flow prevention

42. Were the differing effects of fresh water and salt water flooding considered:

Yes

43. Will the project site and building(s) be accessible during periods of inundation or limited circulation and / or access to transportation:

If yes, to what height above 100 Year Floodplain (Boston City Base Elev.)(Ft.): 2' 6"

44. Describe any additional Building Floor Proofing strategies?

15. Sea-Level Rise and Storms - Building Resiliency and Adaptability

Will the building be able to withstand severe storm impacts and endure temporary inundation

Yes. The Project design includes hardened resilient ground-floor construction and resilient site design materials.

Will the building include additional structural capacity and or building systems to accommodate future on-site renewable and or clean energy sources; if so what:

The proposed building will be PV-ready and solar thermal-ready in terms of structural capacity.

Can the site and building be reasonably modified to increase Building Flood Proofing; if so how:

Following construction, it would not be reasonable to modify the building design.

Describe any additional Building Resiliency and Adaptability strategies: