Northampton Square

Boston, Massachusetts

Expanded Project Notification Form

October 18, 2013

submitted to **Boston Redevelopment Authority**

submitted by **Trinity Northampton Limited Partnership**
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Boston, MA 02110

in collaboration with **Boston Public Health Commission**

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TABLE OF CONTENTS

4.0 Transportation

5.0 Environmental

6.0 Infrastructure

LIST OF FIGURES

LIST OF TABLES

APPENDICES

Chapter 1

PROJECT SUMMARY

1.0 PROJECT SUMMARY

1.1 PROJECT IDENTIFICATION

Project Name:	Northampton Square
Address/Location:	Massachusetts Avenue between Albany Street and Harrison Avenue in Boston, MA
Project Proponent:	Trinity Northampton Limited Partnership

1.2 PROJECT SUMMARY

1.2.1 OVERVIEW

The Northampton Square Campus (the "Campus") consists of a 3.59 acre parcel bounded by Massachusetts Avenue on the north side, Albany Street on the east side, Northampton Street on the south side, and Harrison Avenue on the west side. The Campus contains several different components including a 29-story residential building at 35 Northampton Street (Northampton Tower), a 12-story residential building at 860 Harrison Avenue, the Miranda Creamer Building housing the offices of the Boston Public Health Commission (BPHC), the South End Fitness Center, the Carter Auditorium, a two-story commercial building along Massachusetts Avenue, and a parking garage that accommodates up to 539 vehicles (see Figure 1-1, Locus Map). The Campus was built between 1969 and 1973 to house the Boston City Hospital School of Nursing. The Boston Public Health Commission acquired the site on July 1, 1996 and has managed the property ever since. The Campus does not include the air-rights structure that spans Massachusetts Avenue from Boston Medical Center to and over a portion of the Campus.

Located in Lower Roxbury, the Northampton Square Campus is a vital asset to the BPHC and the City of Boston. The existing 29-story and 12-story residential buildings provide 347 low-rent units of housing to low wage earners, many of whom work in the adjacent medical district that includes Boston Medical Center, the BPHC, Boston University School of Medicine, and numerous other public and private employers. Included in the 347 units are 299 studio apartments that average 362 net square feet. These units are a perfect example of the "micro apartments" recently called for by the Boston Redevelopment Authority to encourage the creation of small, affordable units within the City. Rents for these 299 "micro apartments" are currently priced below market. The Miranda Creamer building on Albany Street and the commercial storefronts along Massachusetts and Harrison Avenues have provided office space for the BPHC and a variety of public health related programs. The South End Fitness Center, which includes a cardio and weight room, a pool, and a basketball court, serve the recreational needs of a number of organizations and individuals from the larger neighborhood. The BPHC's Carter Auditorium serves as a meeting space for a variety of agency training activities. The 539-space parking garage, albeit much underutilized, is also an important resource to the people that live at or work in the Campus area.

The Campus, however, has suffered from much deferred maintenance over the years since there have not been sufficient resources to adequately maintain and invest in this aging property. As a result, this 40-year old property is at the end of its capital maintenance cycle, and simply put, its continued viability will require a major capital investment. The mechanical systems within each component are outdated and extremely inefficient, leading to wasted water and energy, along with very high operating costs. The windows are single glazed in steel frames causing resident discomfort and significant heat loss. The electric service is outdated and needs to be upgraded. All interior fixtures and finishes must be replaced or refurbished. The residential units do not meet handicap accessibility requirements. Trash chutes in the 29-story and 12-story residential buildings are inoperable. The current configuration of the Campus's many entrances and exits make securing this property -- and the many people that live, work and come and go at the Campus -- a nearly impossible proposition. The approximately 40-year old property, which provides substantial benefits to the City, is physically dysfunctional and needs a major capital investment.

In the fall of 2010, the BPHC, recognizing the need to enter into a public/private partnership to access the capital required to serve this property, issued a Request for Qualifications seeking a developer to redevelop various components of the site that are in need of significant capital improvements. On December 16, 2010, Trinity Northampton Limited Partnership, an affiliate of Trinity Financial, Inc., was designated as the developer of the Campus by the BPHC Board. Since that time, Trinity has had numerous meetings with the BPHC, occupants of the Campus, and local and State elected officials to put together a redevelopment plan for Northampton Square. On August 2012, Trinity Northampton Phase One Limited Partnership filed a Project Notification Form (PNF) with the Boston Redevelopment Authority (BRA). The PNF was for the rehabilitation of the existing Northampton Tower and the addition of a one-story connector between this tower and the lobby of 860 Harrison Avenue. The BRA approved the project on September 13, 2012. Construction and renovation has already commenced and will be completed by December 2014. Since this component of the Campus has already been permitted, the unit counts, improvements, and impacts are not described in this Expanded PNF.

The proposed Project is for the construction of a 23-story tower (Albany Tower) on Albany Street at the corner of Northampton Street and the rehabilitation of the 12-story residential building at 860 Harrison Avenue. The plans described in this document reflect the proposed Project (see Figure 1-2, Project Site Plan, Figure 1-3, Aerial Perspective Looking North, Figure 1-4, Aerial Perspective Looking South, Figure 1-5, Aerial Perspective Looking West, Figure 1-6, Corner of Albany Street and Northampton Street, Figure 1-7, Corner of Harrison Avenue and Northampton Street, and Figure 1-8, Corner of Massachusetts Avenue and Albany Street).

The major goals of the Northampton Square development plan ("the Project") are as follows:

- Continue to address the capital needs of the existing housing at the Campus, specifically the 102 units at 860 Harrison Avenue, and increase the supply of mixed-income housing at the site;
- Preserve the mixed-income affordable and low-rent nature of the existing housing;
- Make the redeveloped buildings far more energy efficient and create healthier and more secure living environments throughout the Campus; and
- Generate significant financial resources to support the public health programs of the BPHC.

The main components of the Project are as follows:

- A $12 million renovation of the 12-story residential mid-rise at 860 Harrison Avenue that will include mechanical and electrical system upgrades, elevator system upgrades, all new energy efficient windows, exterior façade repairs, a new roof, renovated and code compliant trash chutes, new laundry rooms on most floors, unit improvements including all new and upgraded kitchens, a new storage closet in the studio units, new low flow plumbing fixtures, and new blinds throughout. This renovation work will also include the replacement of the mechanical equipment currently fronting Massachusetts Avenue with new equipment on the roof so this valuable street frontage can be repurposed into active commercial space.
- A new 23-story building (Albany Tower) to be developed at the corner of Albany and Northampton streets that will include either 218 residential units or 190 residential units and approximately 40,000 sf of additional office space for the BPHC. The auditorium, pool, gym, and fitness center that currently exist at this location will be retained as well as the existing Miranda Creamer building on Albany Street.
- Reuse of the existing parking garage to serve the needs of the Campus, including the new Albany Street building. The existing garage is underutilized and can serve the needs of the entire Campus. Upgrades will include additional handicapped parking spaces, accessible entrances and exits, bicycle racks, Zipcar spaces, and improved security features.

- The open plaza area on top of the parking garage will be renovated into a successful open space amenity for residents, complete with additional areas of green roof (including rooftop farming activities such as the Boston Natural Areas Network's Urban Agriculture Youth Conservation Corps), providing storm water capture, solar gain reduction and improved stormwater runoff quality.

When completed, the overall Campus will be significantly improved. While not every building at the Campus will be renovated as part of this Project, the infusion of new capital will provide a major upgrade and extend the useful life of many of the existing buildings.

1.3 PUBLIC REVIEW PROCESS

The Proponent regularly meets with the existing residents of the Northampton Square Campus and has also met with the local elected officials, several public agencies, the Roxbury Strategic Master Plan Oversight Committee, neighborhood representatives, local organizations, and other interested parties, seeking their input on the Project. A Letter of Intent was filed with the BRA on September 23, 2011 notifying the BRA of the Proponent's intent to file this Project Notification Form in accordance with the requirements of Article 80B. In accordance with the Mayor's Executive Order Relative to the Provision of Mitigation by Development Projects in Boston, an impact advisory group (IAG) will be appointed with up to 15 representatives from areas surrounding the site and with local representation.

1.4 PUBLIC BENEFITS

Northampton Square is a unique property in the City of Boston – it contains a mix of uses and a diverse group of residents that all coexist to create a community in a primarily institutional area of the City. Many of the residents are low wage employees of the institutions located within the adjacent medical district. Of equal importance is the fact that these apartments have also been one of the few if not the only housing resource in the City for low wage earners that cannot afford South End/Lower Roxbury market rents. As a result, the housing provided at Northampton Square is a critical affordable and workforce housing resource to the City of Boston. Without the major reinvestment effort that is proposed, the functionality of the property is in jeopardy and the City is at risk of losing an important asset.

The Proponent has committed to a number of public benefits that will improve the Northampton Square Campus and the surrounding area, and include:

- The Project will preserve or create between 292 and 320 units of housing, at least 102 (31%) of which will be affordable and at least 347 units (61%) will be affordable when 35 Northampton is included.
- At least 50 redeveloped units in the Project (within both 860 Harrison Avenue and Northampton Tower) will be set aside to house clients of the BPHC's social science programs.
- A number of sustainable/green design features will be incorporated into the Project to preserve and protect the local environment, including a large green roof above the parking garage, racks to store 210-238 bicycles, and highly efficient and sustainable housing units in an area well served by public transit.
- The Project will create approximately 925 construction phase employment opportunities, and the proponent will promote local employment through good-faith efforts to hire Boston residents.
- The Project will provide substantial property tax revenues to the City of Boston at full build-out and occupancy.
- The Project will invest over $100 million in the Northampton Square Campus (over $150 million when Northampton Tower is included).
- The Project (including Northampton Tower) will provide at least $1.5 million annually to the BPHC in support of public health initiatives in the City of Boston.

1.5 PROJECT ALTERNATIVES

1.5.1 NO ACTION PLAN

If the No Action Plan were to be implemented, the property at the Northampton Square Campus would continue to fall into further disrepair, continue to be underutilized, and remain inefficient. The BPHC acquired the property in 1996, and while the BPHC has invested regularly as best it could to maintain the property, the buildings have never received the sort of major capital investment that this 40-year old asset sorely needs. The No Action Plan would result in further deterioration of the site and would discourage investment in the neighborhood.

1.5.2 PROPOSED PROJECT

The proposed Project will substantially improve the use of the site for residential uses. It will preserve the local housing stock, including affordable and below market rent units. Since the project site is almost built out at the ground level, additional development above existing footprint will have little, if any, environmental impacts. The site is located in a densely developed neighborhood that already has excellent transit connections to the MBTA Silver Line and other bus lines. Upgrades to the mechanical systems, plumbing, windows, and HVAC systems will substantially reduce impacts to the environment by reducing water and energy use.

1.5.3 ALTERNATIVE ONE

Alternative One is similar to the Proposed Project except it will utilize four floors of the new 23-story tower for office use in the place of 28 residential units. The building exteriors will remain the same as in the Proposed Project and will provide similar benefits as the proposed Project. There will be minor increases in traffic volume and daytime parking due to the increased office space of approximately 40,000 sf. Related impacts are described in the Chapter 4, Transportation, Chapter 5, Environment, and Chapter 6, Infrastructure.

1.6 SUMMARY OF REQUIRED PERMITS AND APPROVALS

The Proponent will secure the required local, state, and federal permits and approvals prior to commencement of construction. The following is a list of the anticipated permits and approvals:

AGENCY	PERMIT/APPROVAL
Federal	
Environmental Protection Agency	NPDES Notice of Intent for Construction Dewatering
	NPDES Stormwater Management Notice of Intent
Federal Aviation Administration	Notice of Proposed Construction – Crane/Building
Dept. of Housing and Urban Development	NEPA Finding of No Significant Impact
State	
Department of Environmental Protection	Notification of Construction/Demolition
	Sewer Connection Source Registration
Massachusetts Water Resources Authority	8(m) Permit
Local	
Mayor of the City of Boston	Approval Authorizing Disposition of Property
Boston City Council	Approval Authorizing Disposition of Property
Boston Public Health Commission	Approval Authorizing Disposition of Property
Boston Redevelopment Authority	Article 80B Large Project Review
	Cooperation Agreement
	Affordable Housing Agreement
	121A Redevelopment Project Approval
	Planned Development Area Development Plan Approval
	South End Urban Renewal Plan Minor Modifications

Boston Civic Design Commission	Recommendation Pursuant to Article 80 Review
South End Landmarks Commission	Certificate of Appropriateness
Boston Transportation Department	Transportation Access Plan Agreement
	Construction Management Plan
Boston Water & Sewer Commission	Site Plan Approval
	General Service Application
	Sewer Connection Permit
Boston Inspectional Services Department	Building Permit
Boston Public Works Department	Street Opening Permit
Boston Public Improvement Commission	Various Permits for Work in Public Ways.
	Discontinuance

The Proponent filed an Environmental Notification Form in January 2012, and the Secretary issued a Certificate in March 2012. In the Certificate, the Secretary determined that no further MEPA review is required and declined to require an additional Public Benefits Review.

1.7 PROJECT TEAM

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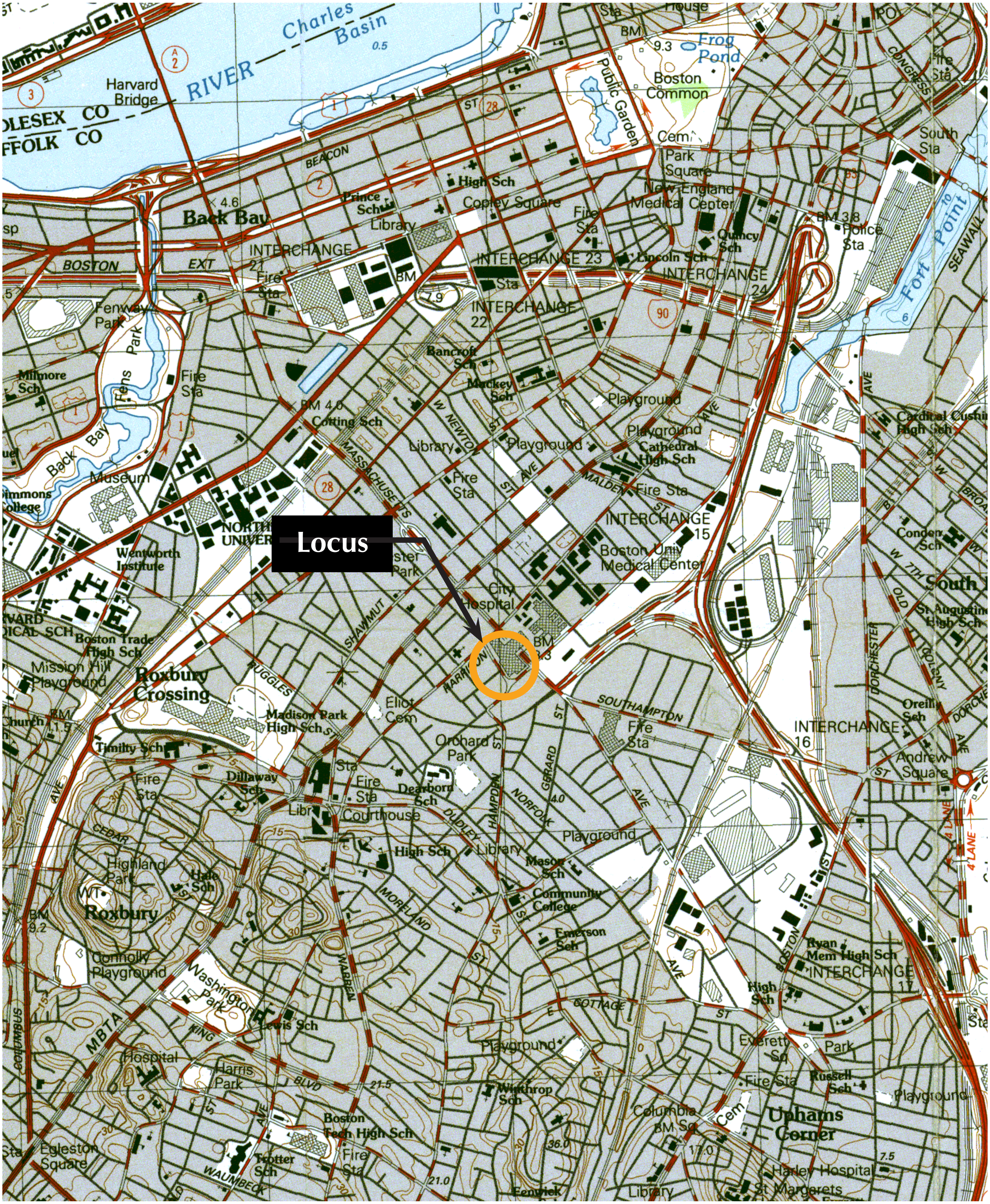


Northampton Square
Boston, Massachusetts

Figure 1-1
Locus Map
Source: USGS

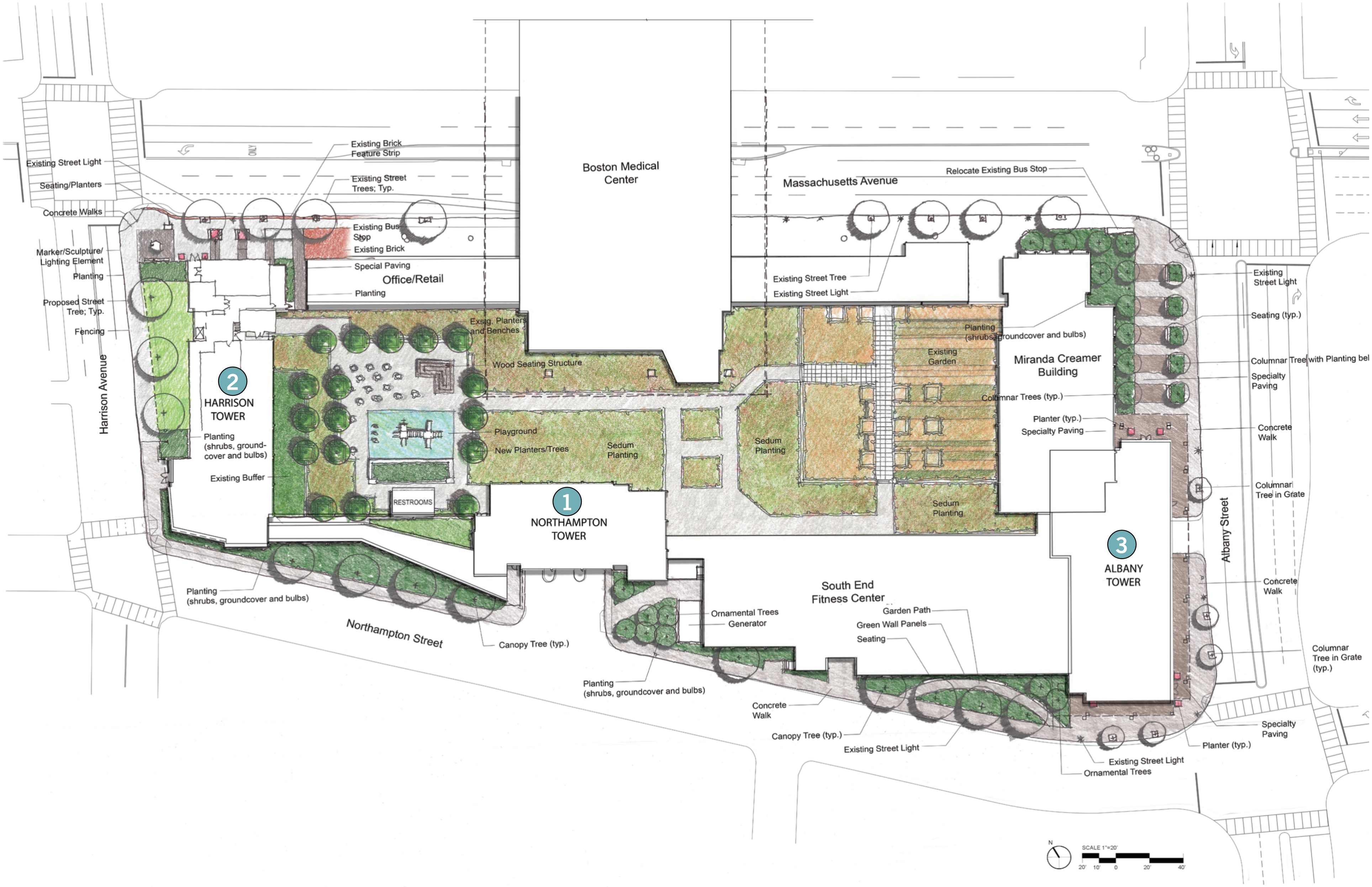


Figure 1-2
Project Site Plan
Source: The Architectural Team, 2013; Copley Wolff Design Group, 2013

Northampton Square
Boston, Massachusetts

Figure 1-3
Aerial Perspective - View Looking North
Source: The Architectural Team, 2013

Figure 1-4
Aerial Perspective - View Looking South
Source: The Architectural Team, 2013

Northampton Square
Boston, Massachusetts

Figure 1-5
Aerial Perspective - View Looking West
Source: The Architectural Team, 2013

Northampton Square
Boston, Massachusetts

Figure 1-6
View from Albany Street and Northampton Street
Source: The Architectural Team, 2013

Northampton Square
Boston, Massachusetts

Figure 1-7
View from Northampton Street
Source: The Architectural Team, 2013

Northampton Square
Boston, Massachusetts

Figure 1-8
Corner of Albany Street and Massachusetts Avenue
Source: The Architectural Team, 2013

Chapter 2

Project Description

2.0 PROJECT DESCRIPTION

2.1 PROJECT LOCATION

The Northampton Square Campus (the "Campus") is in the South End/Lower Roxbury neighborhood of Boston located on Massachusetts Avenue between Albany Street and Harrison Avenue, one block away from the Boston Medical Center and Boston University Medical Campuses (see Figure 2-1, Aerial View Looking North). The Project site is 3.59 acres and is bound by Massachusetts Avenue on the north side, Albany Street on the east side, Northampton Street on the south side, and Harrison Avenue on the west side (see Figure 2-2, Aerial View Looking South, Figure 2-3, Existing Conditions – Ground Plane, Figure 2-4, Existing Conditions Survey).

2.2 PLANNING CONTEXT

The Campus was built by the City between 1969 and 1973 to serve as Boston City Hospital's School of Nursing complex. The two existing residential buildings functioned as dormitories for the students. The Boston Public Health Commission (BPHC) acquired the site in 1996 at the time of the formation of the Boston Medical Center and has managed it ever since. The existing units at 35 Northampton Street and 860 Harrison Avenue provide much needed housing that is affordable to low wage earners near Boston Medical Center, Boston University Medical School, and other major public and private employers in the area. Of the existing units, 299 are small (micro units that average 362 square feet), but they make housing accessible to households with incomes below 60% of the area median income despite the fact they are not regulated as affordable units by the City of Boston. In the interest of maintaining the mixed-income community at the Campus, Trinity and BPHC will implement a set of formal restrictions on the units to protect their affordability.

The Project is located on the South End /Lower Roxbury border and is consistent with the 2004 Roxbury Strategic Master Plan. While no specific goals were outlined for this parcel, the Master Plan sets forth a number of community-wide goals for improving existing housing stock, upgrading publicly owned housing, and creating new housing units on publicly-owned land. In addition, the Master Plan seeks to create new development opportunities for transit-oriented development and for higher density projects in the adjacent Crosstown Center Area and the Melnea Cass Boulevard to the south and west.

The Project is located just to the west of the study area of the Boston Redevelopment Authority's 2011 Harrison-Albany Corridor Strategic Plan, the planning initiative developed to guide future development so that the diverse needs of the community are met without jeopardizing the needs and uses of the existing neighborhood. The proposed development plan for the Campus complements the goals and strategies outlined in the Strategic Plan and balances the demand for new housing with the commitment to maintain affordability of the existing housing units.

The South End Landmark District is located directly across Harrison Avenue from the Project and extends north and west into the South End, primarily west of Harrison Avenue. The Project is located within the Harrison Avenue/Albany Street Protection Area, an area designated to ensure that new development is architecturally compatible with the District. Due to the existing high-rise buildings within the Campus, the addition of the new Albany Street tower (Albany Tower) at the furthermost corner of the site from the Landmark District will be barely visible and will blend in visually and be compatible with the District.

The Boston University Medical Center (BUMC is to the north of the Project across Massachusetts Avenue. The BUMC is composed of the Boston Medical Center and Boston University Medical Campus, which includes the Medical School, Dental School, and School of Public Health. Development activities within this area are implemented in accordance with the approved Institutional Master Plans developed by the institutions and serve to support the high quality care that is delivered at the Boston Medical Center, and the advanced research and educational opportunities provided at the medical schools. The Project is compatible with these important components of the health infrastructure and will provide housing opportunities for workers at the medical center area.

2.3 PROPOSED PROJECT

The existing Campus includes the existing 234 unit (245 unit post renovation), 29-story tower at 35 Northampton Street (Northampton Tower), the Miranda Creamer office building on Albany Street, a two-story office/retail building along Massachusetts Avenue, the existing fitness center, and the existing 539-space parking garage, owned and operated by the BPHC, with sufficient capacity for the new and renovated housing (see Table 2-1; Building Program). The renovation of 35 Northampton Street and a new connector between this building and 860 Harrison Avenue was recently approved and is not part of this Project. However, these approved units and areas are included and noted in the discussion of the proposed Project.

The Project contains two main components – (1) the renovation of 860 Harrison Avenue, and (2) the construction of a new 23-story building on the corner of Northampton and Albany streets. As part of the first phase (35 Northampton Street project), the number of units in Harrison Avenue will be reduced from 112 to 102 due to the inclusion of office space for BPHC programs. In total, the Project will preserve or create 292-320 units of housing, at least 102 (31%) of which will be affordable (and at least 347 units (61%) of the Campus will be affordable when the units at 35 Northampton Street are included. In addition, a new landscaped courtyard will cover the roof of the parking garage.

Table 2-1: Building Program – Proposed Project

Program Use	Existing/Approved Dimensions	Proposed Dimensions
Residential (includes amenity and management space)	258,876 gsf 347 units	522,087 gsf 565 units
Fitness Center, gymnasium, and pool	35,148 gsf	41,037 gsf
Commercial/Office (1)	77,971 gsf	88,515 gsf
Parking	195,765 gsf 539 spaces	195,765 gsf 537 spaces
Total	***567,760 gsf***	***847,404 gsf***

(1) Includes office space within Miranda Creamer building, new tower, 860 Harrison Avenue, and 2-story building along Massachusetts Avenue
(2) gsf = gross square feet

2.3.1 ALTERNATIVE ONE

Alternative One would replace 28 residential units on floors 4 through 7 of the 23-story tower with approximately 40,000 sf of office space. This change would reduce the proposed new units in the tower from 218 to 190 units. The office space will be used by the BPHC. This space would be accessed from the main lobby on the ground floor along Northampton Street and from the office space within the Miranda Creamer building.

Table 2-2: Building Program – Alternative One

Program Use	Existing/Approved Dimensions	Proposed Dimensions
Residential (includes amenity and management space)	258,876 gsf 347 units	487,666 gsf 537 units
Fitness Center, gymnasium, and pool	35,148 gsf	41,037 gsf
Commercial/Office (1)	77,971 gsf	122,936 gsf
Parking	195,765 gsf 539 spaces	195,765 gsf 537 spaces
Total	***567,760 gsf***	***847,404 gsf***

(1) Includes office space within Miranda Creamer building, new tower, 860 Harrison Ave., and 2-story building along Massachusetts Avenue.

2.3.2 HOUSING

The existing residential buildings (35 Northampton Street and 860 Harrison Avenue) at the Campus currently provide 347 low-rent units of housing to low wage earners, many of whom work in the adjacent medical district that includes Boston Medical Center, the Boston Public Health Commission, Boston University School of Medicine, and numerous other public and private employers (see Table 2-3: Residential Unit Types). The housing at 860 Harrison Avenue needs significant repair and restoration in order to continue to provide these valuable resources to the City of Boston. The renovation of 860 Harrison Avenue will (a) complete the work necessary to provide for the long-term stability and code compliance of the property, and (b) significantly improve the energy efficiency of the building and incorporate appropriate green building initiatives.

Table 2-3: Residential Unit Types

Unit Type	Existing/Approved 35 Northampton St	Proposed Renovation 860 Harrison Ave	Proposed New Building	Alternative One New Building
Efficiency	242	55	39	34
One Bedroom	3	21	118	103
Two Bedroom	0	26	61	53
Total	***245***	***102***	***218***	***190***

The proposed 23-story building will provide 218 new apartments, consisting of 39 efficiency apartments, 118 one-bedroom apartments, and 61 two-bedroom apartments. The residential building will be located at the corner of Albany and Northampton streets, relating well to the larger massing, scale, and urban fabric of the existing commercial and medical buildings in this area. The proposed design for the new building respects and complements the existing arrangement of the surrounding buildings. This location also places the building well away from the South End residential neighborhoods that are located north of Harrison Avenue.

2.3.3 FITNESS CENTER, GYMNASIUM, AND POOL

The Northampton Square Campus currently contains the South End Fitness Center (35,148 gsf) at the corner of Albany Street and Northampton Street that contains a weight and cardio workout room, a basketball court, and a swimming pool.

The Project will substantially improve access to the fitness center with a new entrance and lobby located along Northampton Street within the new Albany Tower. The lobby will provide elevator access to the three levels of the fitness center.

2.3.4 COMMERCIAL SPACE

The Miranda Creamer building, at the corner of Massachusetts Avenue and Albany Street, and a two-story storefront on Massachusetts Avenue are also part of the Project site. These two commercial spaces are currently being used as BPHC program office space.

2.3.5 PARKING AND CIRCULATION

An existing three-story parking garage that accommodates 539 parking spaces is contained within the Northampton Square Campus. The garage is currently neither handicap accessible, nor does it have any directly accessible paths into either of the existing residential buildings. A three and a half-story elevator connecting all three levels of the parking garage to the new main entry, lobby, management office, and mailroom in 860 Harrison Avenue was approved for construction in the previous project. Eleven (11) new handicap-accessible parking spaces within the garage will be provided. The new 23-story building will connect to the parking garage.

Parking for the Project, under either Build Alternative, will be accommodated within the existing public parking garage. Howard/Stein-Hudson Associates, Inc. conducted a detailed parking demand study of the existing public parking garage in June 2011, which is in Appendix 1, Transportation Study, and in August 2013. Both assessments indicated that there is adequate supply within this public parking garage to accommodate the parking demand associated with the new residential units, and/or office use, without affecting the current users. As described more fully in Chapter 4: Transportation, during the weekday mid-day period approximately 80% of the garage spaces are occupied, leaving approximately 100 unused spaces. The garage reaches its peak occupancy at about 2:00 p.m. Additionally, only about 29% of the garage spaces are used overnight. In other words, approximately 350 to 400 parking spaces are unused at night when parking demand from the 218 new residential units is expected to peak. Under an existing lease, the Boston Medical Center (BMC) is entitled to use up to 250 spaces at market rates for employees and visitors. Even with this commitment, the garage has adequate supply. In addition, to accommodate any surplus demand, the 1,250-space Crosstown Garage (a public garage) located just across Albany Street from the site, is currently significantly underutilized.

2.4 CONDOMINIUM STRUCTURE

The BPHC has converted the Site into a commercial condominium under the provisions of M.G.L. Chapter 183A, creating separate components of a mixed-use project for financing purposes. The condominium units that contain the residential buildings will be conveyed separately to ownership entities or leased to Trinity affiliates under long-term leases, in accordance with dictates of the financing for each of those condominium units. Unit 1 was conveyed to a BPHC affiliate and then leased to the Trinity affiliate, which is undertaking its renovation. Easements for utilities and access have been granted to meet the needs of the various components of the Project.

2.5 COMPLIANCE WITH BOSTON ZONING CODE

The Project is subject to land use controls contained in the City of Boston Zoning Code ("the Code"). In accordance with Article 80B of the Code, the Project is subject to the requirements of Large Project Review because it exceeds 50,000 square feet of new construction and 100,000 square feet of renovated space.

The Project is also subject to review by the Boston Civic Design Commission under Article 28 of the Code. The Project exceeds the thresholds for review by the Commission and thus the recommendation of the Boston Civic Design Commission will be sought prior to final BRA approvals.

The site is currently zoned as the Albany Street Medical Area Community Facilities sub district within the Roxbury Neighborhood District (Article 50 of the Code). This district was established to reflect the formerly predominant provision of health and educational services and is clearly outdated given the current uses on the site. Zoning relief is required and is proposed to be accomplished with a new Planned Development Area (PDA) designation. The PDA Development Plan will establish the use, dimensional and density requirements for the Project. In addition, like the approval for 35 Northampton Street, a 121A agreement will be needed for a real estate tax agreement for 860 Harrison Avenue in support of its affordable housing use.

The Project is within the Restricted Parking (Overlay) District established under Article 3, Section 3-1A. As no new parking facilities are proposed as part of the Project, the Project is consistent with the provisions of this district.

The Project is subject to Article 37 - Green Buildings of the Code. The new and retrofitted buildings will be LEED Certifiable.

The Project is subject to the South End Urban Renewal Plan (SEURP), as Amended. Minor Modifications to the SEURP were needed to in order to permit new development within a 20-foot setback area along Northampton and Albany streets, and to allow office use within 860 Harrison Avenue. These Minor Modifications were adopted and approved by the BRA on August 15, 2013.

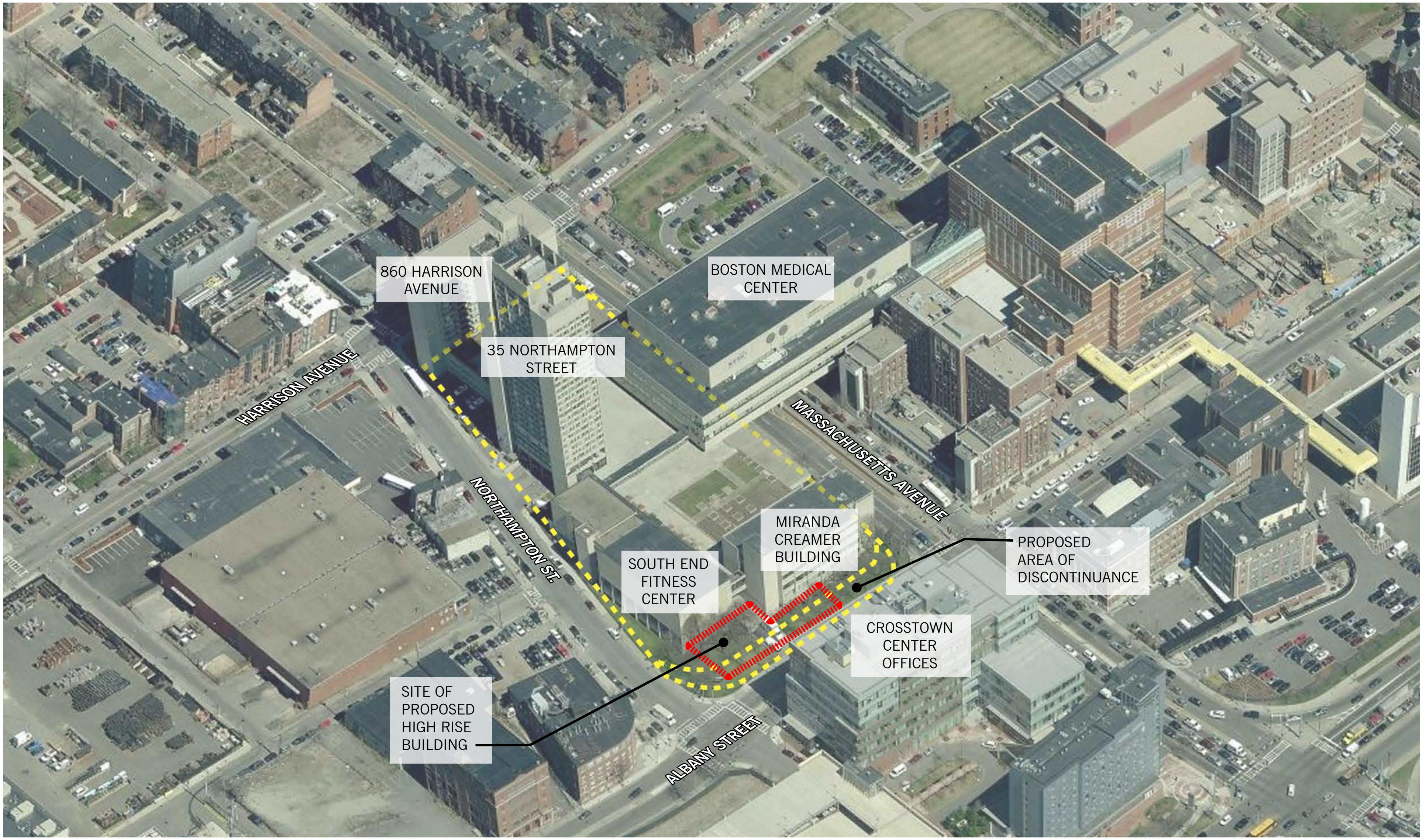
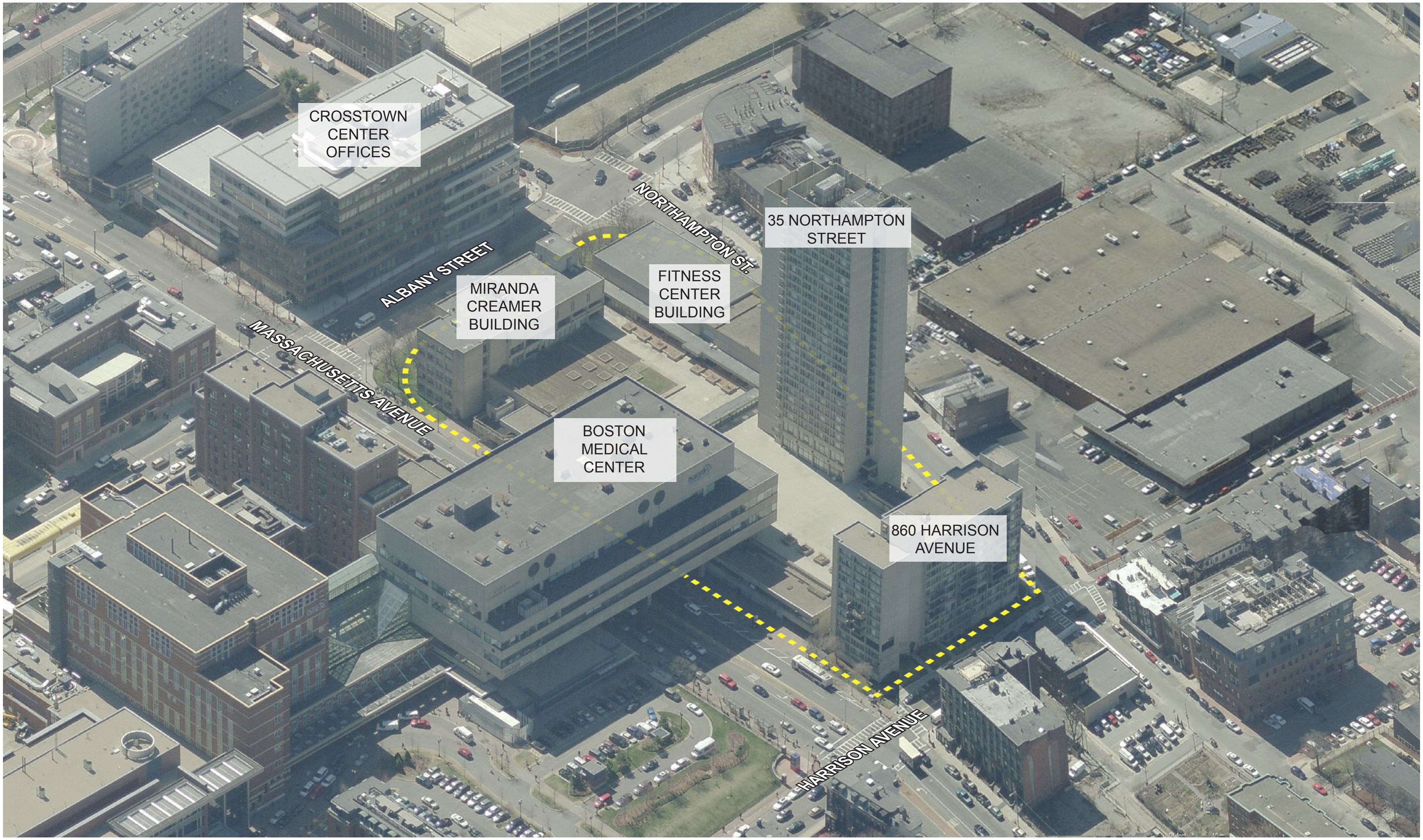


Figure 2-1
Aerial View - Looking North
Source: The Architectural Team, 2013



Northampton Square
Boston, Massachusetts

Figure 2-2
Aerial View - Looking South
Source: The Architectural Team, 2013

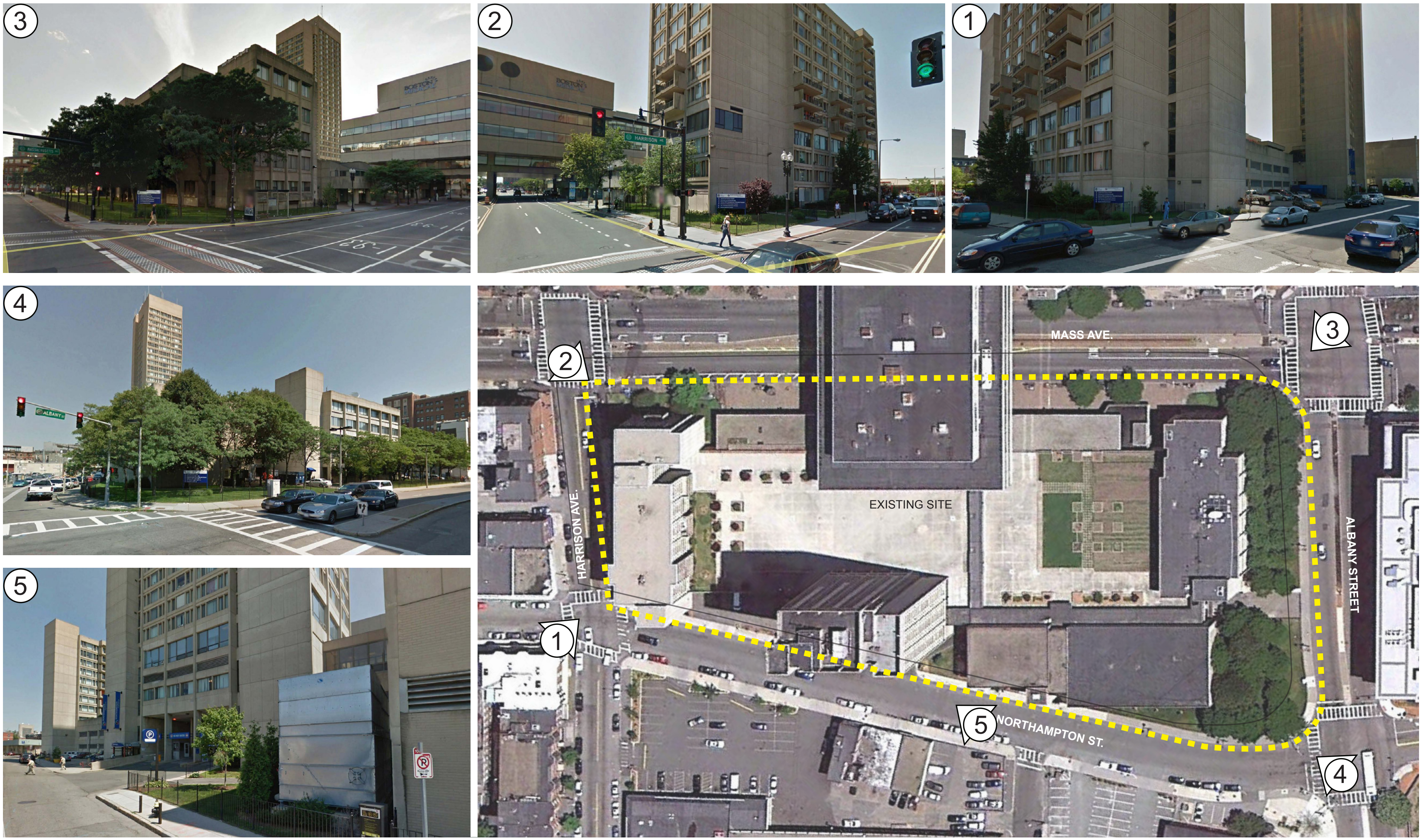


Figure 2-3
Existing Conditions - Ground Plane
Source: The Architectural Team, 2013

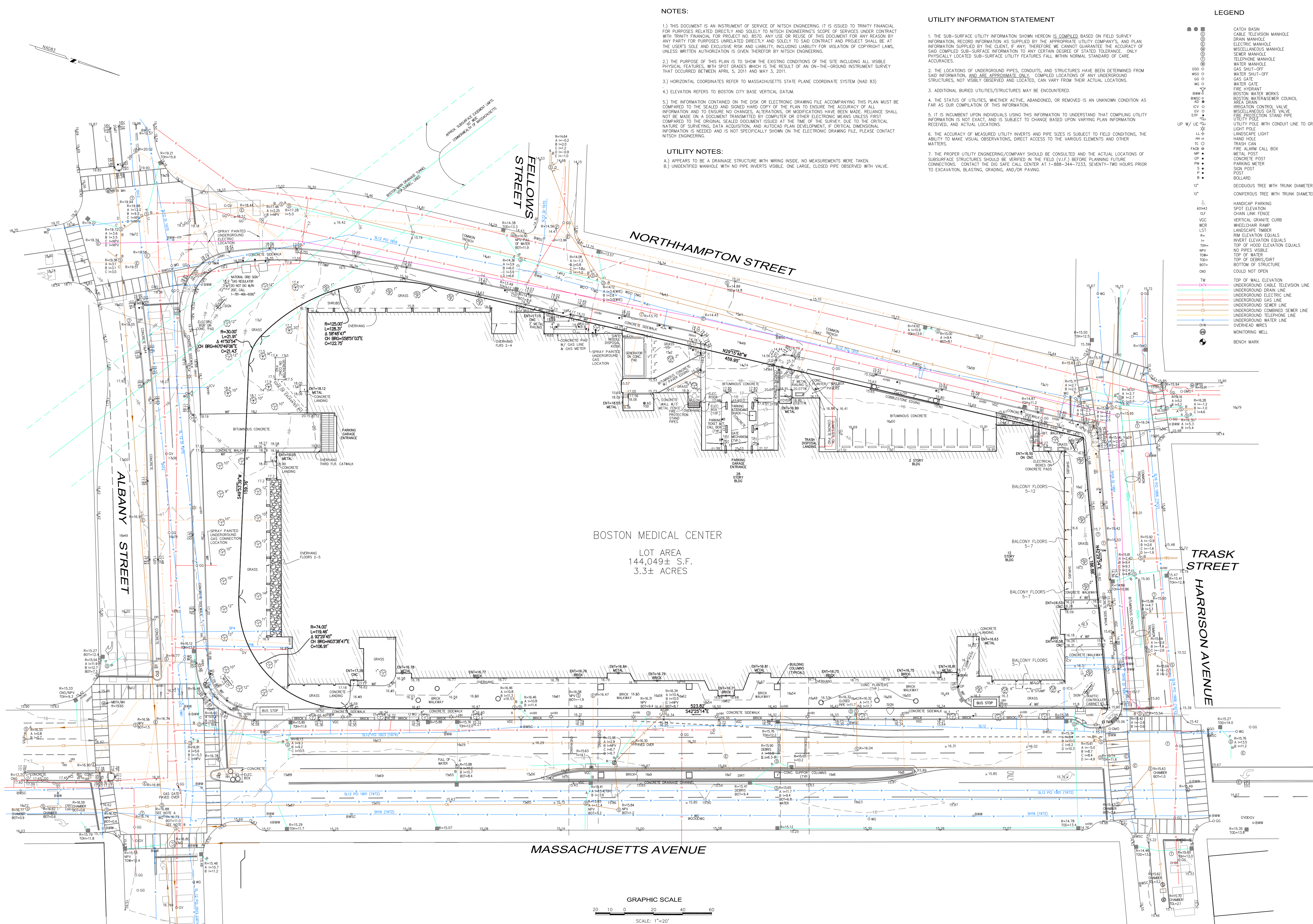


Figure 2-4
Existing Conditions
Source: Nitsch Engineering, 2013

Chapter 3

URBAN DESIGN

3.0 URBAN DESIGN

3.1 INTRODUCTION

The Northampton Square Campus, built between 1969 and 1973, was originally built to house the Boston City Hospital School of Nursing, which closed in 1991. The Campus today consists of a 12-story residential building on Harrison Avenue, a 29-story residential tower (Northampton Tower), 3-story fitness center on Northampton Street, a 2-story commercial building along Massachusetts Avenue, and the Miranda Creamer Building, a 5-story office building on Albany Street. The Campus is also connected to the Yawkey Ambulatory Care Center at the Boston Medical Center by a structure that spans Massachusetts Avenue. All of the buildings are linked by a 3-level (above-grade) parking garage with 539 spaces. See Figures 2-1, 2-2, and 2-3.

Although currently home to hundreds of residents and employees, and located along important Boston public streets, the site lacks urban vitality. The buildings currently do not engage the street in a positive way for pedestrians. The notable lack of activity and transparency at the ground floor levels of the buildings compromises the pedestrian experience significantly.

The Proponent recognizes that there is a great and unique opportunity to transform and re-energize Northampton Square into a vibrant mixed-use development, and in the process, improve the public realm for most of an entire city block.

The redevelopment of Northampton Square has two phases. Phase 1, which was approved in 2012, involved the rehabilitation of the Northampton Tower at 35 Northampton Street and the construction of a ground-level connector between this building and 860 Harrison Avenue along Northampton Street. The program for this phase (Phase 2) of the Northampton Square redevelopment includes 320 total units (292 in Alternative One), split between two residential buildings. The existing 12-story building at 860 Harrison Avenue will be rehabilitated and includes 102 units and approximately 5,800 square feet (sf) of office space (5,800 sf of office space will be part of Unit 1). Figure 3-1 through Figure 3-14 show the floor plans, elevations, and a section of the proposed Project. A new, 218-unit, 23-story building (Albany Tower) is proposed at the corner of Albany and Northampton streets. In addition to the residential use, the building will also include a new main entrance and lobby for the fitness center along Northampton Street. The fitness center lobby will provide access to a new elevator that will serve the center's three levels. The new building will also include a new main entrance for the Miranda Creamer Building along Albany Street as well as approximately 5,600 sf of additional office space.

3.2 URBAN DESIGN PRINCIPLES

Northampton Square is located in a dynamic urban context at the juncture of Boston Medical Center Campus to the east, commercial and light industrial uses to the south and west, and the South End residential neighborhoods to the north. The urban design principles for the redevelopment of Northampton Square seek to reinforce the vitality and quality of life that is found in many areas of the surrounding neighborhoods and improve connectivity to neighboring areas by creating a pedestrian friendly and active public realm (see Figure 3-15, Public Realm Plan). Specifically, the urban design principles governing this Project are to:

- Enhance the public realm and pedestrian experience by rejuvenating the street edge with streetscape improvements and new ground floor uses.
- Recognize, respect, and reinforce the scale and character of the existing development as well as the surrounding area.
- Create new construction that is compatible with the existing Northampton Square buildings, while introducing a new diversity of architectural expression.
- Create new public open space and improve existing open spaces as outdoor amenities for residents and the public.
- Improve the environmental performance of the development.

As noted above, the existing streetscape and public realm about the Northampton Square Campus does not currently offer a good pedestrian experience. In its current state, the ground plane edge features primarily blank concrete walls and a host of mechanical and service equipment associated with the building. The main entrances for the various uses are not fitting for their use or their location. The fitness center does not in fact have an independent entrance, but shares the Northampton Tower residential entrance. The entrance to the Miranda Creamer building is not effectively available from the street, except through two fire egress stairs. In order to rejuvenate the streetscape and improve the public realm, the following improvements will be implemented as part of the overall Project:

Harrison Avenue – The approved Phase 1 design includes the replacement of the existing nondescript entry and blank concrete walls at 860 Harrison Avenue with a new vibrant and transparent main entry lobby addition at the corner of Harrison Avenue and Northampton Street. Phase 2 will build on this improvement with the addition of new large window opening created in existing blank concrete walls at the ground floor that will make new residential common spaces visually accessible from the street.

35 Northampton Street - The approved Phase 1 design includes removal of the existing parking lot and trash compactor on Northampton Street and replacement with a new glass structure that will link the 860 Harrison Avenue main entry lobby and the amenity/management space to the Northampton Tower elevator lobby. The dynamic contemporary form of the link structure, with a high percentage of transparent glass walls,

will provide a marked contrast and relief from the solid walls of concrete that currently dominate the ground plane. Phase 2 will make further improvements to the public realm along Northampton Street. A new main entry at the ground floor of the new building will give the fitness center a direct pedestrian entrance on Northampton Street as well providing the fitness center a new public face and identity. A new pocket park, located adjacent to the fitness center entry, will activate an existing underutilized area of the site while softening the existing concrete walls of the fitness center with new plantings, ornamental trees, and seating areas.

Albany Street – The most striking public realm improvements for the Project will occur along Albany Street. A new glass ground floor entry lobby for the Miranda Creamer Building is proposed at the north end of the new building providing a new public identity for the BPHC office building. North of this entrance, at the corner of Massachusetts Avenue, a new public plaza is proposed, marking the office entry lobby and providing a unique outdoor space with numerous trees, plantings, specialty paving, and ample seating. An independent residential entrance lobby is proposed at the south end of the new building, at the corner of Northampton Street. Combined with the adjacent fitness center entrance and pocket park on Northampton Street, this important corner will be greatly enhanced and activated for pedestrians. A new outdoor arcade extends the Albany Street sidewalk under the footprint of the new building, providing a pleasant pedestrian connection between the office entry and plaza to the north and residential and fitness center entries to the south.

The site survey revealed that Albany Street has been significantly reconfigured leaving a wide piece of land between the property line adjacent to the Miranda Creamer building and the back of the Albany Street sidewalk. The City's easement rights in this abandoned portion of the Albany Street Right-of-Way were never discontinued although it has functioned as part of the Northampton Square parcel and has been maintained by the BPHC. A petition to the Boston Public Improvement Commission will be filed to formally discontinue the City's easement rights leaving the fee interest with the BPHC. Easements for the few utilities within the area of discontinuance are being prepared.

Massachusetts Avenue – Streetscape and public realm improvements are proposed along Massachusetts Avenue in front of the north end of the 860 Harrison Avenue Building, near the corner of Harrison Avenue. The existing ground floor mechanical room at 860 Harrison Avenue that currently fronts on Massachusetts Avenue will be shifted to a new rooftop mechanical room allowing for the introduction of new office space. The existing blank concrete walls and mechanical louvers will be replaced with new transparent storefront glazing and an entry and canopy for the new office space. To mark the new office entrance and enhance this portion of Massachusetts Avenue, a small entry plaza is proposed. The plaza will feature new seating, plantings, specialty paving, and a new sculpture and lighting element focal point located near the corner.

3.3 MASSING, FORM, AND FAÇADE DESIGN

The proposed design for the new Albany Tower respects and complements the existing arrangement of surrounding buildings. The height and density of this new building is appropriately concentrated along Albany Street, relating well to the larger massing, scale, and urban fabric of the existing commercial and medical buildings in this area and locating the building well away from the South End residential neighborhoods north of Harrison Avenue.

The height and massing of the new building is designed to complement the scale and character of existing surrounding buildings as well as future developments approved at nearby Boston Medical Center parcels. At approximately 251 feet tall, the proposed building is lower than, but relates well to the approximately 270 foot tall existing Northampton Tower. The height will also be consistent with future approved projects such as the proposed 14-story/210 feet Inpatient Building for Boston Medical Center, proposed opposite the north end of the Miranda Creamer Building on Massachusetts Avenue, and the 19-story building approved for the Albany Fellows future development, just south of the Northampton Square development, on Albany Street and Fellows Street. Collectively, these buildings will work as an urban composition within the city, emphasizing the importance of the Boston Medical Center, Boston Public Health Commission, and the transformed Northampton Square development.

The façade treatment and form of the new building are designed to be compatible with the existing Northampton Square buildings, while introducing a new diversity of architectural expression. The new building's form is organized to create a slender and vertical appearance, complementing the proportions of the existing 35 Northampton Street tower. To accentuate the slender appearance, the ends of the building are articulated with glass curtainwall and metal panel, configured to emphasize a vertical proportion. The transparent ends mark the entries at grade and extend to the roof top, engaging a mechanical penthouse structure with angular rooflines that contrasts the regular shape of the existing tower. The dynamic penthouse structure adds a contemporary element to the areas skyline that is distinct. Between the building's transparent ends, the exterior building face will be carefully articulated with precast concrete and some elements of metal panel infill.

3.4 GREEN ROOF

The Project will include a substantial green roof with gardens and deck areas as an amenity for residents and tenants of the various buildings. Proposed on the garage rooftop, the green roof includes both active and passive recreational areas. At the west end of the green roof, a tot lot and seating areas are proposed. At the east end, an existing vegetable garden will be maintained and improved. New walkways, surrounded by sedum and other plantings, connect these outdoor spaces to the various buildings. At just over 50,000 SF, the garage roof offers an enormous opportunity to create a unique urban green roof amenity, including urban farming, while allowing a material reduction of heat island effect and helping to manage rain water.

3.5 SERVICE AND LOADING

Loading for the Project is via an interior loading dock located on Albany Street with the entry/exit remaining its current location. This interior loading dock, with two bays, will service the entire development with service routes through the garage connecting to the various buildings.

3.6 SUSTAINABLE DESIGN

3.6.1 SUSTAINABLE DESIGN PRINCIPLES

The Northampton Square Project incorporates a wide range of sustainable design initiatives at both the proposed rehabilitation and new construction portions of the Project. The rehabilitation of 35 Northampton Street and 860 Harrison Avenue will transform the existing outdated buildings; reducing energy consumption and water usage, improving stormwater management, maximizing open space and improving indoor air quality. The proposed Albany Street tower will similarly exemplify the best practices of sustainable design as outlined below.

3.6.2 ARTICLE 37 – GREEN BUILDINGS

Article 37 of the Boston Zoning code requires that projects be designed as certifiable under the U.S. Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED) program. The new construction portion of the Project, the proposed Albany Street tower, will comply with Article 37 requirements for LEED certifiable status. The project team expects the Albany Tower to achieve a LEED NC Silver level (see Figure 3-16, LEED Checklist - Albany Tower). The rehabilitation portion of the Project, 860 Harrison Avenue, also incorporates numerous sustainable design features and is expected to be LEED certifiable. The following narrative outlines the LEED NC 2009 credits applicable to the proposed 23-story building.

3.6.3 PREREQUISITE AND CREDIT NARRATIVE FOR THE NEW ALBANY STREET TOWER

Sustainable Sites (SS)

- *Prerequisite 1* - The Project Team will develop and implement an erosion and sedimentation control plan that is compliant with the 2003 EPA General Permit requirements for the Albany Street tower to reduce the pollution from construction activities by controlling soil erosion, waterway sedimentation, and airborne dust generation.

- *Credit 1* **-** The location of the Albany Street tower will not disturb or disrupt any farmland, endangered species, wetlands or bodies of water making it eligible for SS Credit 1, Site Selection. In fact, this Project will make use of a densely populated and presently developed urban site.

- *Credit 2* – The Albany Street tower is located in a dense, mixed-use neighborhood of commercial and residential occupancy with pedestrian access and a large selection (greater than 10) of basic services in the area.

- *Credit 4.1* – This Project is proximate (less than a 1/4 mile) to several MBTA bus stops which provide connectivity throughout the city.

- *Credit 4.2* – The Project will provide covered storage facilities for securing one bicycle per unit, up to 218 storage units, for the residents of the Albany Street tower.

- *Credit 4.3* – Residents and visitors of the Albany Street tower will have access to, at minimum, two fuel-efficient Zipcars in a preferred parking space in the adjacent garage.

- *Credit 4.4* – Given the capacity of parking that currently exists on the Northampton Square site and detailed analysis by traffic engineers related to current use, we are proposing that there be no new parking associated with the development of this Project.

- *Credits 6.1 and 6.2* – As part of the redevelopment, the Project Team will be evaluating the ability of the Albany Street tower site to meet these criteria related to stormwater quantity reduction and quality improvement.

- *Credit 7.1* – At least 50% of the Albany Street tower site's hardscape will have a SRI of at least 29.

- *Credit 7.2* – The Project will be specifying roofing materials with a high SRI to meet the requirements of this credit.

Water Efficiency (WE)

Prerequisite 1 – The building will use high performance, water efficient fixtures in bathrooms and kitchens reducing the burden on the municipal water supply and waste water systems. We expect water savings to exceed 30% as compared to the baseline.

- *Credit 2 – Plan*tings at the Albany Street tower site will be minimal and drought tolerant. Trees and groundcover around the site perimeter will be drought tolerant and will only use minimal irrigation. In addition, new plantings and ground cover on the shared garage roof area will be drought tolerant.

- *Credit 3* – The building will use high performance, water efficient fixtures in bathrooms and kitchens reducing the burden on the municipal water supply and waste water systems. We expect water savings to exceed 30% as compared to the baseline.

Energy & Atmosphere (EA)

- *Prerequisite 1* – The Project Team will engage a certified commissioning agent to carry out fundamental commissioning of the building's energy systems**.**

- *Prerequisite 2* – The building will exceed the ASHRAE 90.1 Energy Performance standard by at least 20% through the implementation of a high performance building envelope, high efficiency lighting and mechanical systems, and the incorporation of renewable technologies such as solar thermal. Once the geometries of the building are solidified through the BCDC review and approval process, an early stage energy model will be built to confirm compliance and be used as a decision making tool.

- *Prerequisite 3* – The Project will not incorporate the use of CFC based refrigerants in building heating, cooling, ventilation, and refrigeration.

- *Credit 1* - The building will exceed the ASHRAE 90.1 Energy Performance standard by at least 20% through the implementation of a high performance building envelope, high efficiency lighting and mechanical systems, and the incorporation of renewable technologies such as solar thermal. This will be confirmed through the energy modeling process.

- *Credit 3* – Trinity will engage the required commissioning agent to provide enhanced commissioning services.

- *Credit 5* – Trinity will develop a metering and tracking protocol for energy use at this building that meets the Measurement and Verification requirements.

Materials & Resources (MR)

- *Prerequisite 1* – The Albany Street tower will have easily-accessible designated areas for collection and storage of recyclable materials.

- *Credit 2* – The project team will implement a construction waste management plan that identifies materials to be diverted from disposal and how collection of the materials will be done on site. At least 75% of the demolition and construction debris from the Project will be diverted from landfills.

- *Credit 4* – At least 20% of the materials cost for this Project will be from materials with recycled content.

- *Credit 7 (maybe)* – The project team is investigating the financial feasibility of incorporating 50% of the cost of wood based materials derived from wood that is FSC certified.

Indoor Environmental Quality (IEQ)

- *Prerequisite 1* – The Project will meet the minimum requirements of Sections 4 through 7 of ASHRAE 62.1-2007 for mechanically ventilated spaces.

- *Prerequisite 2* - Residents will be prohibited from smoking in their units, any common areas in the building, as well as anywhere that is within 25 feet of entries, air intakes, and operable windows.

- *Credit 3.1* – The project team will develop and implement an Indoor Air Quality Management Plan (IAQ) which meets all stated requirements to be implemented by the contractor during the construction and preoccupancy phases of the building.

- *Credit 4.1* – The project team will require that all sealants and adhesives are low VOC as outlined in the South Coast Air Quality Management District (SCAQMD) regulations.

- *Credit 4.2* – The building will only include low or no VOC paints and coatings certified by Green Seal.

- *Credit 4.3* – All carpet and associated products used in the building will be CRI Green Label Plus certified. Any hard surface flooring will be FloorScore certified. All adhesives and finishes will meet applicable VOC thresholds.

- *Credit 4.4* – All composite wood used on the interior of the building will contain no added urea-formaldehyde resins.

- *Credit 6.1* – The design will provide for individual lighting controls for at least 90% of building occupants and lighting system controllability will be supplied for all shared and multi-occupant spaces to enable lighting adjustments.

- *Credit 6.2* – This Project will provide individual comfort controls for a majority of building occupants. All units will have individual thermostatic control. In addition, office space will have individual control. Shared multi-occupant spaces will have controls that can be adjusted to suit group needs and preferences.

- *Credit 7.1* – The building will include an HVAC system and building envelope designed to meet the requirements of ASHRAE Standard 55-2004.

- *Credit 7.2* – Trinity will provide residents with a thermal comfort survey at approximately 10 months after occupancy. The survey will collect responses to overall satisfaction with thermal performance and if more than 20% of occupants are dissatisfied, corrective action will be taken.

- *Credit 8.1* – The Albany Street tower will incorporate daylight glazing throughout the building; at least 75% of the regularly occupied areas will be daylight.

- *Credit 8.2* – The glazing at this building will also provide views to at least 90% of the regularly occupied building areas.

Innovation & Design (ID)

- *Credit 1.2* - The Project will earn an exemplary performance point for exceeding the public transportation access thresholds set by SS Credit 4.1.

- *Credit 1.3* – The Project will earn an exemplary performance point for exceeding the development density and community connectivity thresholds set by SS Credit 2.

- *Credit 2* – NEI's Lauren Baumann is an LEED accredited professional (BD&C and Homes) and is the green and sustainable design consultant on the Albany Street Tower Project.

3.6.4 PREREQUISITE AND CREDIT NARRATIVE FOR 860 HARRISON AVENUE

Sustainable Sites (SS)

- *Prerequisite 1* - The Project Team will develop and implement an erosion and sedimentation control plan that is compliant with the 2003 EPA General Permit requirements for the existing residential complex to reduce the pollution from construction activities by controlling soil erosion, waterway sedimentation, and airborne dust generation.

- *Credit 1* –Given the existing nature of this Project, the rehabilitation work will not disturb or disrupt any farmland, endangered species, wetlands or bodies of water making it eligible for SS Credit 1, Site Selection.

- *Credit 2* – The existing residential complex is located in a dense, mixed-use neighborhood of commercial and residential occupancy with pedestrian access and a large selection (greater than 10) of basic services in the area.

- *Credit 4.1* – This Project is in very close proximity (less than a 1/4 mile) to several MBTA bus stops which provide connectivity throughout the city.

- *Credit 4.2* – The Project will provide 20 covered bicycle storage spaces in the parking garage for the residents of 860 Harrison St.

- *Credit 4.3* – Residents of 860 Harrison Street will have access to, at minimum, one fuel-efficient Zipcar in a preferred parking space in the adjacent garage.

- *Credit 4.4* – Given the capacity of parking that currently exists on the Northampton Gardens site and detailed analysis by traffic engineers related to current use, there will be no new parking associated with the rehabilitation of this Project.

- *Credit 5.2* – As part of the redevelopment of the site, the roof of the adjacent parking structure will be converted into usable green space for resident enjoyment. The area of this space far exceeds the 20% requirement of this credit.

- *Credit 7.1* – At least 50% of the existing residential complex's hardscape will have a SRI of at least 29.

- *Credit 7.2* – The Project will include the use of a light colored roof materials that meets the SRI requirements of this credit.

Water Efficiency (WE)

- *Prerequisite 1* – The building will be outfit with high performance, water efficient fixtures in bathrooms and kitchens reducing the burden on the municipal water supply and waste water systems. We expect water savings to exceed 30% as compared to the baseline.

- *Credit 2* – Plantings incorporated into the redesign of the garage building green roof will be chosen for a combination of aesthetics and drought tolerance. Ground covers such as sedum will be planted where water intensive turf is typically installed. We expect that this, along with an efficient irrigation system that makes use of storm water, will result in a 50% reduction of irrigation water needed for the site as compared to the baseline assumptions.

- *Credit 3* – The building will use high performance, water efficient fixtures in bathrooms and kitchens reducing the burden on the municipal water supply and waste water systems. We expect water savings to exceed 30% as compared to the baseline.

Energy & Atmosphere (EA)

- *Prerequisite 1* – A limited commissioning scope will be provided for the Project. The Commissioning Agent will be a member of the M and P engineering staff. All new equipment and major existing pieces of equipment will be reviewed for proper installation and operation by this individual.

- *Prerequisite 2* – The work being done as a part of the rehabilitation of these buildings will have a marked and significant impact on its overall energy consumption. Andelman and Lelek Engineering were engaged to model the building to predict the energy savings. Their study indicates a 19% reduction, by cost, of gas and electric expenditures based on the scheduled envelope and system improvements.

- *Prerequisite 3* – The Project will not incorporate the use of CFC based refrigerants in building heating, cooling, ventilation and refrigeration.

- *Credit 1* – The study by Andelman and Lelek Engineering indicates a 19% reduction, by cost, of gas and electric expenditures based on the scheduled envelope and system improvements.

Materials & Resources (MR)

- *Prerequisite 1* – The building will have easily-accessible designated areas for collection and storage of recyclable materials in the trash rooms on each floor.

- *Credit 1.1* – 100% of the existing walls, floors, and roofing structure will be maintained during this rehabilitation.

- *Credit 1.2* – The Project team will be rehabilitating the building with a careful eye towards retaining and reusing interior non-structural elements where possible, and will exceed a retention percentage of 50% for these elements.

- *Credit 2* – The Project team will implement a construction waste management plan which indentifies materials that will be diverted from disposal and how collection of the materials will be done on site. At least 75% of the demolition and construction debris from the Project will be diverted from landfills.

- *Credit 4* – At least 20% of the materials cost for this Project will be from materials with recycled content.

Indoor Environmental Quality (IEQ)

- *Prerequisite 1* – The rehabilitation of this building complies with all of the mandatory requirements of ASHRAE 62.1-2007.

- *Prerequisite 2* - Upon lease turnover, the units at 35 Northampton Street will become non-smoking. Residents will be prohibited from smoking in any common areas in the building, as well as anywhere that is within 25 feet of entries, air intakes, and operable windows.

- *Credit 3.1* – The Project team will develop and implement an Indoor Air Quality Management Plan (IAQ) which meets all stated requirements to be implemented by the contractor during construction. This is a credit of particular importance given the occupied nature of the building during the construction period, and much care will be taken to ensure a healthy environment for residents.

- *Credit 4.1* – The Project team will require that all sealants and adhesives are low VOC as outlined in the South Coast Air Quality Management District (SCAQMD) regulations.

- *Credit 4.2* – The building will only include low or no VOC paints and coatings certified by Green Seal.

- *Credit 4.3* – All carpet and associated products used in the building will be CRI Green Label Plus certified. Any hard surface flooring will be FloorScore certified. All adhesives and finishes will meet applicable VOC thresholds.

- *Credit 4.4* – All composite wood used on the interior of the building will contain no added urea-formaldehyde resins.

- *Credit 6.1* – The design will provide for individual lighting controls for at least 90% of building occupants and lighting system controllability will be supplied for all shared and multi-occupant spaces to enable lighting adjustments.

- *Credit 6.2* – This Project will provide individual comfort controls for a majority of building occupants. All units will have individual thermostatic control. In addition, office space will have individual control. Shared multi-occupant spaces will have controls that can be adjusted to suit group needs and preferences.

- *Credit 8.1* – This building has a significant amount of glazing which provides daylighting to at least 75% of the regularly occupied areas.

- *Credit 8.2* – The glazing at this building will also provide views to at least 90% of the regularly occupied building areas.

Innovation & Design (ID)

- *Credit 1.2* - The Project will earn an exemplary performance point for exceeding the public transportation access thresholds set by SS Credit 4.1.

- *Credit 1.3* – The Project will earn an exemplary performance point for exceeding the development density and community connectivity thresholds set by SS Credit 2.

- *Credit 2* – NEI's Lauren Baumann is an LEED accredited professional (BD&C and Homes) and is the green and sustainable design consultant on the Northampton Square Project.

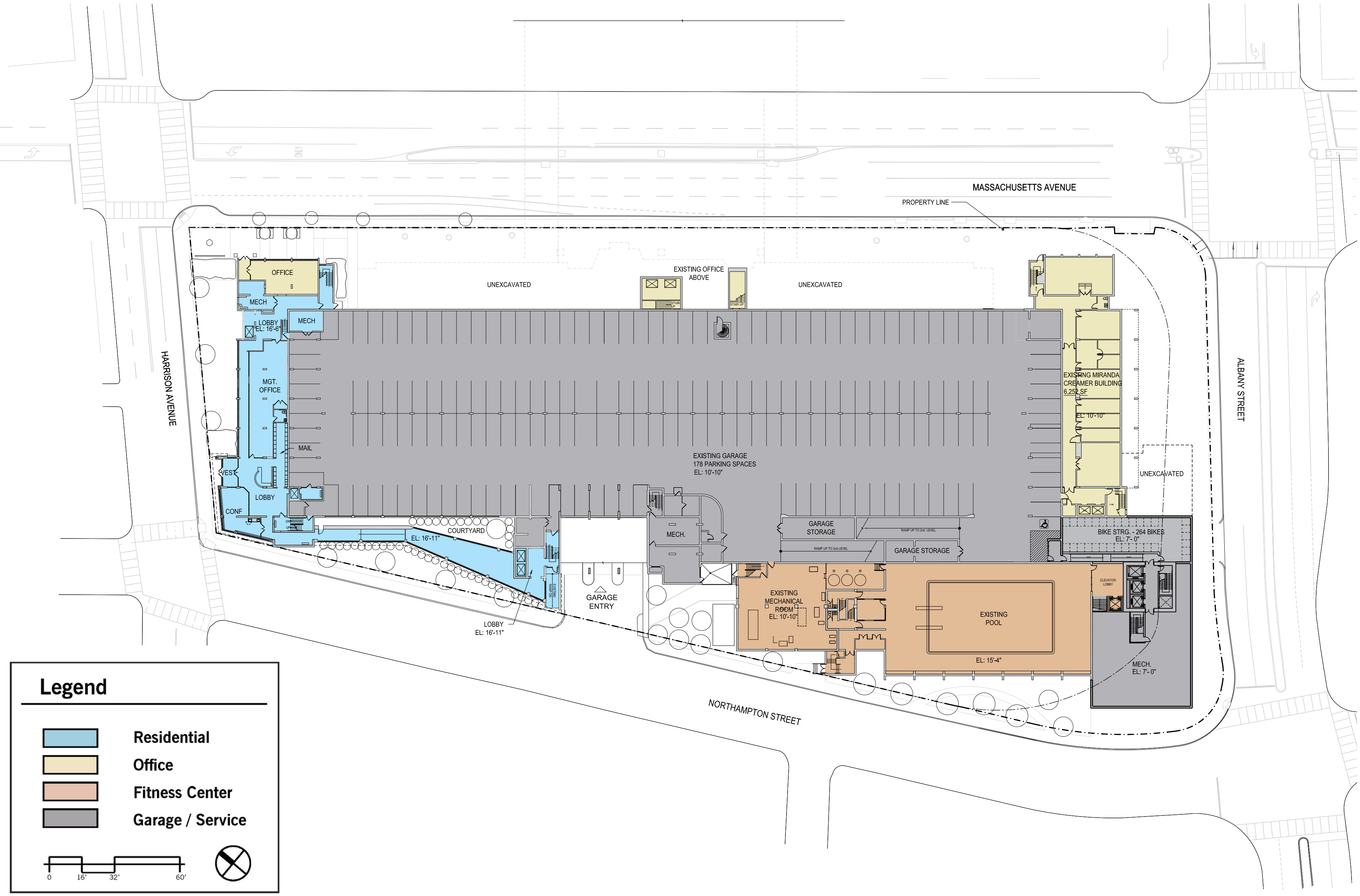


Figure 3-1
First Floor Plan / Parking Level 1
Source: The Architectural Team, 2013

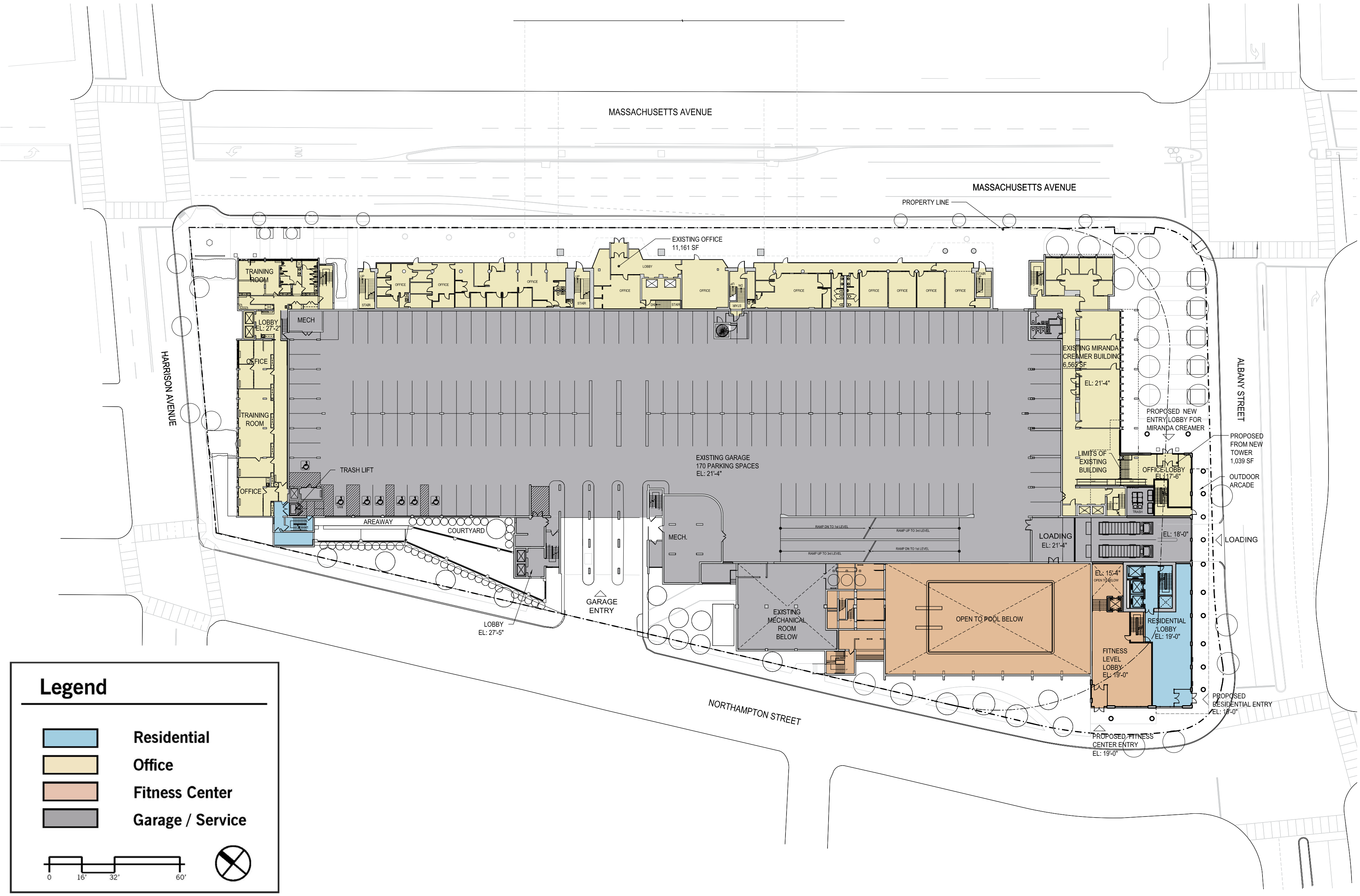


Figure 3-2
Second Floor Plan / Parking Level 2
Source: The Architectural Team, 2013

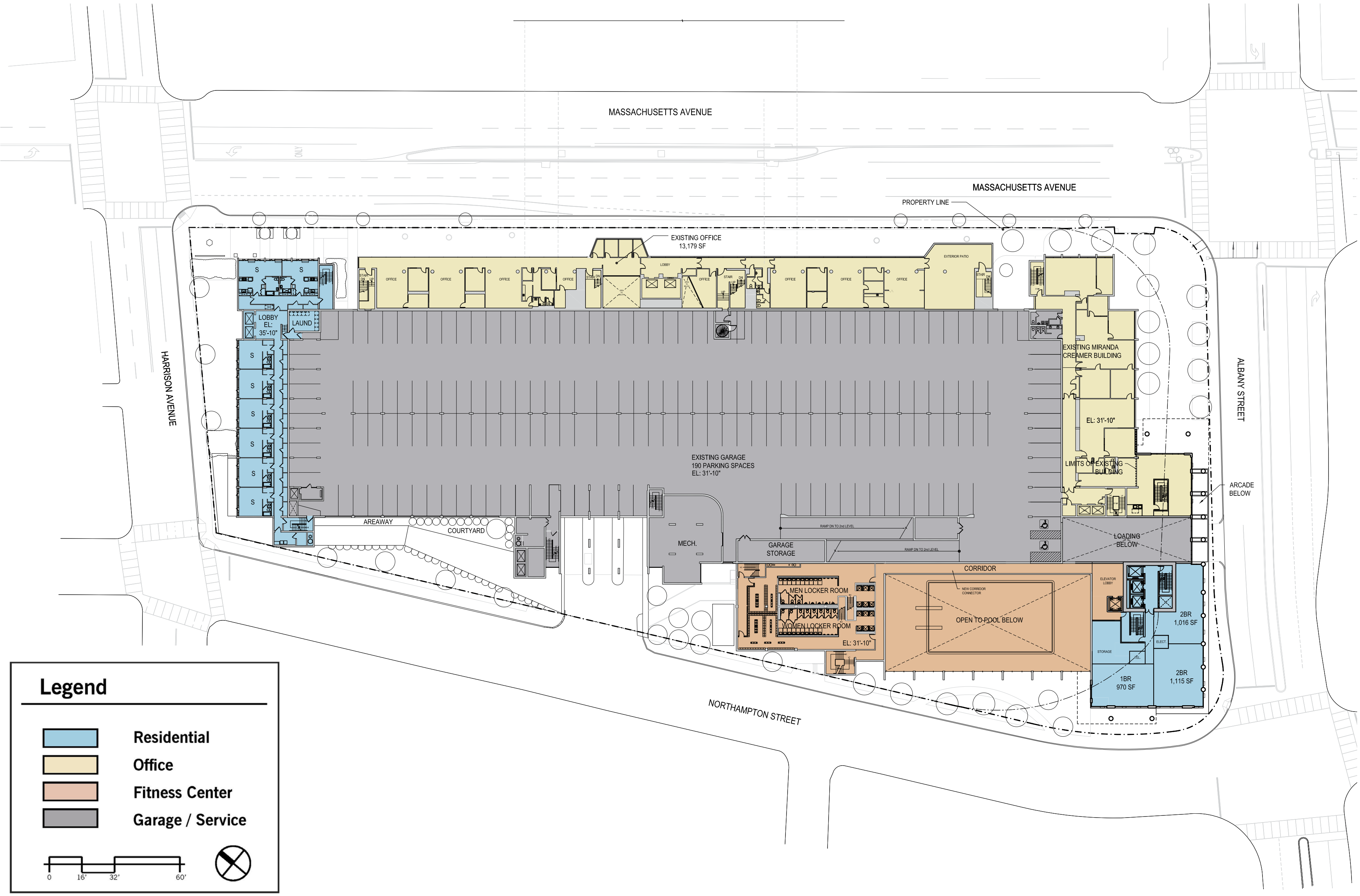


Figure 3-3
Third Floor Plan / Parking Level 3
Source: The Architectural Team, 2013

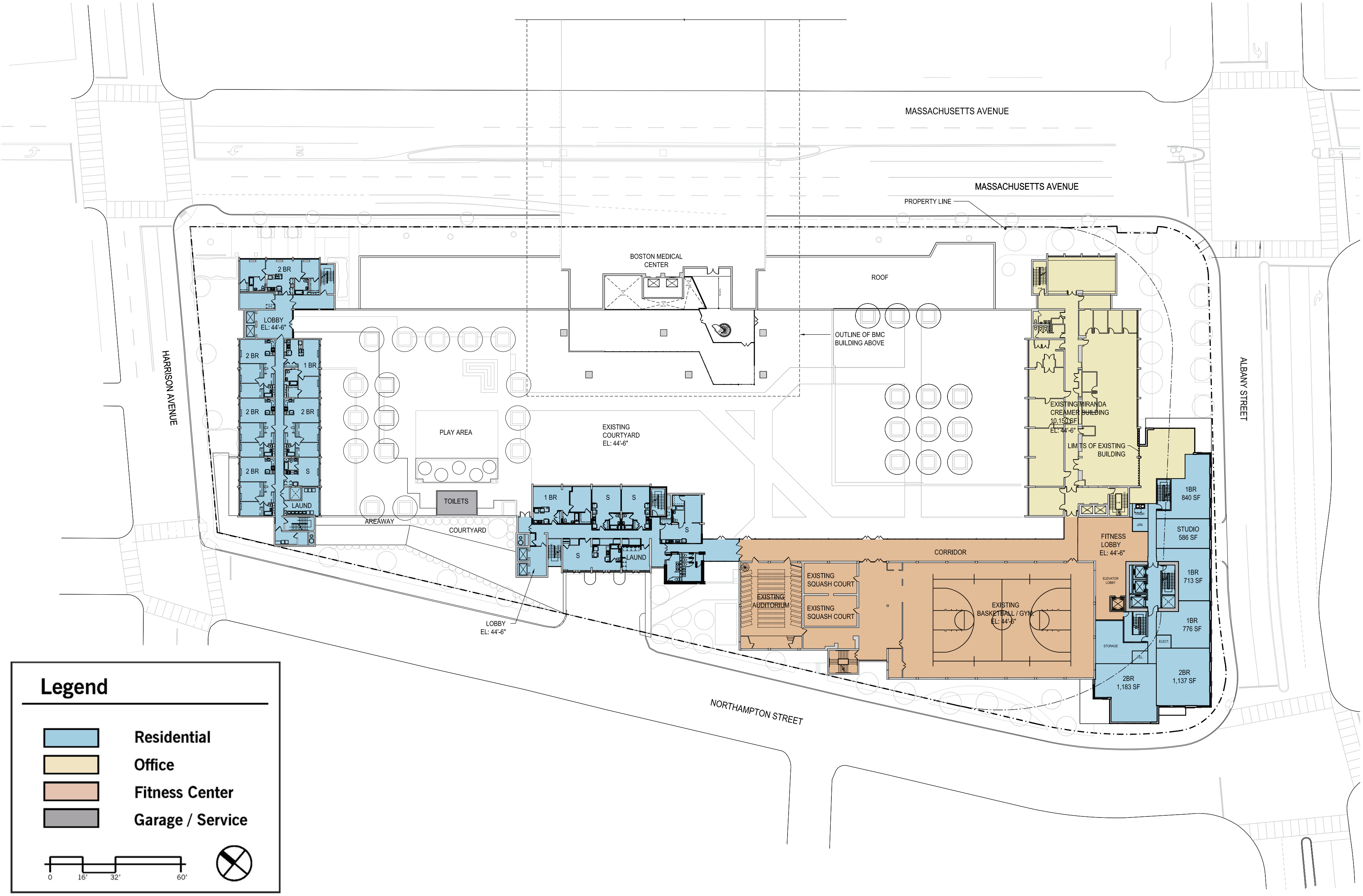


Figure 3-4
Fourth Floor Plan
Source: The Architectural Team, 2013

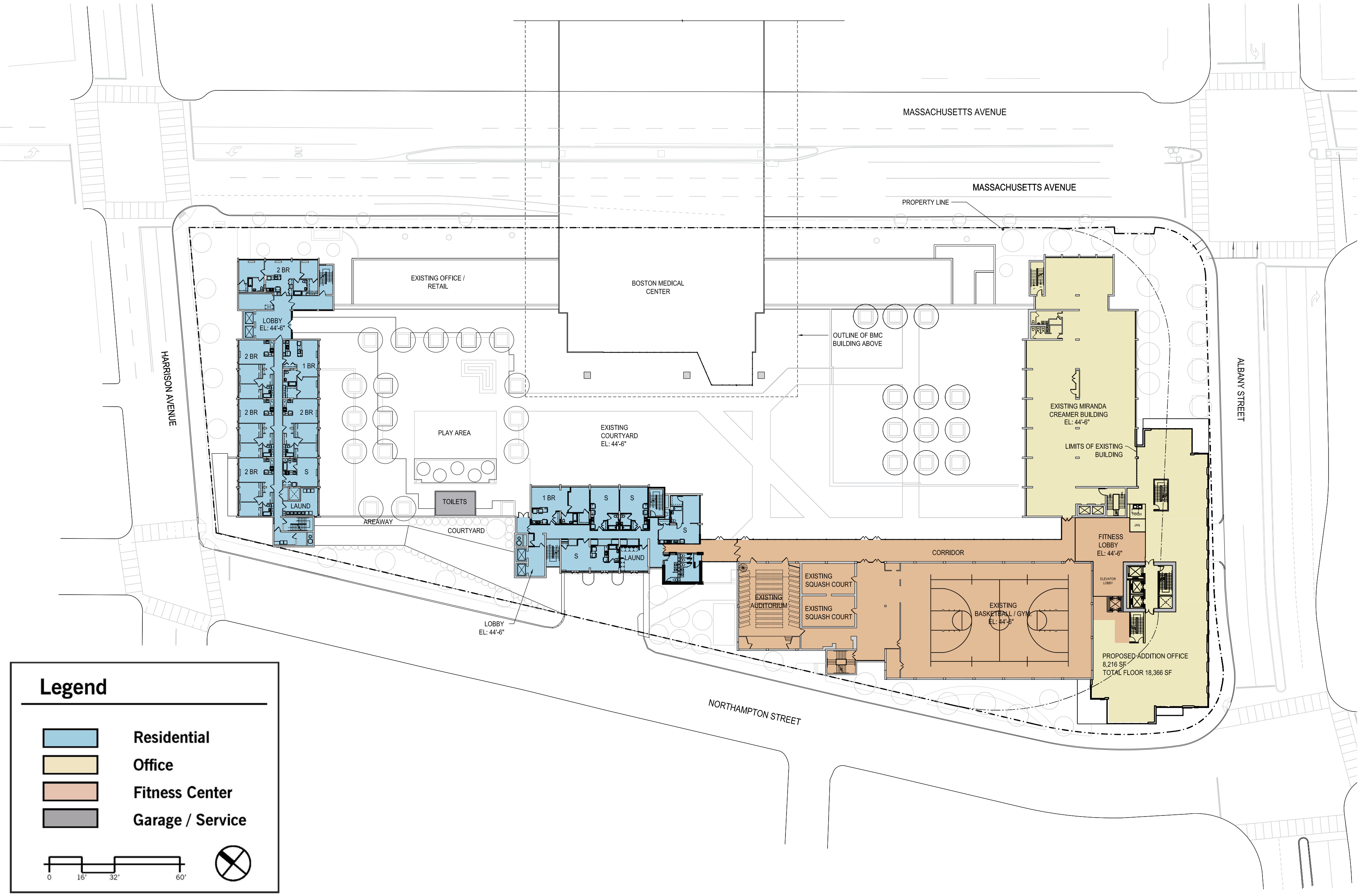


Figure 3-5
Fourth Floor Plan (Alternative One)
Source: The Architectural Team, 2013

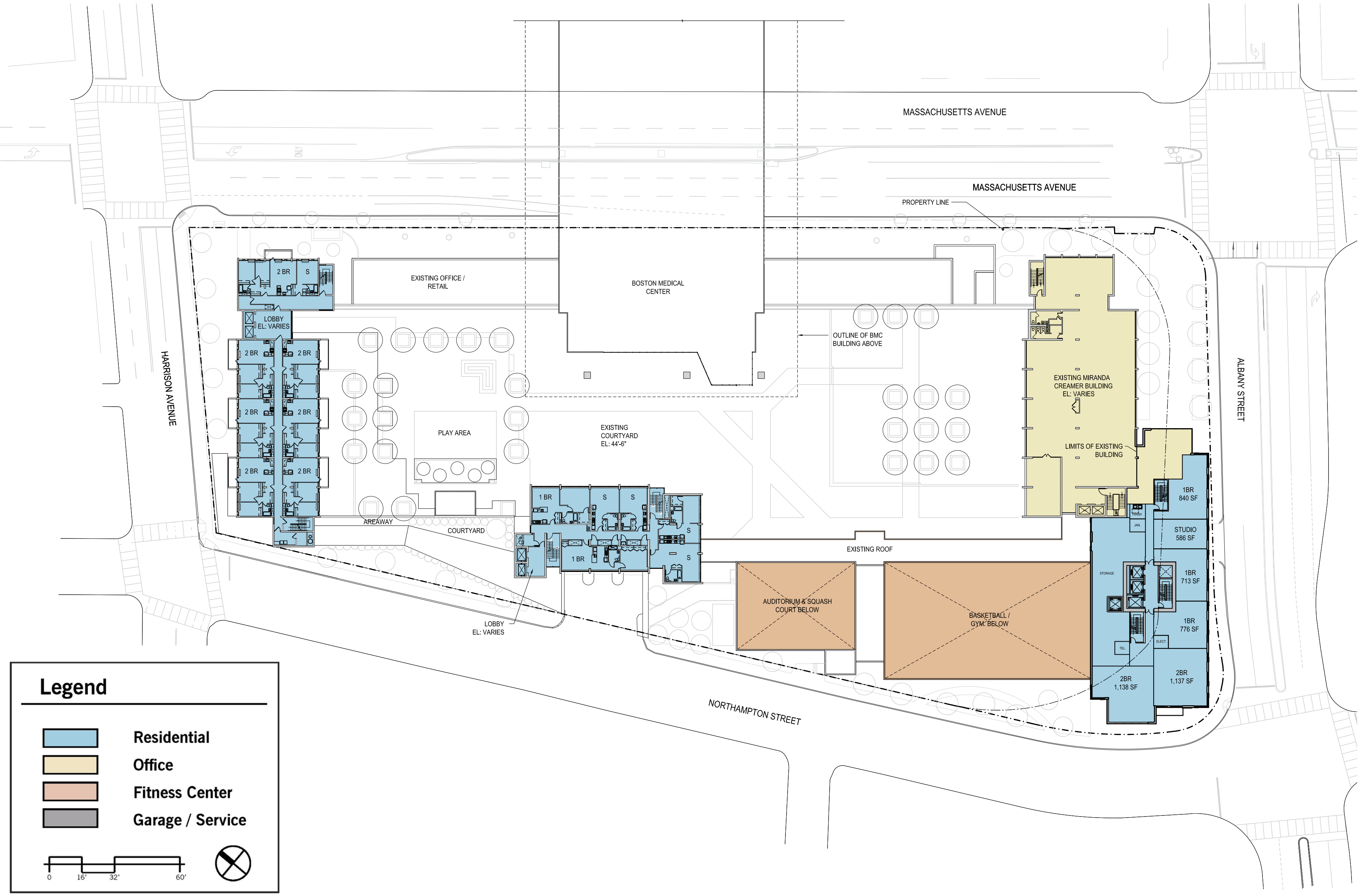


Figure 3-6
Fifth and Sixth Floor Plan
Source: The Architectural Team, 2013

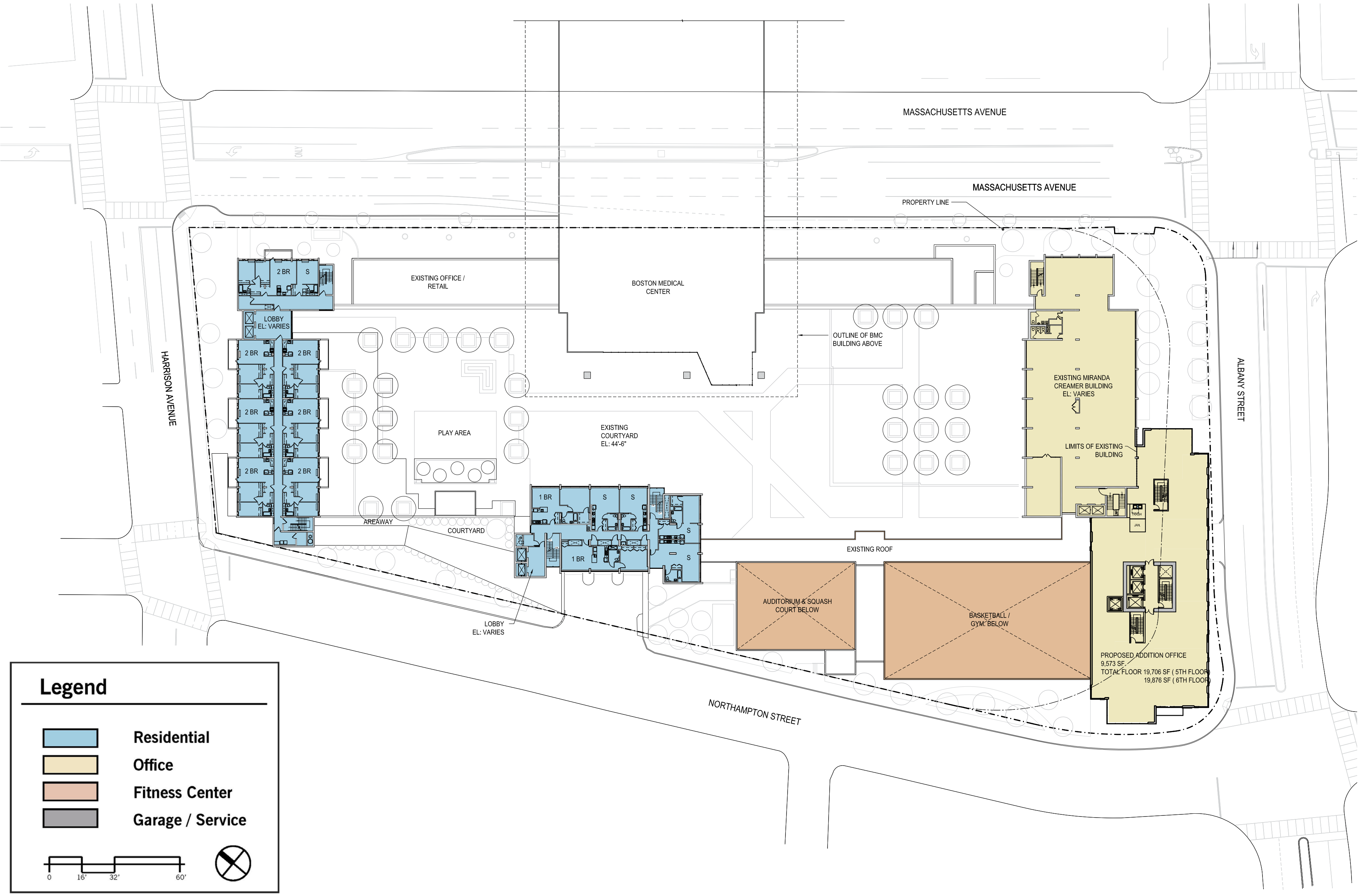


Figure 3-7
Fifth and Sixth Floor Plan (Alternative One)
Source: The Architectural Team, 2013

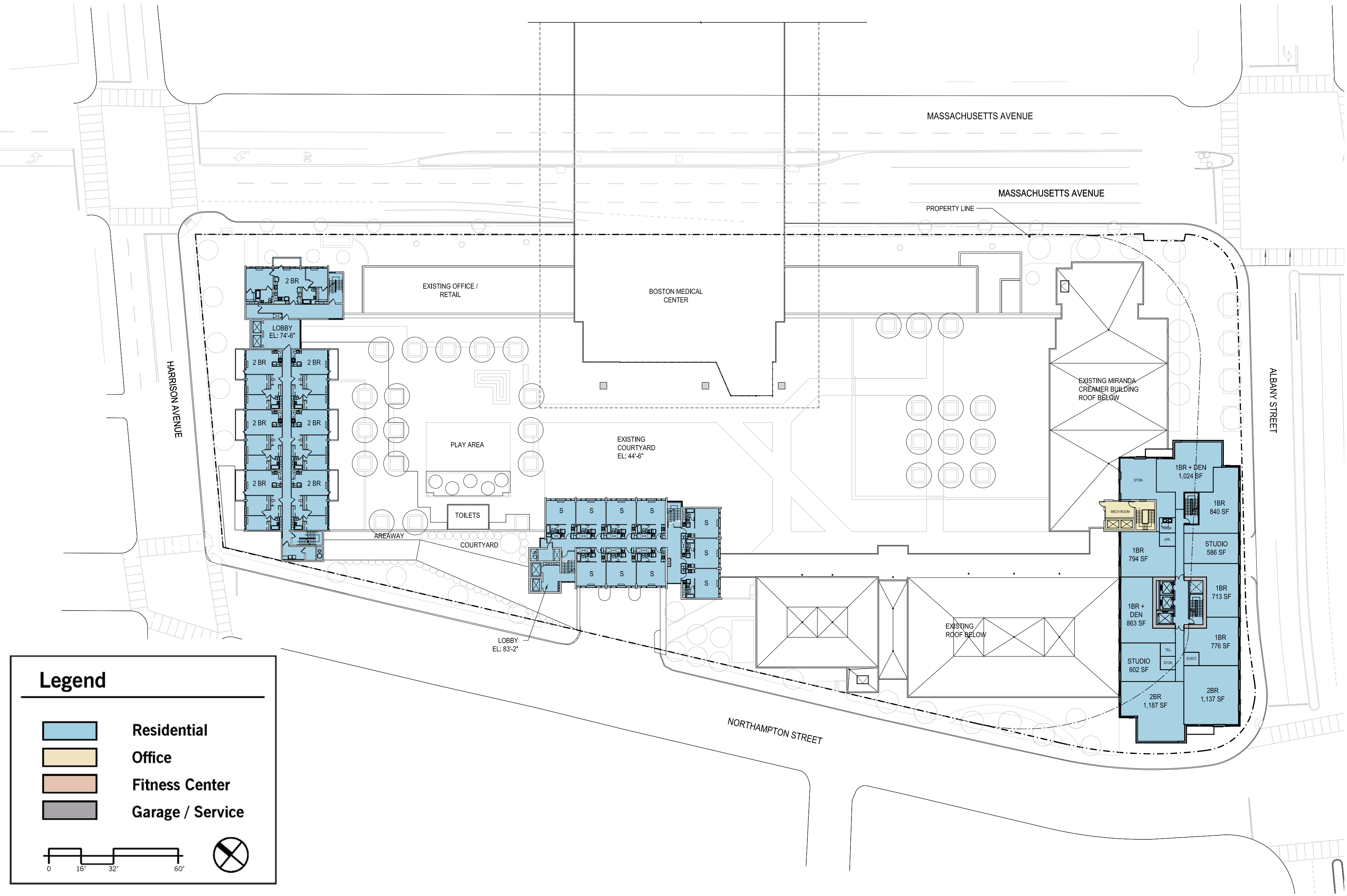


Figure 3-8
Seventh Floor Plan
Source: The Architectural Team, 2013

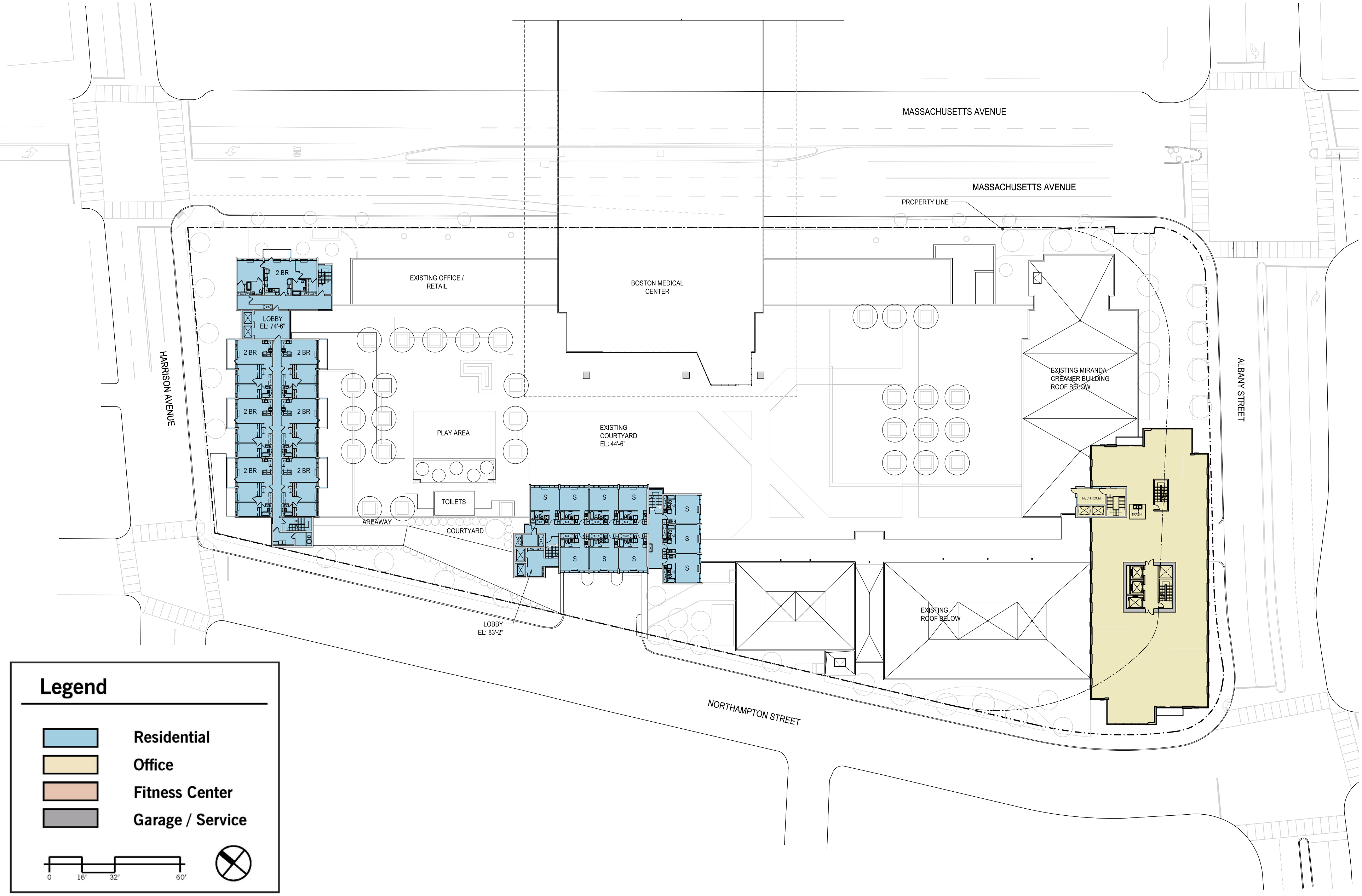


Figure 3-9
Seventh Floor Plan (Alternative One)
Source: The Architectural Team, 2013

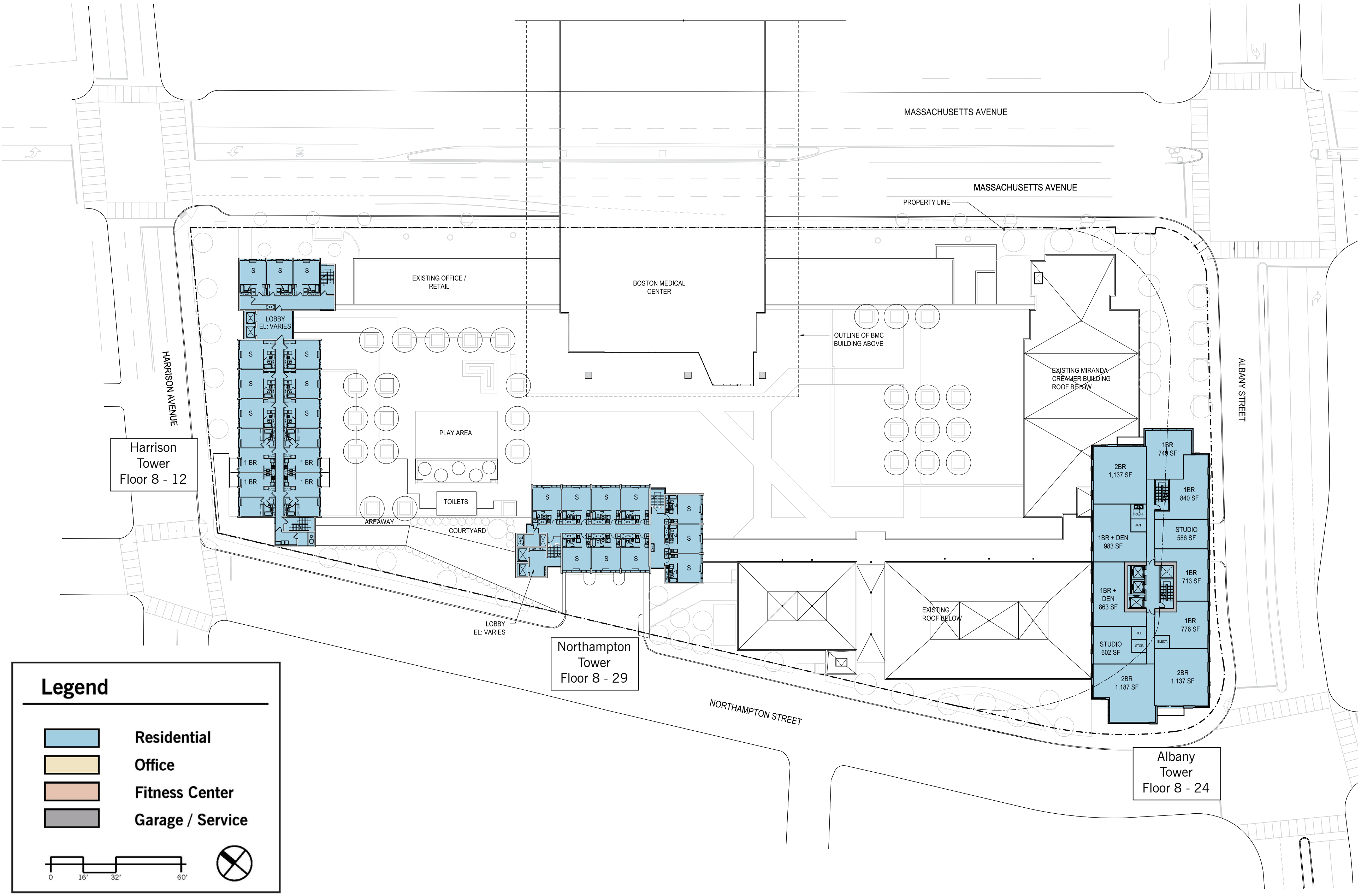


Figure 3-10
Typical Floor Plan
Source: The Architectural Team, 2013

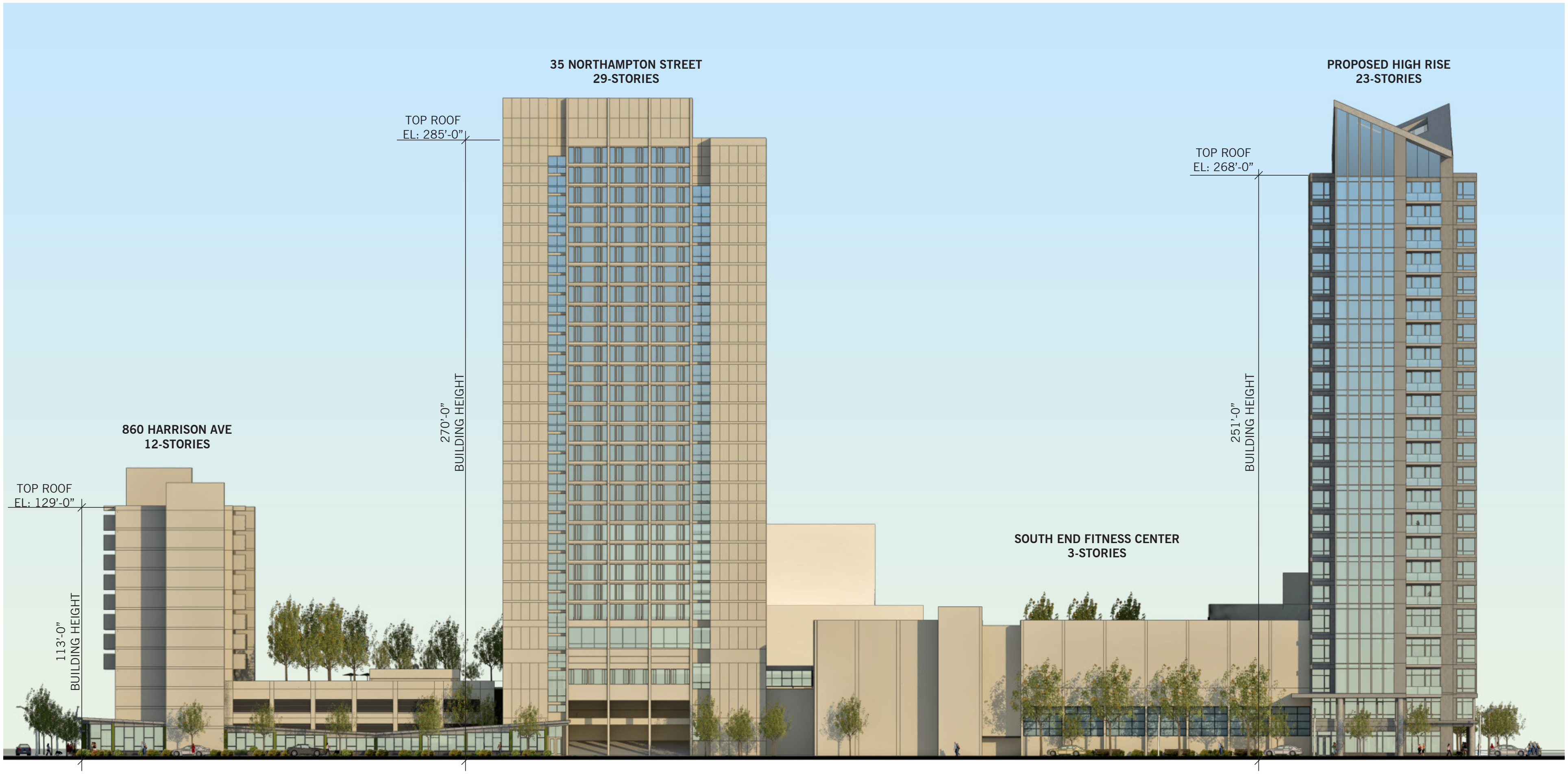


Figure 3-11
West Elevation - Northampton Street
Source: The Architectural Team, 2013

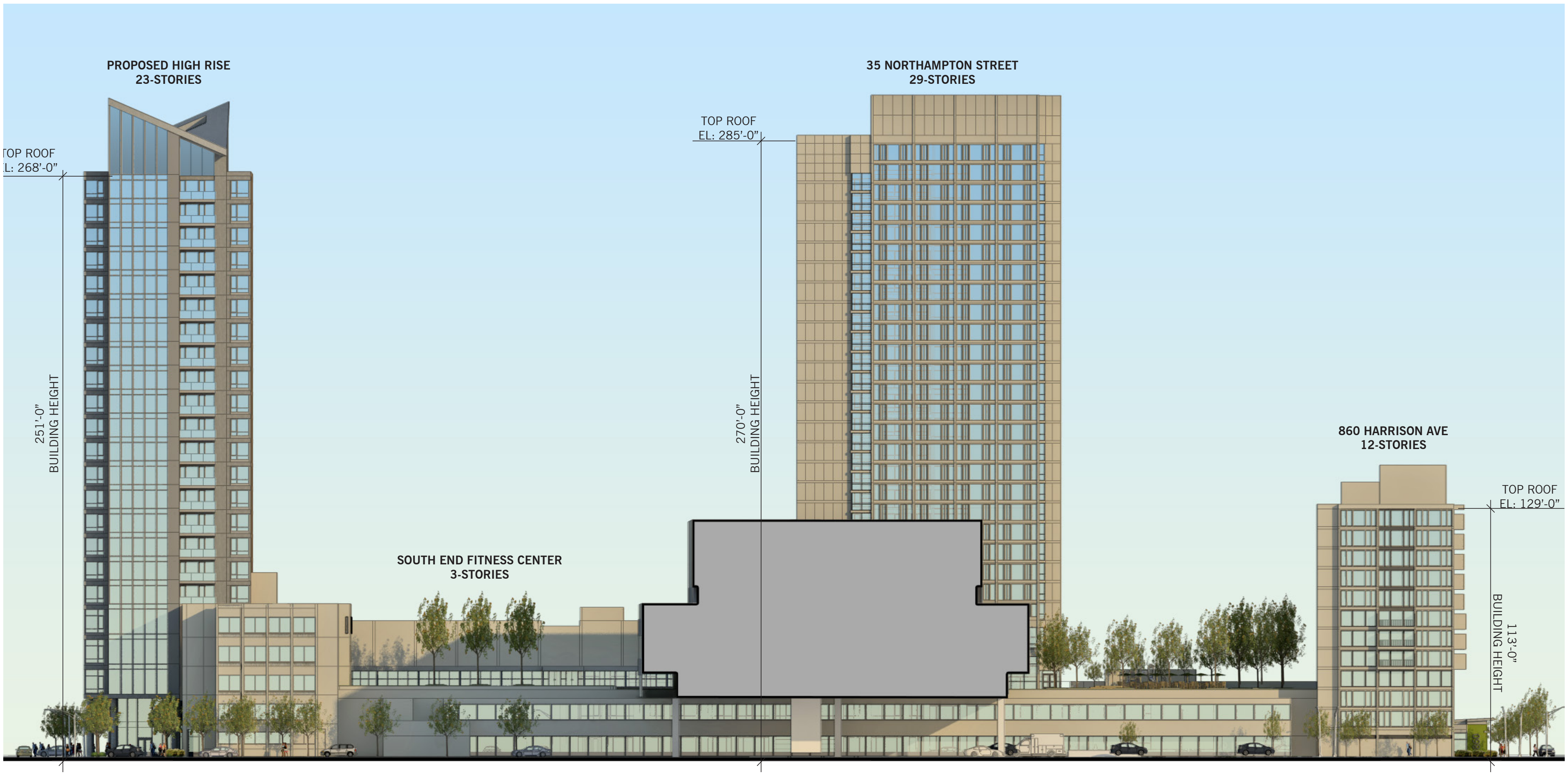


Figure 3-12
East Elevation - Massachusetts Avenue
Source: The Architectural Team, 2013

Figure 3-13
South Elevation - Albany Street
Source: The Architectural Team, 2013

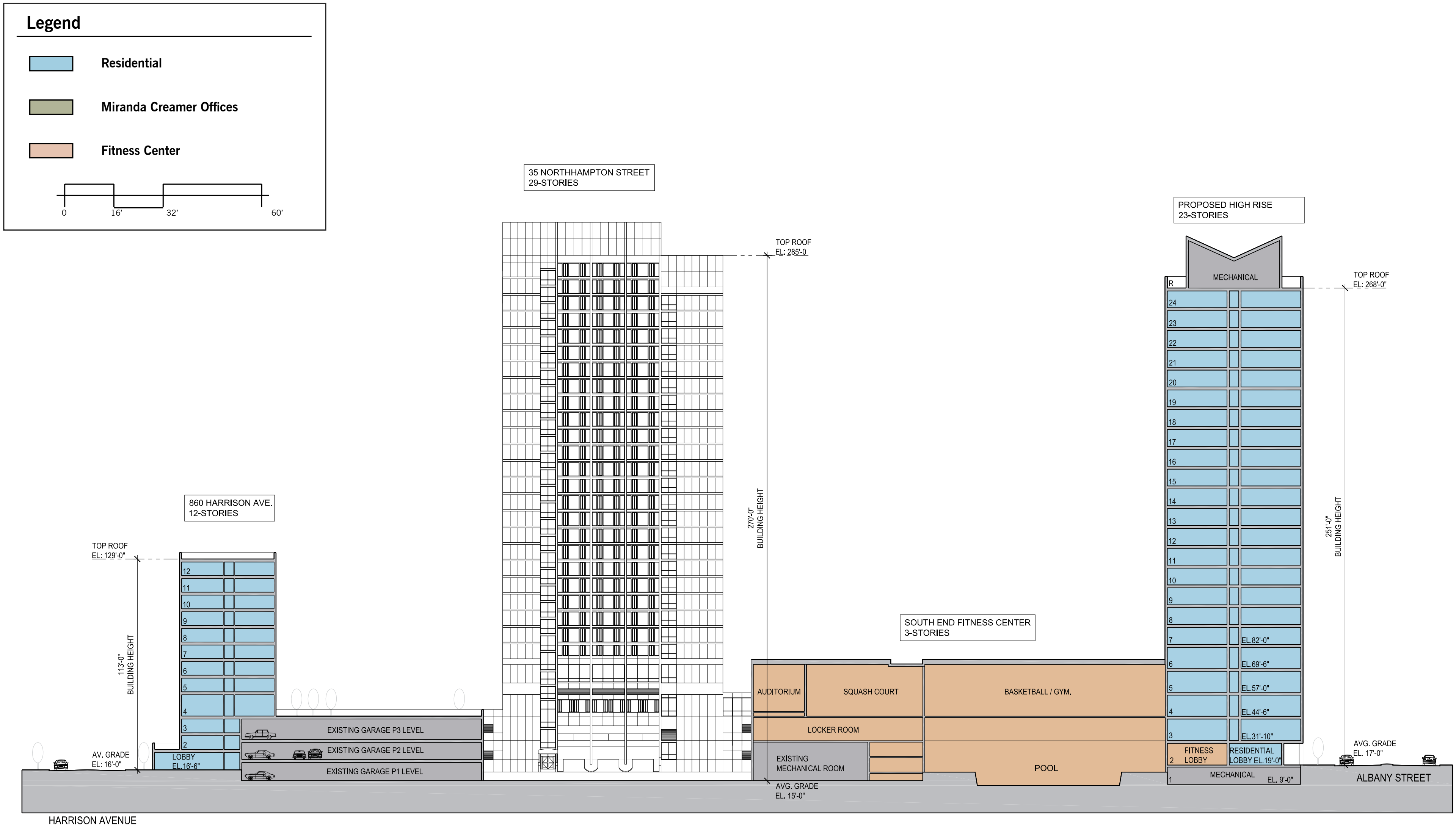


Figure 3-14
Site Section
Source: The Architectural Team, 2013

Northampton Square
Boston, Massachusetts

Figure 3-15
Public Realm Plan
Source: The Architectural Team, 2013

LEED 2009 for New Construction and Major Renovations

Project Checklist

Albany Street Tower

Sustainable Sites

Y	?	N			Possible Points: 26
21	2	3		**Sustainable Sites**	**26**
Y			Prereq 1	Construction Activity Pollution Prevention	
1			Credit 1	Site Selection	1
5			Credit 2	Development Density and Community Connectivity	5
		1	Credit 3	Brownfield Redevelopment	1
6			Credit 4.1	Alternative Transportation—Public Transportation Access	6
1			Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	1
3			Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	3
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

Water Efficiency

Y	?	N			Possible Points: 10
4		6		**Water Efficiency**	**10**
Y			Prereq 1	Water Use Reduction—20% Reduction	
2		2	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

Energy and Atmosphere

Y	?	N			Possible Points: 35
10	2	23		**Energy and Atmosphere**	**35**
Y			Prereq 1	Fundamental Commissioning of Building Energy Systems	
Y			Prereq 2	Minimum Energy Performance	
Y			Prereq 3	Fundamental Refrigerant Management	
5	2	12	Credit 1	Optimize Energy Performance	1 to 19
		7	Credit 2	On-Site Renewable Energy	1 to 7
2			Credit 3	Enhanced Commissioning	2
		2	Credit 4	Enhanced Refrigerant Management	2
3			Credit 5	Measurement and Verification	3
		2	Credit 6	Green Power	2

Materials and Resources

Y	?	N			Possible Points: 14
4	1	9		**Materials and Resources**	**14**
Y			Prereq 1	Storage and Collection of Recyclables	
		3	Credit 1.1	Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 3
		1	Credit 1.2	Building Reuse—Maintain 50% of Interior Non-Structural Elements	1
2			Credit 2	Construction Waste Management	1 to 2
		2	Credit 3	Materials Reuse	1 to 2

Materials and Resources, Continued

Y	?	N			
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

Y	?	N			Possible Points: 15
11		4		**Indoor Environmental Quality**	**15**
Y			Prereq 1	Minimum Indoor Air Quality Performance	
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	
		1	Credit 1	Outdoor Air Delivery Monitoring	1
		1	Credit 2	Increased Ventilation	1
1			Credit 3.1	Construction IAQ Management Plan—During Construction	1
		1	Credit 3.2	Construction IAQ Management Plan—Before Occupancy	1
1			Credit 4.1	Low-Emitting Materials—Adhesives and Sealants	1
1			Credit 4.2	Low-Emitting Materials—Paints and Coatings	1
1			Credit 4.3	Low-Emitting Materials—Flooring Systems	1
1			Credit 4.4	Low-Emitting Materials—Composite Wood and Agrifiber Products	1
		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
1			Credit 8.1	Daylight and Views—Daylight	1
1			Credit 8.2	Daylight and Views—Views	1

Innovation and Design Process

Y	?	N			Possible Points: 6
3		3		**Innovation and Design Process**	**6**
		1	Credit 1.1	Innovation in Design:	1
1			Credit 1.2	Innovation in Design: Public Transportation Access	1
1			Credit 1.3	Innovation in Design: Development Density and Connectivity	1
		1	Credit 1.4	Innovation in Design:	1
		1	Credit 1.5	Innovation in Design:	1
1			Credit 2	LEED Accredited Professional	1

Regional Priority Credits

Y	?	N			Possible Points: 4
2	1	1		**Regional Priority Credits**	**4**
1			Credit 1.1	Regional Priority: SSc7.2 Heat Island Effect - Roof	1
1			Credit 1.2	Regional Priority: SSc7.1: Heat Island Effect- non-roof	1
	1		Credit 1.3	Regional Priority: SSc6.1 Stormwater Quantity Control	1
		1	Credit 1.4	Regional Priority:	1

Total

Y	?	N		Possible Points: 110
55	6	49	**Total**	**110**

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

Figure 3-16
LEED Checklist - Albany Tower
Source: The Architectural Team, 2013

LEED 2009 for New Construction and Major Renovations

Project Checklist

860 Harrison St. Rehabilitation

Y	?	N			
20		6	**Sustainable Sites**		Possible Points: 26
Y			Prereq 1	Construction Activity Pollution Prevention	
1			Credit 1	Site Selection	1
5			Credit 2	Development Density and Community Connectivity	5
		1	Credit 3	Brownfield Redevelopment	1
6			Credit 4.1	Alternative Transportation—Public Transportation Access	6
1			Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	1
3			Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	3
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
4		4	**Water Efficiency**		Possible Points: 10
Y			Prereq 1	Water Use Reduction—20% Reduction	
2		2	Credit 1	Water Efficient Landscaping	2 to 4
		2	Credit 2	Innovative Wastewater Technologies	2
2			Credit 3	Water Use Reduction	2 to 4
6		29	**Energy and Atmosphere**		Possible Points: 35
Y			Prereq 1	Fundamental Commissioning of Building Energy Systems	
Y			Prereq 2	Minimum Energy Performance	
Y			Prereq 3	Fundamental Refrigerant Management	
6		13	Credit 1	Optimize Energy Performance	1 to 19
		7	Credit 2	On-Site Renewable Energy	1 to 7
		2	Credit 3	Enhanced Commissioning	2
		2	Credit 4	Enhanced Refrigerant Management	2
		3	Credit 5	Measurement and Verification	3
		2	Credit 6	Green Power	2
8		6	**Materials and Resources**		Possible Points: 14
Y			Prereq 1	Storage and Collection of Recyclables	
3			Credit 1.1	Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 3
1			Credit 1.2	Building Reuse—Maintain 50% of Interior Non-Structural Elements	1
2			Credit 2	Construction Waste Management	1 to 2
		2	Credit 3	Materials Reuse	1 to 2

Y	?	N			
			Materials and Resources, Continued		
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
9		6	**Indoor Environmental Quality**		Possible Points: 15
Y			Prereq 1	Minimum Indoor Air Quality Performance	
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	
		1	Credit 1	Outdoor Air Delivery Monitoring	1
		1	Credit 2	Increased Ventilation	1
1			Credit 3.1	Construction IAQ Management Plan—During Construction	1
		1	Credit 3.2	Construction IAQ Management Plan—Before Occupancy	1
1			Credit 4.1	Low-Emitting Materials—Adhesives and Sealants	1
1			Credit 4.2	Low-Emitting Materials—Paints and Coatings	1
1			Credit 4.3	Low-Emitting Materials—Flooring Systems	1
1			Credit 4.4	Low-Emitting Materials—Composite Wood and Agrifiber Products	1
		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
1			Credit 8.1	Daylight and Views—Daylight	1
1			Credit 8.2	Daylight and Views—Views	1
3		3	**Innovation and Design Process**		Possible Points: 6
		1	Credit 1.1	Innovation in Design:	1
1			Credit 1.2	Innovation in Design: Public Transportation Access	1
1			Credit 1.3	Innovation in Design: Development Density and Connectivity	1
		1	Credit 1.4	Innovation in Design:	1
		1	Credit 1.5	Innovation in Design:	1
1			Credit 2	LEED Accredited Professional	1
1		3	**Regional Priority Credits**		Possible Points: 4
1			Credit 1.1	Regional Priority: SSc7.2 Heat Island Effect - Roof	1
		1	Credit 1.2	Regional Priority:	1
		1	Credit 1.3	Regional Priority:	1
		1	Credit 1.4	Regional Priority:	1
51		57	**Total**		Possible Points: 110

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

Figure 3-17
LEED Checklist - 860 Harrison Avenue
Source: The Architectural Team, 2013

Chapter 4

TRANSPORTATION

4.0 TRANSPORTATION

4.1 INTRODUCTION

Howard/Stein-Hudson Associates, Inc. (HSH) has conducted an evaluation of the transportation impacts associated with the Northampton Square Campus Project ("the Project"), located in the South End/Lower Roxbury neighborhood of Boston. This transportation study adheres to the Boston Transportation Department (BTD) *Transportation Access Plan Guidelines* and Article 80 development review process and includes an evaluation of existing conditions, future conditions with and without the Project, projected parking demand, loading operations, transit services, and pedestrian activity.

4.1.1 PROJECT DESCRIPTION

The Boston Public Health Commission's (BPHC's) Northampton Square Campus (the "Campus") is located on the border of the South End and Lower Roxbury on a block defined by Massachusetts Avenue, Harrison Avenue, Northampton Street and Albany Street. Currently located on-site are several BPHC offices and other facilities - the 245-unit and 103-unit existing buildings at 35 Northampton Street and 860 Harrison Avenue); the Carter Auditorium on Northampton Street; the South End Fitness Center on Northampton Street; the Miranda Creamer Building on Albany Street; and a two-story commercial storefront along Massachusetts Avenue. An existing 539-space parking garage on the property, owned and operated by BPHC, primarily serves the aforementioned abutting buildings although public parking is also permitted. Vehicular access to the garage is provided on Northampton Street.

As detailed in the 35 Northampton Street Project Notification Form (PNF) submitted to the BRA on August 3, 2012, and approved on September 13, 2012, the first phase of the Project involves the renovation of the existing 234-unit residential tower at 35 Northampton Street; the addition of 11 new handicap-accessible (HC) units within this building; the elimination of nine residential units at 860 Harrison Avenue to accommodate the relocation of BPHC offices from 35 Northampton Street; and the construction of a new entry lobby shared by 860 Harrison and 35 Northampton Street.

For the purposes of this chapter, the Proposed Project includes the following alternatives:

- ***Proposed Project (***Residential Project) – includes the construction of a new residential high-rise building containing approximately 218 residential units and the renovation of the existing residential building located at 860 Harrison Avenue. The renovation of 860 Harrison Avenue will reduce the number of units from the Phase 1 total of 103 to 102 to allow for the creation of accessible units. The net increase in residential units on the Campus would be 217 units.

- ***Alternative One (***Residential/Office Project)– the same as Alternative 1, but replaces 28 residential units on floors 4 through 7 of the proposed tower with approximately 40,000 square feet (sf) of office space. This alternative would yield a net increase of 189 residential units on the Campus.

No new parking will be provided for the Project. A detailed parking study conducted by Howard/Stein Hudson Associates, Inc. (HSH) indicated that there is adequate supply within the existing garage to accommodate the parking demand associated with the Project under either Build alternative. It is worth noting that the public Crosstown Garage located at 7-17 Melnea Cass Boulevard, within close walking distance of the Project Site, is currently significantly underutilized.

4.1.2 STUDY AREA

The study area includes intersections along Massachusetts Avenue and Northampton Street. The site is bound by Massachusetts Avenue to the east, Northampton Street to the west, Harrison Avenue to the north and Albany Street to the south. As shown in **Figure 4-1**, the study area includes the following five intersections:

- Massachusetts Avenue/Harrison Avenue (signalized);
- Massachusetts Avenue/Albany Street (signalized);
- Northampton Street/Albany Street/Crosstown Drive (signalized);
- Northampton Street/Garage Driveway (unsignalized); and
- Northampton Street/Harrison Avenue (unsignalized).

4.1.3 METHODOLOGY

This transportation study was conducted in accordance with BTD guidelines and is described below.

The existing condition analysis includes an inventory of the existing (2013) transportation conditions such as roadway and intersection conditions, parking and curb usage, transit, pedestrian circulation, bicycle facilities, loading, and site conditions.

The future transportation conditions analysis evaluates potential transportation impacts associated with the Project and other neighboring projects. Long-term impacts are evaluated for the year 2018, based on a five-year horizon from the existing year (2013). Expected roadway, parking, transit, pedestrian, bicycle accommodation, and loading conditions and deficiencies are identified. This section includes the following scenarios:

- The 2018 No-Build condition scenario includes both general background traffic growth and traffic growth associated with specific developments that are planned near the Project. Transportation infrastructure improvements in the study area are identified and incorporated into the 2018 No-Build conditions.
- The 2018 Build condition scenario includes Project-generated traffic volume estimates for each building alternative added to the traffic volumes developed as part of the 2018 No-Build conditions scenario. This section also details parking, loading operations, bicycle storage, Transportation Demand Management (TDM) measures to reduce dependence on automobiles, and any appropriate mitigation measures.

Finally, an evaluation of short-term traffic impacts associated with construction activities is provided.

4.2 EXISTING CONDITIONS

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

4.2.1 EXISTING ROADWAY CONDITIONS

The study area roadways are described below. The descriptions reflect functional classifications by the Massachusetts Department of Transportation (MassDOT) Highway Division's Office of Transportation Planning.

Massachusetts Avenue is an urban principal arterial, running north–south from Cambridge and the northwestern part of the Boston metropolitan area to Columbia Road to the southeast. Massachusetts Avenue carries about 40,000 vehicles total in both directions on an average weekday. Within the study area, Massachusetts Avenue features two travel lanes in each direction, divided by a narrow concrete median. Additional turning lanes are provided at the intersections with Harrison Avenue and Albany Street. Metered on-street parking is provided in the northbound direction between Albany Street and Harrison Avenue, while resident parking is found in both directions of Massachusetts Avenue north of Harrison Avenue. Bus stops are located regularly on both sides of Massachusetts Avenue serving several MBTA routes and the Boston University Medical Center shuttle routes within the campus. Sidewalks on each side range in width from 7 to 23 feet. Near the site, the mix of land uses includes medical, retail, office, and residential.

The City of Boston is nearing the end of construction on a $14.5 million improvement program for Massachusetts Avenue from 150 feet south of Albany Street to 100 feet north of St. Botolph Street. The project includes repaving the roadway and fully modernizing all traffic signal equipment and interconnecting it with the City's traffic management center via a new fiber optic connection. Left turn bays have been installed at certain intersections to reduce congestion and improve traffic safety. New curbing, sidewalks, street lighting and trash receptacles are being installed and landscaping enhanced with trees and shrubbery. A critical element of the plan, as discussed below, is bike accommodations in the corridor.

As signal timing improvements have not been finalized by the City, analyses below are based on the existing signal timings.

Albany Street is an urban minor arterial roadway that runs east-west parallel to Harrison Avenue within the study area from Herald Street in the east to Eustis Street in the west. Albany Street provides two travel lanes in each direction near the site separated by a median. Parking is not permitted along either side of the street. Sidewalks on each side range in width from 8 to 10 feet. Land uses along Albany Street include a mix of research, educational, city services, medical uses, and in and outpatient medical uses.

Harrison Avenue is an urban minor arterial running east-west providing access between Essex Street in the east to Warren Street in Roxbury. Harrison Avenue provides one travel lane in each direction near the Site. Parking is permitted on both sides of the street. Bus stops are located regularly on both sides of Harrison Avenue. Sidewalks on each side range in width from 9 to 11 feet.

Northampton Street is an urban major collector running north-south parallel to Massachusetts Avenue within the study area from Melnea Cass Boulevard to Columbus Avenue. Northampton Street provides one travel lane in each direction near the project area with parking permitted on both sides of the street. Sidewalks on each side range in width from 6.5 to 10 feet.

4.2.2 EXISTING INTERSECTION CONDITIONS

Massachusetts Avenue/Harrison Avenue is a signalized intersection with four approaches. Harrison Avenue eastbound and westbound approach provides one 20-foot left-turn/through/right-turn lane that functions as one 10-foot left-turn/through lane and one 10-foot through/right-turn lane. Massachusetts Avenue northbound and southbound approaches provide three travel lanes; a 10-foot exclusive left-turn lane, a 12-foot exclusive through lane, and an 18-foot shared through/right-turn lane. Crosswalks, wheelchair ramps, pedestrian pushbuttons and indications are provided on all approaches.

Massachusetts Avenue/Albany Street is a signalized intersection with four approaches. Albany Street eastbound approach provides an 11-foot shared left-turn/through lane, a 12-foot exclusive through lane, and a 12-foot exclusive right-turn lane. Albany Street westbound approach provides an 11-foot left-turn-only lane, a 12-foot through lane, and a 12-foot shared through/right-turn lane. Massachusetts Avenue northbound approach provides two 12-foot through lanes and one 11-foot right-turn-only lane; left-turns onto Albany Street are prohibited. Massachusetts Avenue southbound approach provides one 10-foot left-turn-only lane, one 11-foot through lane, and one 11-foot shared through/right-turn lane. Crosswalks, wheelchair ramps, pedestrian pushbuttons and indications are provided on all approaches.

Northampton Street/Albany Street/Crosstown Drive is a signalized intersection with four approaches. Albany Street eastbound approach provides an 11-foot shared left-turn/through and an 11-foot through/right-turn lane. Albany Street westbound approach provides an 11-foot left-turn/through and an 11-foot through/right-turn lane. The Crosstown Drive northbound approach provides an 11-foot left-turn/through and a 12-foot exclusive right-turn lane. The Northampton Street southbound approach provides an 11-foot left-turn/through/right-turn lane. Crosswalks, wheelchair ramps, pedestrian pushbuttons and indications are provided on all approaches.

Northampton Street/Garage Driveway is an unsignalized intersection with three approaches. The garage driveway westbound is approximately 48 feet wide. The Northampton Street northbound approach provides an 11-foot through/right-turn lane. The Northampton Street southbound approach provides an 11-foot left-turn/through lane. On-street parking is allowed on both sides of the roadway.

Northampton Street/Harrison Avenue is an unsignalized intersection with four approaches. Harrison Avenue eastbound and westbound approaches provide one 12-foot left-turn/through/right-turn lane with 8-foot parking lane. The Northampton Street northbound and southbound stop controlled approaches provide one 20-foot left-turn/through/right-turn lane with a parking lane starting 200 feet south of the intersection. Crosswalks and wheelchair ramps are provided on the westbound approach. Field observations showed that Northampton Street has no visible roadway striping and that a queue occurs on the northbound and westbound legs during morning peak hour.

4.2.3 EXISTING TRAFFIC CONDITIONS

Traffic count data collected in March 2013 during the morning (7:30–9:30 a.m.) and evening (3:30–5:30 p.m.) peak periods were obtained from Boston University Medical Center *Institutional Master Plan (IMP) Amendment* for the intersections of Massachusetts Avenue/Albany Street and Massachusetts Avenue/Harrison Avenue.

The remaining traffic counts were conducted on August 6, 2013 during the morning (7:30–9:30 a.m.) and evening (4:00–6:00 p.m.) peak periods.

Based on this data, the peak hours were identified as 7:45–8:45 a.m. and 4:45–5:45 p.m. **Figure 4-2** and **Figure 4-3** show the existing peak-hour turning movement volumes for the a.m. and p.m. peak hours, respectively.

The traffic volumes were balanced to remove discrepancies between intersections and no seasonal adjustment was necessary to account for traffic data collected in March and August. Complete traffic count data are provided in Appendix 1.

4.2.4 EXISTING TRAFFIC OPERATIONS

The criterion for evaluating traffic operations is level of service (LOS), which is determined by assessing average delay incurred by vehicles at intersections and along intersection approaches. Trafficware's Synchro (version 6) software package was used to calculate average delay and associated LOS at the study area intersections. This software is based on the traffic operational analysis methodology of the Transportation Research Board's 2000 Highway Capacity Manual (HCM).

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

The 50th percentile queue length, measured in feet, represents the average extent of the vehicle queue (to the last stopped vehicle) upstream from the stop line during 50 percent of all signal cycles. The 50th percentile queue will be seen during most cycles. The queue would be this long about 50 percent of the time and would typically occur during off-peak hours.

The 95th percentile queue length, measured in feet, represents the farthest extent of the vehicle queue (to the last stopped vehicle) upstream from the stop line during 5 percent of all signal cycles. The 95th percentile queue will not be seen during each cycle. The queue would be this long only 5 percent of the time and would typically not occur during off-peak hours.

Field observations were performed by HSH to collect intersection geometry such as number of turning lanes, lane length, and lane width. Signal timing and phasing used in this analysis were obtained from the BTD and confirmed through the field observations conducted by HSH.

LOS designations are based on average delay per vehicle for all vehicles entering an intersection. **Table 4-1** displays the intersection level of service criteria. LOS A indicates the most favorable condition, with minimum traffic delay, while LOS F represents the worst condition, with significant traffic delay. LOS D or better is typically considered acceptable in an urban area. However, LOS E or F is often typical for a stop controlled minor street that intersects a major roadway.

Table 4-1 Level of Service Criteria (HCM Except)

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

Source: *2000 Highway Capacity Manual*, Transportation Research Board.

Table 4-2 and **Table 4-3** present the 2013 Existing conditions operational analysis for the study area intersections during the a.m. and p.m. peak hours, respectively. The detailed analysis is provided in Appendix 1, Transportation.

During the a.m. peak hour, the signalized intersections operate at LOS D or better. However, some movements at the three signalized intersections operate at LOS E or F. All movements at the unsignalized intersections operate at a LOS D or better.

During the p.m. peak hour, the signalized intersections operate at LOS D or better, with some movements operating at LOS E. The Albany Street and Harrison westbound movements at Massachusetts Avenue currently operate at LOS E and F, respectively. All movements at the unsignalized intersections operate at a LOS D or better, except Harrison westbound movement at Harrison Avenue/Northampton Street.

Table 4-2 Existing (2013) Level of Service Summary, a.m. Peak Hour

Intersection/Approach	LOS	Delay (seconds)	V/C Ratio	50th Percentile Queue length (feet)	95th Percentile Queue length (feet)
Signalized Intersections					
Massachusetts Ave/Albany St	**C**	**32.8**	-	-	-
Albany EB left/thru | thru	D	43.3	0.68	136	208
Albany EB right	D	36.6	0.24	34	m69
Albany WB left	F	>80.0	0.81	111	#202
Albany WB thru | thru/right	C	24.2	0.32	93	131
Mass Ave NB thru | thru	D	35.5	0.75	366	453
Mass Ave NB right	C	20.4	0.49	200	293
Mass Ave SB left	E	70.8	0.61	78	129
Mass Ave SB thru | thru/right	B	18.1	0.44	181	232
Massachusetts Ave/Harrison Ave	**C**	**33.5**	-	-	-
Harrison EB left/thru/right	E	71.5	0.98	279	#475
Harrison WB left/thru/right	E	64.6	0.92	191	#343
Mass Ave NB left	A	9.6	0.21	16	26
Mass Ave NB thru | thru/right	C	25.2	0.79	298	390
Mass Ave SB left	B	12.2	0.36	24	45
Mass Ave SB thru | thru/right	B	17.6	0.54	189	254
Albany St/Northampton St/Crosstown Dr	**C**	**23.8**	-	-	-
Albany EB left/thru | thru/right	B	11.9	0.49	85	253
Albany WB left/thru | thru/right	C	24.0	0.25	93	145
Crosstown NB left/thru	D	46.1	0.45	92	113
Crosstown NB right	B	10.9	0.18	0	7
Northampton SB left/thru/right	D	54.4	0.74	131	118
Unsignalized Intersections					
Harrison Ave/Northampton St	-	-	-	-	-
Harrison EB left/thru/right	C	23.6	0.75	-	-
Harrison WB left/thru/right	C	17.7	0.62	-	-
Northampton NB left/thru/right	C	16.1	0.54	-	-
Northampton St/Garage	-	-	-	-	-
Garage WB left	C	15.3	0.07	-	6
Garage WB right	B	10.8	0.01	-	1
Northampton NB thru/right	A	0.0	0.24	-	0
Northampton SB left/thru	A	3.0	0.06	-	5

~/# = 50th/95th percentile volume exceeds capacity. Queue maybe longer. Queue shown is the maximum after 2 cycles.
m = Volume for 95th percentile queue is metered by an upstream signal.
Grey shading indicates undesirable LOS.

Table 4-3 Existing (2013) Level of Service Summary, p.m. Peak Hour

Intersection/Approach	LOS	Delay (seconds)	V/C Ratio	50th Percentile Queue length (feet)	95th Percentile Queue length (feet)
Signalized Intersections					
Massachusetts Ave/Albany St	**C**	**31.0**	-	-	-
Albany EB left/thru | thru	D	43.3	0.50	95	m117
Albany EB right	D	44.9	0.49	100	m141
Albany WB left	E	65.1	0.71	183	206
Albany WB thru | thru/right	A	8.4	0.40	54	65
Mass Ave NB thru | thru	D	37.8	0.63	273	358
Mass Ave NB right	B	15.8	0.28	99	151
Mass Ave SB left	E	55.6	0.29	32	67
Mass Ave SB thru | thru/right	C	28.1	0.64	314	411
Massachusetts Ave/Harrison Ave	**D**	**44.9**	-	-	-
Harrison EB left/thru/right	D	40.2	0.73	165	#279
Harrison WB left/thru/right	F	>80.0	>1.00	~386	#587
Mass Ave NB left	B	13.1	0.39	26	44
Mass Ave NB thru | thru/right	B	18.6	0.55	181	239
Mass Ave SB left	A	10.0	0.20	17	32
Mass Ave SB thru | thru/right	B	19.8	0.63	245	316
Albany St/Northampton St/Crosstown Dr	**C**	**28.9**	-	-	-
Albany EB left/thru | thru/right	B	14.1	0.39	55	146
Albany WB left/thru | thru/right	C	28.3	0.38	152	282
Crosstown NB left/thru	D	39.2	0.38	79	99
Crosstown NB right	A	6.6	0.27	0	33
Northampton SB left/thru/right	D	51.6	0.83	187	90
Unsignalized Intersections					
Harrison Ave/Northampton St	-	-	-	-	-
Harrison EB left/thru/right	B	14.4	0.49	-	-
Harrison WB left/thru/right	E	40.5	0.91	-	-
Northampton NB left/thru/right	C	16.4	0.54	-	-
Northampton St/Garage	-	-	-	-	-
Garage WB left	B	14.5	0.16	-	14
Garage WB right	B	10.9	0.11	-	9
Northampton NB thru/right	A	0.0	0.15	-	0
Northampton SB left/thru	A	0.8	0.02	-	1

~/# = 50th/95th percentile volume exceeds capacity. Queue maybe longer. Queue shown is the maximum after 2 cycles.
m = Volume for 95th percentile queue is metered by an upstream signal.
Grey shading indicates undesirable LOS.

4.2.5 EXISTING PARKING

Off-Street Parking

Howard/Stein-Hudson (HSH) conducted a detailed assessment of the existing 539-space parking garage at 35 Northampton Street in June 2011 (see Appendix 1) and August 2013.

The 3-level garage is owned and operated by the Boston Public Health Commission (BPHC) as a public garage and primarily serves the abutting buildings, including the McCormack Residential Towers (35 Northampton Street and 860 Harrison Avenue); the Carter Auditorium on Northampton Street; the South End Fitness Center on Northampton Street; the Miranda Creamer Building on Albany Street; and 721-729 Massachusetts Avenue (Boston Medical Center (BMC)). Under an existing lease, BMC is entitled to use up to 250 spaces at market rates for employees and visitors. In addition, the garage is open for public transient and monthly parking, where available. Vehicular access to the garage is provided at Level 2, on Northampton Street with one gate-controlled entrance driveway and two gate-controlled exit driveways.

According to parking demand observations conducted by HSH in June 2011, the existing garage reaches a peak average occupancy of only approximately 80% (100 unused spaces) during the weekday peak periods and is typically less than 30% occupied during the weekday evening and throughout the day on Saturday and Sunday. Additional observations made by HSH in August 2013 showed peak midday occupancy of the garage at 394 spaces (or 73% occupancy at 1:00 p.m.) and overnight demand at 155 spaces (or 29% at 11:00 p.m.) – indicating that parking demand has not substantially changed since the 2011 observations. The existing hourly parking demand at the 35 Northampton Street garage is illustrated in **Figure 4-4.**

As shown in **Figure 4-4,** the garage reaches its peak occupancy at about 2:00 p.m. with 439 vehicles parked (approximately 81% occupied) – 100 vehicles fewer than the striped capacity of 539 spaces. Overnight parking demand was approximately 140 to 170 vehicles, primarily attributed to the residential users at 35 Northampton and 860 Harrison Avenue, as well as night shift personnel at BMC.

According to data provided by BPHC in 2011, the parking demand ratio for the residents of 35 Northampton and 860 Harrison Avenue was approximately 0.30 spaces per occupied unit (103 cards/(234+112 units) = 0.30). As of August 2013, residential parking demand at 35 Northampton and 860 Harrison Avenue has remained generally consistent at approximately 0.34 spaces per unit (118 cards/(234+112 units) = 0.34).

There are three off-site public parking locations adjacent to the Project (**see Figure 4-5**): Stanhope Garage (12 Northampton Street), Stanhope Garage (53 Northampton Street), and Crosstown Garage. The following details the midday and evening parking occupancy at these locations based on data collected by HSH on Thursday August 22, 2013 at the two Stanhope locations and data provided by the Crosstown Garage for Tuesday, August 20, 2013:

- The Stanhope Garage (12 Northampton Street) is a surface lot with approximately 47 parking spaces. At 1:00 p.m., the lot was 77% occupied. Overnight parking is not permitted at this location.
- The Stanhope Garage (53 Northampton Street) has approximately 39 spaces within a surface lot and garage. At 1:00 p.m., this facility had a demand of approximately 19 vehicles (or 49%). Overnight parking is not permitted at this location.
- The Crosstown Garage is a 1,250 parking space garage. At 1:00 p.m., it was approximately 53% occupied and at 11:00 p.m., it was only 7% occupied.

On-Street Parking

Figure 4-6 illustrates the on-street parking regulations near the study area. As shown in **Figure 4-7,** curb use regulations adjacent to the Project site include unrestricted parking, no parking, and restricted for Boston EMS or the Funeral Director. Parking is prohibited along Albany Street and Massachusetts Avenue adjacent to the site. Parking on Northampton Street and Harrison Avenue consists of a mix of no parking, unrestricted, and metered parking.

4.2.6 EXISTING PUBLIC TRANSPORTATION

The Project site is well served by public transportation as shown in **Figure 4-8** and summarized in **Table 4-4**.

RAPID TRANSIT ROUTES

In July 2002, Boston's first Bus Rapid Transit service, the "Silver Line", opened along Washington Street between Dudley Square and Downtown Crossing. In the fall of 2009, the route was extended and now runs between Dudley Square, Downtown Crossing, and South Station. A transit priority lane is provided in each direction between Melnea Cass Boulevard and the Massachusetts Turnpike along Washington Street (the lane is shared with general traffic turning right). The Silver Line replaces the existing Route #49 bus, which previously operated on Washington Street, and operates at 8-10 minute headways during peak periods. The Silver Line stop closest to the site is on Washington Street at Massachusetts Avenue, approximately a five-minute (one-quarter mile) walk, or two blocks from the intersection of Harrison Avenue and Northampton Street.

Table 4-4 Local Buses and Bus Rapid Transit

Bus Route	Origin-Destination	Peak Hour Headway (min)*
Rapid Transit Routes		
Silver Line SL4	Dudley Station–South Station at Essex Street via Washington Street	10
Silver Line SL5	Dudley Station–Downtown Crossing at Temple Street via Washington Street	7
Local Bus Routes		
1	Harvard/Holyoke Gate – Dudley Station via Mass Ave.	8-11
8	Harbor Point/UMass – Kenmore Station	15-20
10	City Point – Copley Square	20
47	Central Square Cambridge – Broadway Station via BU Medical Center	8-10
170	Central Square, Waltham – Dudley Square via Back Bay	60
171	Dudley Station – Logan Airport via Andrew Station	30
Regional Circumferential Bus Routes		
CT1	Cross Town Transit – Central Square Cambridge – BU Medical Center/Boston Medical Center via M.I.T	20
CT3	Beth Israel Deaconess Hospital – Andrew Station	20
MASCO	Crosstown	

Source: www.mbta.com
* Headway is the scheduled time between trains or buses, as applicable.

MBTA Bus Routes

Located within a 5-10 minute walk of the project site are several bus stations with shelters on Washington Street, Massachusetts Avenue, Harrison Avenue, and Albany Street. The Silver Line bus rapid transit service via Washington Street provides service to and from Dudley Square, Downtown Boston, and South Station. Local bus routes provide connections to MBTA subway stations, such as the Red Line (Broadway, Andrew, and JFK/UMass) and the Orange Line (Massachusetts Avenue, Back Bay, and Ruggles).

MBTA Commuter Rail Service

The closest commuter rail station to the project area is found at Newmarket Square. The MBTA is in the process of upgrading the Fairmount commuter rail line, which runs from Readville in Hyde Park into South Station, with a new stop completed at Newmarket Square on July 1, 2013. The Newmarket Station is located at Massachusetts Avenue and Newmarket Square.

MASCO

Medical Academic and Scientific Community Organization (MASCO) is a non-profit organization dedicated to enhancing Boston's Longwood Medical and Academic

(LMA) area for the benefit of those who live, work, study or receive care in the area. There are eight MASCO routes.

The closest MASCO bus service is the Crosstown route located at 7-17 Melnea Cass Boulevard, a block away from the Project site. This service provides connection to several locations in the Longwood Medical Area, including Ruggles Station, Wentworth lots, Brigham Circle, Brigham and Women Hospital Shapiro, 440 Brookline Avenue, 435 Brookline Avenue, Beth Israel Deaconess Medical Center (BIDMC) East Shapiro, BIDMC East Campus, Coop MBTA and Vanderbilt Hall. The stop locations vary between the a.m. and p.m. service with buses departing approximately every 7-12 minutes.

4.2.7 EXISTING PEDESTRIAN CONDITIONS

Pedestrian counts were conducted at Massachusetts Avenue/Albany Street and Massachusetts Avenue/Harrison Avenue in March 2013 and at Northampton Street/Harrison Avenue, Northampton Street/Garage Driveway, and Northampton Street/Albany Street/Crosstown Drive on August 6, 2013. **Figure 4-9** illustrates the a.m. and p.m. peak hour pedestrian volumes. Detailed pedestrian count data is provided in Appendix 1.

The local roadways near the project site provide good pedestrian access for the light pedestrian activity along Northampton Street and the moderate level along Massachusetts Avenue. There is also a direct pedestrian connection from Levels 2 and 3 of the garage to the Boston Area Health Education Center (BAHEC) and Boston Emergency Medical Services in the Miranda Creamer building.

4.2.8 EXISTING BICYCLE CONDITIONS

Albany Street, Massachusetts Avenue, and Harrison Avenue are generally considered on-street bicycle routes in this area. In recent months, the City of Boston has created marked bike lanes and marked shared-travel bike lanes (where space does not allow an exclusive bike lane) on Massachusetts Avenue between Albany Street and St. Botolph Street as part of a major improvement project. The Southwest Corridor bike path can be reached via Massachusetts Avenue or Melnea Cass Boulevard. **Figure 4-10** summarizes existing a.m. and p.m. peak hour bicycle volumes; bicycle volumes are low in the vicinity of the site. Detailed bicycle count data is provided in Appendix 1.

Hubway, a bicycle sharing system in Metro Boston launched in July 2011, now has more than 100 stations with 1,000 bicycles available throughout Boston, Brookline, Cambridge, and Somerville. Hubway bicycles are available during the spring, summer, and fall seasons (the system is closed during the winter). There are two Hubway Stations within close walking distance to the Project site (see **Figure 4-11**).

There is one Hubway station at Boston Medical Center FGH Building at 820 Harrison Avenue and one at the corner of Washington Street and Lenox Street. Each station accommodates between 15 and 20 bicycle docks.

4.2.9 CAR SHARING

Car sharing, predominantly provided by Zipcar in the Boston area, supplies easy short-term access to vehicular transportation for those who do not own cars. Vehicles are rented on an hourly or daily basis with all vehicle costs (gas, maintenance, insurance, and parking) included in the rental fee. Vehicles are checked out for a specific time period and returned to their designated location. Approximately 27 Zipcars are located at six locations within one-quarter mile of the Project site. Zipcar shared car locations are shown in **Figure 4-11**.

4.2.10 LOADING AND SERVICE

A centralized loading and service area serve the Northampton Square Campus with access provided via Albany Street. A secondary trash storage area/compactor is provided within the surface parking lot off Northampton Street. As part of the renovation work associated with 35 Northampton Street, the surface parking lot would be removed to allow for the construction of the new entrance lobby and corridor serving 35 Northampton and 860 Harrison Avenue and the trash compactor would be relocated to the primary loading area off Albany Street.

4.3 FUTURE CONDITIONS

For transportation impact analyses, it is standard practice to evaluate two future conditions: No-Build conditions (without the proposed Project) and Build conditions (with the proposed Project). In accordance with BTD guidelines, these conditions are projected to a future date five years from the existing conditions year. For this evaluation of this Project, 2018 was selected as the horizon year for the future conditions analyses.

This section presents a description of the 2018 future conditions scenarios and includes an evaluation of the transportation facilities under the No-Build and Build conditions.

4.3.1 NO–BUILD CONDITIONS

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

4.3.2 BACKGROUND GROWTH

A background growth factor of 1% per year was selected for the Project, consistent with BTD approved rates for current development projects in the area. All existing traffic volumes were then increased by 1% per year for a period of 5 years.

4.3.3 PLANNED DEVELOPMENT

To provide a conservative analysis, the no-build scenario also adds traffic contributions from specific projects approved and/or under construction. The following projects, which are depicted in **Figure 4-12**, are located near the study area and, where appropriate, traffic volumes associated with these projects were also incorporated into the future conditions traffic volumes. Traffic volumes from the following projects were specifically traced through the study area traffic network:

- BioSquare Building E – The proposed project includes 160,000 square feet (sf) of research and development space. Although its traffic has been added to the No- Build network, it is not anticipated that this project will be built within the 5-year horizon.
- BioSquare Building G – The proposed project includes 215,000 sf of research and development space (approved, not constructed). Although its traffic has been added to the No-Build network, it is not anticipated that this project will be built within the 5-year horizon.
- NEIDL Building – The proposed project includes 250 additional employees (built, not fully occupied).
- Parcel 9 – The proposed project includes construction of a new five-story building with 9,095 sf of retail, 55 residential units, and 145 hotel rooms.
- Parcel 10 – The proposed project includes a redevelopment of a mixed-use building into a new 40,000 sf grocery store (for Tropical Foods); construction of a new approximately 64,100 sf mixed-use building (14,600 sf of retail, 11,160 sf of office, and 36 residential units); and renovation of the existing Tropical Foods building into approximately 11,000 sf of retail space and 30 residential units.
- 2-14 Taber Street – The proposed project includes constructing a new three-story building with 23,559 sf of office and retail. Phase 1 will construct 7,853 sf of retail space on the ground floor and Phase 2 will consist of construction of the second and third floors with 15,706 sf of office space.

4.3.4 PLANNED INFRASTRUCTURE IMPROVEMENTS

In addition, the following infrastructure improvements were taken into account in developing the No-Build network:

- Massachusetts Avenue Traffic Signal Optimization. Currently Massachusetts Avenue traffic signals are still being optimized and are at the end of the improvement contract, although no completion time has been determined.
- MBTA Indigo Line. The MBTA is improving the Fairmount Branch of the commuter rail that runs from South Station to Readville in Hyde Park, calling it the "Indigo Line." Construction of Phase 1 of the "Indigo Line" is complete. This will rebuild Uphams Corner and Morton St stations so they are ADA compliant, with high-level platforms, and better shelter from the elements. Phase 2 will construct new stations along the route at Newmarket, Five Corners, Talbot Ave, and Blue Hill Ave. The MBTA service to the new Newmarket Station began on July 1, 2013. No increased transit mode share was estimated as a result of this new service in the interest of a conservative analysis.
- City of Boston Melnea Cass Boulevard Improvement Project. The Boston Transportation Department is working with the Roxbury community to redesign Melnea Cass Boulevard with the goal of making it a neighborhood friendly corridor. The scope includes the development of roadway and streetscape designs that create a pedestrian friendly environment, ensure efficient traffic flow, accommodate transit vehicles and bicycles and promote economic development. The redesign plans will include dedicated bus lanes that can accommodate existing transit and future BRT service. As a final design has not yet been adopted, traffic analyses reflect current geometry and signal timing.
- Southbound Frontage Road Connection. The BioSquare Phase II project permitting included a connection from BioSquare Drive to the Frontage Road Southbound, which was approved.
-

4.3.5 NO-BUILD CONDITIONS TRAFFIC VOLUMES

To develop the 2018 No-Build conditions traffic volumes at the study area intersections, the 1% per year annual growth rate was applied to the 2013 Existing conditions traffic volumes, then the traffic volumes associated with the background development projects listed above were added.

The 2018 No-Build a.m. and p.m. peak hour traffic volumes are shown in **Figure 4-13** and **Figure 4-14**, respectively.

4.3.6 NO-BUILD CONDITIONS TRAFFIC OPERATIONS

The 2018 No-Build conditions scenario analysis uses the same methodology as the 2013 Existing conditions scenario analysis. **Table 4-5** and **Table 4-6** present the 2018 No-Build conditions operations analysis for the a.m. and p.m. peak hours, respectively. The shaded cells in the tables indicate a worsening in LOS between the

2013 Existing conditions and the 2018 No-Build conditions. The detailed analysis is provided in the Appendix 1, Transportation.

As shown in **Table 4-5**, all intersections will continue to operate at the same level of service during the morning peak hour with the exception of Massachusetts Avenue southbound left movement at Albany Street, which worsens, from a LOS E to a LOS F.

As shown in **Table 4-6**, all intersections will continue to operate at the same level of service during the evening peak hour with the exception of Albany Street westbound movement at Massachusetts Avenue, which worsens from a LOS E to LOS F.

Massachusetts Avenue traffic signals are still being optimized, although no completion time has been determined.

4.3.7 BUILD CONDITIONS

As previously summarized, the Project includes the following two alternatives:

- ***Proposed Project*** (Residential Project) – consists of the construction of a new residential building with 218-units and the renovation of 860 Harrison Avenue, which will decrease the number of residential units in that building from 103 to 102. Thus, the net increase in residential units created for this Project will be 217 units.
- ***Alternative One*** (Residential/Office Project) – the same as Alternative 1, but replaces 28 residential units on floors 4 through 7 of the proposed tower with approximately 40,000 sf of office space. This alternative would yield a net increase of 189 residential units on the Campus.

Parking for the new units will be accommodated within the existing garage, with additional parking available at other public parking garages in the area including the Crosstown Garage, if needed.

The 2018 Build conditions reflect a future scenario that adds anticipated Project-generated trips under each alternative to the 2018 No-Build conditions traffic volumes.

4.3.8 SITE ACCESS AND CIRCULATION

Vehicular access and egress will remain the same with a full access garage driveway along Northampton Street. Pedestrian access for the renovated 860 Harrison Avenue building will remain the same off Harrison Avenue. The proposed new tower will have the residential entry at the corner of Northampton Street and Albany Street. The proposed site access plan is illustrated in **Figure 4-15**.

Table 4-5 No-Build (2018) Level of Service Summary, a.m. Peak Hour

Intersection/Approach	LOS	Delay (seconds)	V/C Ratio	50th Percentile Queue length (feet)	95th Percentile Queue length (feet)
Signalized Intersections					
Massachusetts Ave/Albany St	**D**	**42.6**	-	-	-
Albany EB left/thru | thru	D	44.1	0.73	145	204
Albany EB right	D	35.1	0.21	30	m65
Albany WB left	F	>80.0	0.47	135	#278
Albany WB thru | thru/right	C	24.3	0.32	95	133
Mass Ave NB thru | thru	D	37.9	0.80	405	498
Mass Ave NB right	C	31.5	0.77	393	571
Mass Ave SB left	F	>80.0	>1.00	~150	#295
Mass Ave SB thru | thru/right	B	19.0	0.49	212	268
Massachusetts Ave/Harrison Ave	**C**	**34.8**	-	-	-
Harrison EB left/thru/right	E	69.8	0.97	294	#503
Harrison WB left/thru/right	E	67.5	0.93	195	#370
Mass Ave NB left	A	9.7	0.20	13	28
Mass Ave NB thru | thru/right	C	28.3	0.85	341	443
Mass Ave SB left	C	22.7	0.61	37	#88
Mass Ave SB thru | thru/right	B	19.1	0.62	233	312
Albany St/Northampton St/Crosstown Dr	**C**	**21.5**	-	-	-
Albany EB left/thru | thru/right	B	10.6	0.52	82	268
Albany WB left/thru | thru/right	C	23.8	0.26	122	186
Crosstown NB left/thru	D	48.1	0.40	72	117
Crosstown NB right	B	13.9	0.14	0	27
Northampton SB left/thru/right	D	53.2	0.70	102	166
Unsignalized Intersections					
Harrison Ave/Northampton St	-	-	-	-	-
Harrison EB left/thru/right	C	24.5	0.77	-	-
Harrison WB left/thru/right	C	17.9	0.63	-	-
Northampton NB left/thru/right	C	15.7	0.52	-	-
Northampton St/Garage	-	-	-	-	-
Garage WB left	B	14.5	0.05	-	4
Garage WB right	B	10.8	0.01	-	1
Northampton NB thru/right	A	0.0	0.23	-	0
Northampton SB left/thru	A	2.8	0.05	-	4

~/# = 50th/95th percentile volume exceeds capacity. Queue maybe longer. Queue shown is the maximum after 2 cycles.
m = Volume for 95th percentile queue is metered by an upstream signal.
Grey shading indicates worsening from Existing LOS.

Table 4-6 No-Build (2018) Level of Service Summary, p.m. Peak Hour

Intersection/Approach	LOS	Delay (seconds)	V/C Ratio	50th Percentile Queue length (feet)	95th Percentile Queue length (feet)
Signalized Intersections					
Massachusetts Ave/Albany St	**D**	**36.5**	-	-	-
Albany EB left/thru | thru	D	43.5	0.49	91	m125
Albany EB right	D	44.5	0.47	95	m143
Albany WB left	F	>80.0	0.89	236	#429
Albany WB thru | thru/right	B	10.7	0.47	95	103
Mass Ave NB thru | thru	D	42.0	0.72	305	383
Mass Ave NB right	B	16.8	0.35	130	196
Mass Ave SB left	E	60.4	0.43	49	97
Mass Ave SB thru | thru/right	C	32.1	0.71	359	444
Massachusetts Ave/Harrison Ave	**E**	**57.2**	-	-	-
Harrison EB left/thru/right	D	41.1	0.74	171	#298
Harrison WB left/thru/right	F	>80.0	>1.00	~482	#693
Mass Ave NB left	B	13.3	0.39	25	46
Mass Ave NB thru | thru/right	C	20.6	0.64	229	298
Mass Ave SB left	B	11.0	0.27	19	38
Mass Ave SB thru | thru/right	C	20.5	0.66	265	341
Albany St/Northampton St/Crosstown Dr	**C**	**27.3**	-	-	-
Albany EB left/thru | thru/right	B	12.8	0.36	49	156
Albany WB left/thru | thru/right	C	27.7	0.39	149	345
Crosstown NB left/thru	D	38.9	0.32	65	101
Crosstown NB right	A	7.2	0.27	0	41
Northampton SB left/thru/right	D	50.1	0.83	170	245
Unsignalized Intersections					
Harrison Ave/Northampton St	-	-	-	-	-
Harrison EB left/thru/right	C	15.7	0.54	-	-
Harrison WB left/thru/right	F	>50.0	0.98	-	-
Northampton NB left/thru/right	C	16.4	0.53	-	-
Northampton St/Garage	-	-	-	-	-
Garage WB left	B	13.9	0.13	-	11
Garage WB right	B	10.9	0.10	-	8
Northampton NB thru/right	A	0.0	0.15	-	0
Northampton SB left/thru	A	0.4	0.01	-	1

~/# = 50th/95th percentile volume exceeds capacity. Queue maybe longer. Queue shown is the maximum after 2 cycles.
m = Volume for 95th percentile queue is metered by an upstream signal.
Grey shading indicates worsening from Existing LOS.

4.3.9 TRIP GENERATION

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

To estimate the number of trips expected to be generated by the Project, data published by the Institute of Transportation Engineers (ITE) in the *Trip Generation Manual, 9th Edition* were used. ITE provides data to estimate the total number of unadjusted vehicular trips associated with the Project. In an urban setting well served by transit, adjustments are necessary to account for vehicle occupancy and other travel modes such as walking, bicycling, and transit.

Trip generation estimates for the Project were derived using the following Land Use Codes (LUC):

LUC 220 – Apartment. The apartment land use can be a rental dwelling unit located within the same building with at least three other dwelling units. The fitted curve equations were used to estimate person trips associated with the apartment use.

LUC 710 – General Office Building. A general office building houses multiple tenants. It is a location where affairs of businesses, commercial or industrial organizations or professional persons or firms are conducted.

4.3.10 MODE SPLIT

The BTD publishes vehicle, transit, and walking mode split rates for different areas of Boston. The Project is located within designated Area 15. The unadjusted vehicular trips were converted to person trips by using vehicle occupancy rates published by the Federal Highway Administration (FHWA). The BTD's travel mode share data for Area 15 are shown in **Table 4-7**.

4.3.11 VEHICLE TRIP GENERATION

The trip generation process described above yields the adjusted vehicle trips associated with the Project under each Build alternative, are summarized in **Table 4-8**. Detailed trip generation information is provided in the Appendix 1.

Table 4-7 BTD Area 15 Mode Shares

Land Use	Period/ Direction	Vehicle Trips	Transit Trips	Bike/Walk/Other Trips
Daily				
Residential	In	57%	17%	26%
	Out	57%	17%	26%
Office	In	58%	24%	18%
	Out	58%	24%	18%
a.m. Peak Hour				
Residential	In	54%	19%	27%
	Out	44%	29%	27%
Office	In	55%	27%	18%
	Out	43%	40%	17%
p.m. Peak Hour				
Residential	In	44%	29%	27%
	Out	54%	19%	27%
Office	In	43%	40%	17%
	Out	55%	27%	18%

Source: Boston Transportation Department mode share data for Area 15 for residential and office.

Table 4-8 Vehicle Trip Generation Summary

Period/ Direction	Proposed Project Vehicle Trips[1]	Alternative One Vehicle Trips[2]
Daily		
Total	**828**	**978**
In	414	489
Out	414	489
a.m. Peak Hour		
Total	**51**	**78**
In	12	40
Out	39	38
p.m. Peak Hour		
Total	**65**	**88**
In	39	39
Out	26	49

Source: 1 Based on ITE LUC- 220, Apartment averages rates for 218 units.
2 Based on ITE LUC- 220, Apartment averages rates for 190 units and LUC- 710, General Office Building averages rates for 40,000 sf.

As shown in **Table 4-8,** the Proposed Project is expected to generate only approximately 51 vehicle trips during the morning peak hour (12 in and 39 out) and 65 vehicle trips during the evening peak hour (39 in and 26 out). Alternative One is expected to generate only approximately 78 vehicle trips during the morning peak hour (40 in and 38 out) and 88 vehicle trips during the evening peak hour (39 in and 49 out). This corresponds to an increase of approximately one to two new vehicle trips per minute on the adjacent roadway network during the peak periods under either alternative – a negligible increase.

4.3.12 TRIP DISTRIBUTION

The trip distribution identifies the various travel paths for vehicles arriving and leaving the Project Site. Trip distribution patterns for the Project were based on BTD's origin-destination data for Area 15. The trip distribution patterns were refined based on existing traffic patterns and review of the adjacent roadway network. The trip distribution pattern for the Project is illustrated in **Figure 4-16**.

The Project-generated vehicle trips were assigned to the study area roadway network based on the trip distribution patterns. The Project-generated trips for each Build alternative were added to the 2018 No-Build conditions traffic volumes to develop the 2018 Build conditions peak hour traffic volume networks. The resulting a.m. and p.m. peak hour traffic volume networks for the Proposed Project and Alternative One are shown in **Figures 4-17** through **Figure 4-20** for the a.m. and p.m. peak hours, respectively.

4.3.13 BUILD CONDITIONS TRAFFIC OPERATIONS

The 2018 Build conditions scenario analyses uses the same methodology as the 2013 Existing and 2018 No-Build conditions scenario analyses. The results of the 2018 Build conditions traffic analysis, for each Build Alternative, at study area intersections are presented in **Tables 4-9** through **Table 4-12** for the a.m. and p.m. peak hours, respectively. The shaded cells in the tables indicate a decrease in LOS between the 2018 No-Build conditions and the 2018 Build conditions. The detailed analysis sheets are provided in the Appendix 1.

As shown in Table 4-9 and Table 4-12, all intersections will continue to operate at the same level of service, under either Build Alternative, during the morning and evening peak hour, due to the small increase in vehicle trips generated by the Project.

Table 4-9 Proposed Project Build (2018) Level of Service Summary, a.m. Peak Hour

Intersection/Approach	LOS	Delay (seconds)	V/C Ratio	50th Percentile Queue length (feet)	95th Percentile Queue length (feet)
Signalized Intersections					
Massachusetts Ave/Albany St	**D**	**42.6**	-	-	-
Albany EB left/thru | thru	D	44.0	0.73	146	206
Albany EB right	D	36.2	0.28	42	m82
Albany WB left	F	>80.0	0.97	135	#278
Albany WB thru | thru/right	C	24.3	0.32	95	133
Mass Ave NB thru | thru	D	37.9	0.80	406	500
Mass Ave NB right	C	31.4	0.77	393	571
Mass Ave SB left	F	>80.0	>1.00	~150	#295
Mass Ave SB thru | thru/right	B	19.0	0.49	212	268
Massachusetts Ave/Harrison Ave	**D**	**35.8**	-	-	-
Harrison EB left/thru/right	E	76.2	1.00	301	#516
Harrison WB left/thru/right	E	67.5	0.93	194	#369
Mass Ave NB left	A	9.8	0.20	13	29
Mass Ave NB thru | thru/right	C	28.3	0.85	341	443
Mass Ave SB left	C	22.7	0.61	37	#88
Mass Ave SB thru | thru/right	B	19.2	0.62	234	312
Albany St/Northampton St/Crosstown Dr	**C**	**21.0**	-	-	-
Albany EB left/thru | thru/right	B	10.6	0.52	82	268
Albany WB left/thru | thru/right	C	21.7	0.27	105	174
Crosstown NB left/thru	D	48.1	0.40	72	117
Crosstown NB right	B	13.9	0.14	0	27
Northampton SB left/thru/right	D	53.2	0.70	102	166
Unsignalized Intersections					
Harrison Ave/Northampton St	-	-	-	-	-
Harrison EB left/thru/right	D	26.7	0.79	-	-
Harrison WB left/thru/right	C	18.9	0.64	-	-
Northampton NB left/thru/right	C	17.1	0.57	-	-
Northampton St/Garage	-	-	-	-	-
Garage WB left	C	15.4	0.10	-	8
Garage WB right	B	11.0	0.05	-	4
Northampton NB thru/right	A	0	0.24	-	0
Northampton SB left/thru	A	3.1	0.06	-	5

~/# = $50^{th}/95^{th}$ percentile volume exceeds capacity. Queue maybe longer. Queue shown is the maximum after 2 cycles.
m = Volume for 95^{th} percentile queue is metered by an upstream signal.
Grey shading indicates worsening from No-Build LOS.

Table 4-10 Proposed Project Build (2018) Level of Service Summary, p.m. Peak Hour

Intersection/Approach	LOS	Delay (seconds)	V/C Ratio	50th Percentile Queue length (feet)	95th Percentile Queue length (feet)
Signalized Intersections					
Massachusetts Ave/Albany St	**D**	**36.6**	-	-	-
Albany EB left/thru | thru	D	43.4	0.49	91	m125
Albany EB right	D	45.7	0.51	103	m154
Albany WB left	F	>80.0	0.89	236	#429
Albany WB thru | thru/right	B	10.7	0.47	95	103
Mass Ave NB thru | thru	D	42.2	0.73	307	386
Mass Ave NB right	B	16.8	0.35	130	196
Mass Ave SB left	E	60.4	0.43	49	97
Mass Ave SB thru | thru/right	C	32.2	0.71	359	444
Massachusetts Ave/Harrison Ave	**E**	**57.3**	-	-	-
Harrison EB left/thru/right	D	42.6	0.75	174	#308
Harrison WB left/thru/right	F	>80.0	>1.0	~482	#693
Mass Ave NB left	B	13.7	0.41	26	48
Mass Ave NB thru | thru/right	C	20.6	0.64	229	298
Mass Ave SB left	B	11.0	0.27	19	38
Mass Ave SB thru | thru/right	C	20.6	0.66	267	343
Albany St/Northampton St/Crosstown Dr	**C**	**27.2**	-	-	-
Albany EB left/thru | thru/right	B	12.8	0.36	49	156
Albany WB left/thru | thru/right	C	27.6	0.40	152	351
Crosstown NB left/thru	D	38.9	0.32	65	101
Crosstown NB right	A	7.2	0.27	0	41
Northampton SB left/thru/right	D	50.1	0.83	170	245
Unsignalized Intersections					
Harrison Ave/Northampton St	-	-	-	-	-
Harrison EB left/thru/right	C	16.6	0.57	-	-
Harrison WB left/thru/right	F	>50.0	>1.0	-	-
Northampton NB left/thru/right	C	17.3	0.56	-	-
Northampton St/Garage	-	-	-	-	-
Garage WB left	C	15.4	0.17	-	16
Garage WB right	B	11.1	0.12	-	10
Northampton NB thru/right	A	0	0.16	-	0
Northampton SB left/thru	A	1.4	0.03	-	2

~/# = $50^{th}/95^{th}$ percentile volume exceeds capacity. Queue maybe longer. Queue shown is the maximum after 2 cycles.
m = Volume for 95^{th} percentile queue is metered by an upstream signal.
Grey shading indicates worsening from No-Build LOS.

Table 4-11 Alternative One Build (2018) Level of Service Summary, a.m. Peak Hour

Intersection/Approach	LOS	Delay (seconds)	V/C Ratio	50th Percentile Queue length (feet)	95th Percentile Queue length (feet)
Signalized Intersections					
Massachusetts Ave/Albany St	**D**	**42.6**	-	-	-
Albany EB left/thru | thru	D	44.1	0.73	146	206
Albany EB right	D	36.2	0.28	41	m81
Albany WB left	F	>80.0	0.97	135	#278
Albany WB thru | thru/right	C	24.3	0.32	95	133
Mass Ave NB thru | thru	D	38.0	0.81	407	501
Mass Ave NB right	C	31.4	0.77	393	571
Mass Ave SB left	F	>80.0	>1.00	~150	#295
Mass Ave SB thru | thru/right	B	19.0	0.49	212	268
Massachusetts Ave/Harrison Ave	**D**	**35.8**	-	-	-
Harrison EB left/thru/right	E	76.2	1.00	301	#516
Harrison WB left/thru/right	E	67.5	0.93	194	#369
Mass Ave NB left	A	9.9	0.22	14	30
Mass Ave NB thru | thru/right	C	28.3	0.85	341	443
Mass Ave SB left	C	22.7	0.61	37	#88
Mass Ave SB thru | thru/right	B	19.3	0.62	235	313
Albany St/Northampton St/Crosstown Dr	**C**	**20.9**	-	-	-
Albany EB left/thru | thru/right	B	10.7	0.53	82	268
Albany WB left/thru | thru/right	C	21.5	0.27	107	177
Crosstown NB left/thru	D	48.1	0.40	72	117
Crosstown NB right	B	13.9	0.14	0	27
Northampton SB left/thru/right	D	53.2	0.70	102	166
Unsignalized Intersections					
Harrison Ave/Northampton St	-	-	-	-	-
Harrison EB left/thru/right	D	28.7	0.81	-	-
Harrison WB left/thru/right	C	19.6	0.66	-	-
Northampton NB left/thru/right	C	17.3	0.57	-	-
Northampton St/Garage	-	-	-	-	-
Garage WB left	C	16.5	0.11	-	9
Garage WB right	B	11.1	0.05	-	4
Northampton NB thru/right	A	0.0	0.24	-	0
Northampton SB left/thru	A	3.7	0.08	-	6

~/# = 50th/95th percentile volume exceeds capacity. Queue maybe longer. Queue shown is the maximum after 2 cycles.
m = Volume for 95th percentile queue is metered by an upstream signal.
Grey shading indicates worsening from No-Build LOS.

Table 4-12 Alternative One Build (2018) Level of Service Summary, p.m. Peak Hour

Intersection/Approach	LOS	Delay (seconds)	V/C Ratio	50th Percentile Queue length (feet)	95th Percentile Queue length (feet)
Signalized Intersections					
Massachusetts Ave/Albany St	**D**	**36.7**	-	-	-
Albany EB left/thru | thru	D	43.3	0.49	92	m125
Albany EB right	D	46.9	0.54	112	m162
Albany WB left	F	>80.0	0.89	236	#429
Albany WB thru | thru/right	B	10.7	0.47	95	103
Mass Ave NB thru | thru	D	42.2	0.73	307	386
Mass Ave NB right	B	16.8	0.35	130	196
Mass Ave SB left	E	60.4	0.43	49	97
Mass Ave SB thru | thru/right	C	32.2	0.71	359	444
Massachusetts Ave/Harrison Ave	**E**	**57.3**	-	-	-
Harrison EB left/thru/right	D	43.6	0.77	176	#313
Harrison WB left/thru/right	F	>80.0	>1.0	~481	#692
Mass Ave NB left	B	13.7	0.41	26	48
Mass Ave NB thru | thru/right	C	20.6	0.64	229	298
Mass Ave SB left	B	11.0	0.27	19	38
Mass Ave SB thru | thru/right	C	20.6	0.66	267	343
Albany St/Northampton St/Crosstown Dr	**C**	**27.2**	-	-	-
Albany EB left/thru | thru/right	B	12.8	0.36	49	156
Albany WB left/thru | thru/right	C	27.6	0.40	152	351
Crosstown NB left/thru	D	38.9	0.32	65	101
Crosstown NB right	A	7.2	0.27	0	41
Northampton SB left/thru/right	D	50.1	0.83	170	245
Unsignalized Intersections					
Harrison Ave/Northampton St	-	-	-	-	-
Harrison EB left/thru/right	C	16.9	0.58	-	-
Harrison WB left/thru/right	F	>50.0	>1.0	-	-
Northampton NB left/thru/right	C	18.1	0.59	-	-
Northampton St/Garage	-	-	-	-	-
Garage WB left	C	15.8	0.20	-	18
Garage WB right	B	11.3	0.14	-	12
Northampton NB thru/right	A	0.0	0.16	-	0
Northampton SB left/thru	A	1.4	0.03	-	2

~/# = 50th/95th percentile volume exceeds capacity. Queue maybe longer. Queue shown is the maximum after 2 cycles.
m = Volume for 95th percentile queue is metered by an upstream signal.
Grey shading indicates worsening from No-Build LOS.

4.3.14 PARKING

The detailed parking analyses performed by HSH in June 2011 (see Appendix 1) and August 2013 indicate that the Northampton Garage is currently only approximately 80% occupied (100 unused spaces) during the weekday peak periods and is typically less than 30% occupied (more than 300 unused spaces) during the weekday evening and throughout the day on Saturday and Sunday. As such, there is currently underutilized supply in the existing garage that could be used to serve the Proposed Project. The following details the parking demand under the proposed Build Alternatives:

Proposed Project – (Residential)

The construction of the new residential building and the renovations at 860 Harrison Avenue, for the Proposed Project, will result in a net increase of 217 residential units at the Northampton Square Campus.

The parking demand ratio for the existing residential units on the Northampton Square Campus is currently only approximately 0.30 to 0.34 spaces per occupied unit, which is likely low in comparison to the proposed Project since most of the existing units are efficiency apartments. Although, according to parking survey data collected by HSH throughout the City, parking demand at market rate units is only slightly higher at approximately 0.50 spaces per unit. The Boston Transportation Department (BTD) parking space guidelines for this area of the City allow for a maximum of 1.0 to 1.5 spaces per residential unit.

Assuming a parking demand ratio of 0.5 spaces per residential unit, the parking demand associated with the proposed Project would be easily accommodated within the existing garage without any impact to current users, as the residential demand is typically lowest during the mid-day period when the garage is at its peak and highest (overnight) when the garage is underutilized. Using time of day demand factors, published in the Urban Land Institute's publication *Shared Parking, Second Edition*, the resulting weekday parking demand by hour is illustrated in **Figure 4-21.**

As shown in **Figure 4-21,** the 217 new residential units are expected to add only approximately 78 vehicles during the busiest period of the garage (about 2 p.m.) – leaving approximately 23 unused spaces.

Were the parking demand ever to exceed the anticipated 0.5 spaces per unit for the new residential uses, it is worth noting that the public 1,250-space Crosstown Garage, located just across Albany Street from the site, is significantly underutilized.

Alternative One (Residential/Office)

Under Build Alternative One, the Project would result in a net increase of 189 residential units and 40,000 sf of office space. Assuming a parking demand ratio of 0.5 spaces per residential unit and 1.0 spaces per 1,000 sf of office space, the additional Project-generated parking demand would use the remainder of the existing unused supply within the garage; however, the new parking demand can be adequately accommodated within the garage. BTD guidelines allow a maximum of 0.75 to 1.0 spaces per 1,000 sf of office space. **Figure 4-22** illustrates the resulting residential and office demand by hour.

Similar to the Proposed Project, additional parking demand beyond that anticipated could be accommodated at the nearby Crosstown Garage.

4.3.15 PUBLIC TRANSPORTATION

As summarized in **Table 4-13**, the Propose Project will generate an estimated 296 new transit trips daily, with 36 new transit trips (5 alighting and 31 boarding) during the a.m. peak hour and 42 new trips (31 alighting and 11 boarding) during the p.m. peak hour. Alternative One will generate an estimated 385 new transit trips daily, with 53 new transit trips (22 alighting and 30 boarding) during the a.m. peak hour and 57 new trips (32 alighting and 26 boarding) during the p.m. peak hour.

Table 4-13 Public Transportation Trip Generation Summary

Period/ Direction	Proposed Project Transit Trips[1]	Alternative One Transit Trips[2]
Daily		
Total	**296**	**385**
In	148	192
Out	148	192
a.m. Peak Hour		
Total	**36**	**53**
In	5	22
Out	31	30
p.m. Peak Hour		
Total	**42**	**57**
In	31	32
Out	11	26

Source: 1 Trip Generation based on ITE LUC- 220, Apartment averages rates for 218 units.
2 Trip Generation based on ITE LUC- 220, Apartment averages rates for 190 units.
Trip Generation based on ITE LUC- 710, General Office Building averages rates for 40,000 sf.

4.3.16 PEDESTRIAN AND BICYCLE TRIPS

As summarized in **Table 4-14**, the Proposed Project will generate an estimated 452 new pedestrian trips and an additional 296 new transit trips that will require a walk to or from the Site. This results in an additional 748 new pedestrian trips per day. Approximately 36 new pedestrian trips will occur during the a.m. peak hour and 43 new pedestrian trips will occur during the p.m. peak hour. Alternative One will generate an estimated 489 new pedestrian trips and an additional 385 new transit trips that will require a walk to or from the Site. This results in an additional 874 new pedestrian trips per day. Approximately 45 new pedestrian trips will occur during the a.m. peak hour and 57 new pedestrian trips will occur during the p.m. peak hour.

Table 4-14 Pedestrian and Bicycle Trip Generation Summary

Period/ Direction	Proposed Project Walk/Bike Trips[1]	Alternative One Walk/Bike Trips[2]
	Daily	
Total	**452**	**489**
In	226	245
Out	226	245
	a.m. Peak Hour	
Total	**36**	**45**
In	7	18
Out	29	27
	p.m. Peak Hour	
Total	**43**	**57**
In	28	27
Out	15	25

Source: 1 Trip Generation based on ITE LUC- 220, Apartment averages rates for 218 units.
2 Trip Generation based on ITE LUC- 220, Apartment averages rates for 190 units.
Trip Generation based on ITE LUC- 710, General Office Building averages rates for 40,000 sf.

4.3.17 BICYCLE ACCOMMODATIONS

The Project will provide secure covered bicycle storage spaces on-site for the new tower at a minimum ratio of one bicycle parking space per unit, and/or 0.3 bicycle spaces per 1,000 sf of office space, consistent with the City of Boston *Bicycle Parking Guidelines*. This would correspond to a minimum of 238 bicycle spaces for the Proposed Project and 210 bicycle spaces for Alternative One. The Project would also provide an additional 46 secure covered bicycle spaces in the new tower for the Proposed Project, and 62 bicycle spaces in Alternative One, for residents in the renovated 35 Northampton and 860 Harrison buildings.

The Project Proponent is working with the Boston Public Health Commission to *provide* bicycle racks for approximately 60 bicycles in the garage for the renovated 35

Northampton and 860 Harrison buildings. Visitor bicycle racks will be located around the site in accordance with the guidelines.

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

4.3.18 LOADING AND SERVICE ACCOMMODATIONS

All loading and service operations will occur on-site at the designated loading dock with two bays below the proposed high-rise building. Access and egress will be provided via the existing site driveway along Albany Street.

All recycling and trash collection for the proposed residential will occur inside the buildings and then wheeled/carried out to a dumpster enclosure located in the loading area. Most residential deliveries are made in smaller vehicles—cars, vans, or small panel trucks. Building management will coordinate all residential move-in and move-out activity and schedule this activity during off-peak hours, when possible. Move-in and move-out activity is generally infrequent once the building is fully occupied.

4.4 TRANSPORTATION MITIGATION MEASURES

Due to the low volume of Project-generated vehicle trips, the LOS at all study area intersections will remain unchanged under the Build Condition alternatives, as summarized for a.m. and p.m. Peak Hour in **Table 4-15** and **Table 4-16**, respectively. As such, mitigation is not warranted beyond providing safe vehicular and pedestrian access to and from the Project site and provision of transportation demand management (TDM) measures in support the City's efforts to reduce dependency on the automobile. The Proponent will work with the BTD as part of the TAPA process to identify appropriate TDM measures.

TDM measures encourage travelers to use alternatives to driving, especially during peak periods and will be facilitated by the nature of the Project and its proximity to public transit. The Proponent will emphasize the site's convenient transit and pedestrian access in marketing the Project to future residents and tenants.

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

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

- Bicycle Accommodation: The Proponent will provide bicycle storage in secure, sheltered areas for residents. Subject to necessary approvals, public use bicycle racks for visitors will be placed near building entrances.
- Electric Vehicle Charging: The Proponent will explore the feasibility of providing electric vehicle charging stations within the garage, which is owned and operated by the BPHC.
- Shared-car Services: Zipcar currently provides up to four vehicles on-site within the Northampton Garage. The Proponent will work with Zipcar, and/or another shared car provider, to determine the appropriateness of adding additional shared vehicles on-site to accommodate the new residents.
- Transportation Coordinator: The Proponent will designate a transportation coordinator to oversee transportation issues including parking, service and loading, and deliveries and will work with residents as they move in to raise awareness of public transportation, bicycling, and walking opportunities.
- Project Web Site: The web site will include transportation-related information for residents, workers, and visitors.

The proponents will work with BTD to determine an appropriate TDM program and will formalize this program in a TAPA.

Table 4-15 Level of Service Summary, a.m. Peak Hour

Intersection/Approach	2013 Existing	2018 No-Build	2018 Proposed Project	2018 Build – Alt One
Signalized Intersections				
Massachusetts Ave/Albany St	C	D	D	D
Albany EB left/thru | thru	D	D	D	D
Albany EB right	D	D	D	D
Albany WB left	F	F	F	F
Albany WB thru | thru/right	C	C	C	C
Mass Ave NB thru | thru	D	D	D	D
Mass Ave NB right	C	C	C	C
Mass Ave SB left	E	F	F	F
Mass Ave SB thru | thru/right	B	B	B	B
Massachusetts Ave/Harrison Ave	C	C	D	D
Harrison EB left/thru/right	E	E	E	E
Harrison WB left/thru/right	E	E	E	E
Mass Ave NB left	A	A	A	A
Mass Ave NB thru | thru/right	C	C	C	C
Mass Ave SB left	B	C	C	C
Mass Ave SB thru | thru/right	B	B	B	B
Albany St/Northampton St/Crosstown Dr	C	C	C	C
Albany EB left/thru | thru/right	B	B	B	B
Albany WB left/thru | thru/right	C	C	C	C
Crosstown NB left/thru	D	D	D	D
Crosstown NB right	B	B	B	B
Northampton SB left/thru/right	D	D	D	D
Unsignalized Intersections				
Harrison Ave/Northampton St	-	-	-	-
Harrison EB left/thru/right	C	C	D	D
Harrison WB left/thru/right	C	C	C	C
Northampton NB left/thru/right	C	C	C	C
Northampton St/Garage	-	-	-	-
Garage WB left	C	B	C	C
Garage WB right	B	B	B	B
Northampton NB thru/right	A	A	A	A
Northampton SB left/thru	A	A	A	A

Grey shading indicates worsening LOS from previous condition.

Table 4-16 Level of Service Summary, p.m. Peak Hour

Intersection/Approach	2013 Existing	2018 No-Build	2018 Proposed Project	2018 Build – Alt One
Signalized Intersections				
Massachusetts Ave/Albany St	C	D	D	D
Albany EB left/thru | thru	D	D	D	D
Albany EB right	D	D	D	D
Albany WB left	E	F	F	F
Albany WB thru | thru/right	A	B	B	B
Mass Ave NB thru | thru	D	D	D	D
Mass Ave NB right	B	B	B	B
Mass Ave SB left	E	E	E	E
Mass Ave SB thru | thru/right	C	C	C	C
Massachusetts Ave/Harrison Ave	D	E	E	E
Harrison EB left/thru/right	D	D	D	D
Harrison WB left/thru/right	F	F	F	F
Mass Ave NB left	B	B	B	B
Mass Ave NB thru | thru/right	B	C	C	C
Mass Ave SB left	A	B	B	B
Mass Ave SB thru | thru/right	B	C	C	C
Albany St/Northampton St/Crosstown Dr	C	C	C	C
Albany EB left/thru | thru/right	B	B	B	B
Albany WB left/thru | thru/right	C	C	C	C
Crosstown NB left/thru	D	D	D	D
Crosstown NB right	A	A	A	A
Northampton SB left/thru/right	D	D	D	D
Unsignalized Intersections				
Harrison Ave/Northampton St	-	-	-	-
Harrison EB left/thru/right	B	C	C	C
Harrison WB left/thru/right	E	F	F	F
Northampton NB left/thru/right	C	C	C	C
Northampton St/Garage	-	-	-	-
Garage WB left	B	B	C	C
Garage WB right	B	B	B	B
Northampton NB thru/right	A	A	A	A
Northampton SB left/thru	A	A	A	A

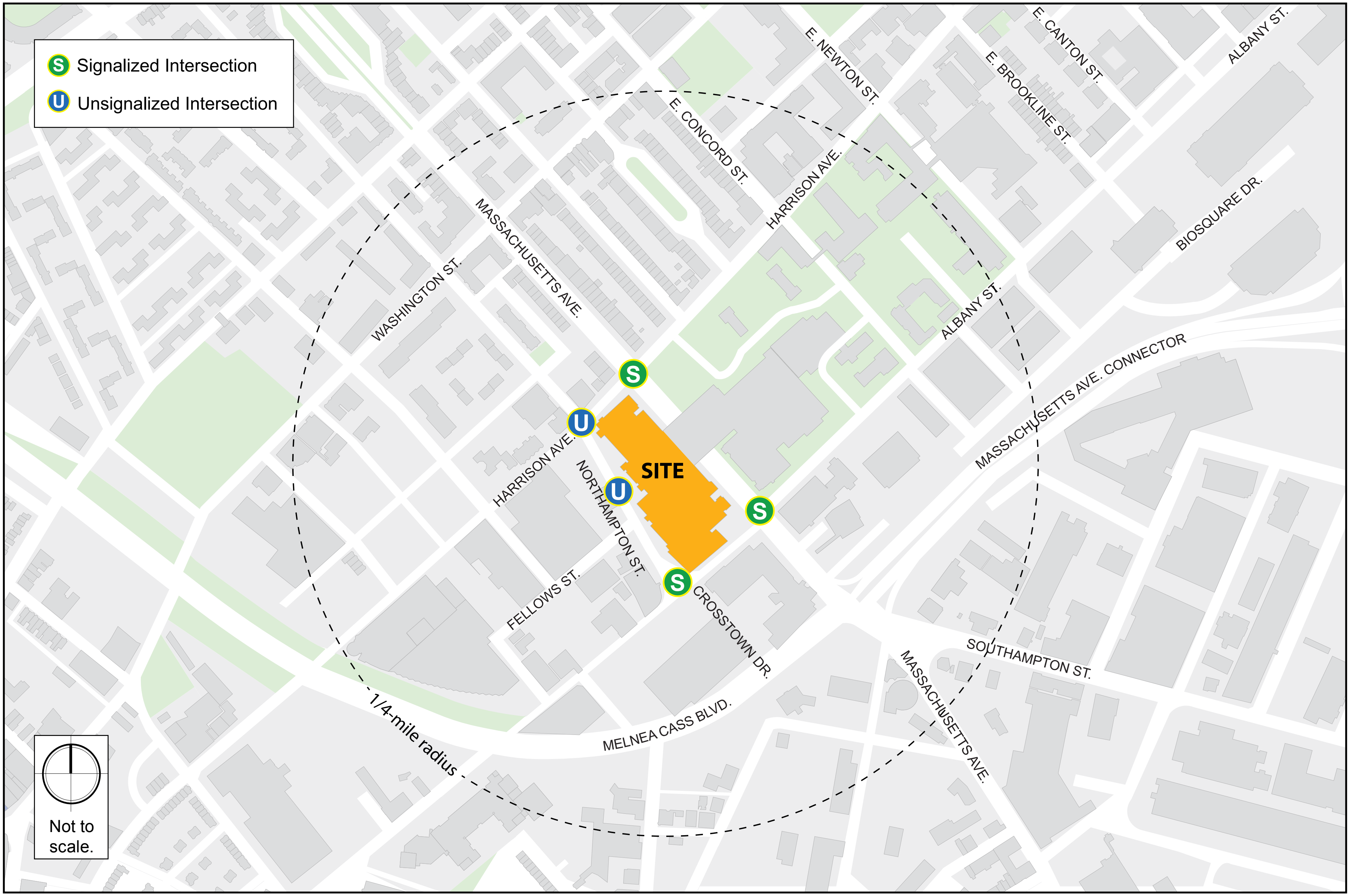
Grey shading indicates worsening LOS from previous condition.

4.5 EVALUATION OF SHORT-TERM CONSTRUCTION IMPACTS

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

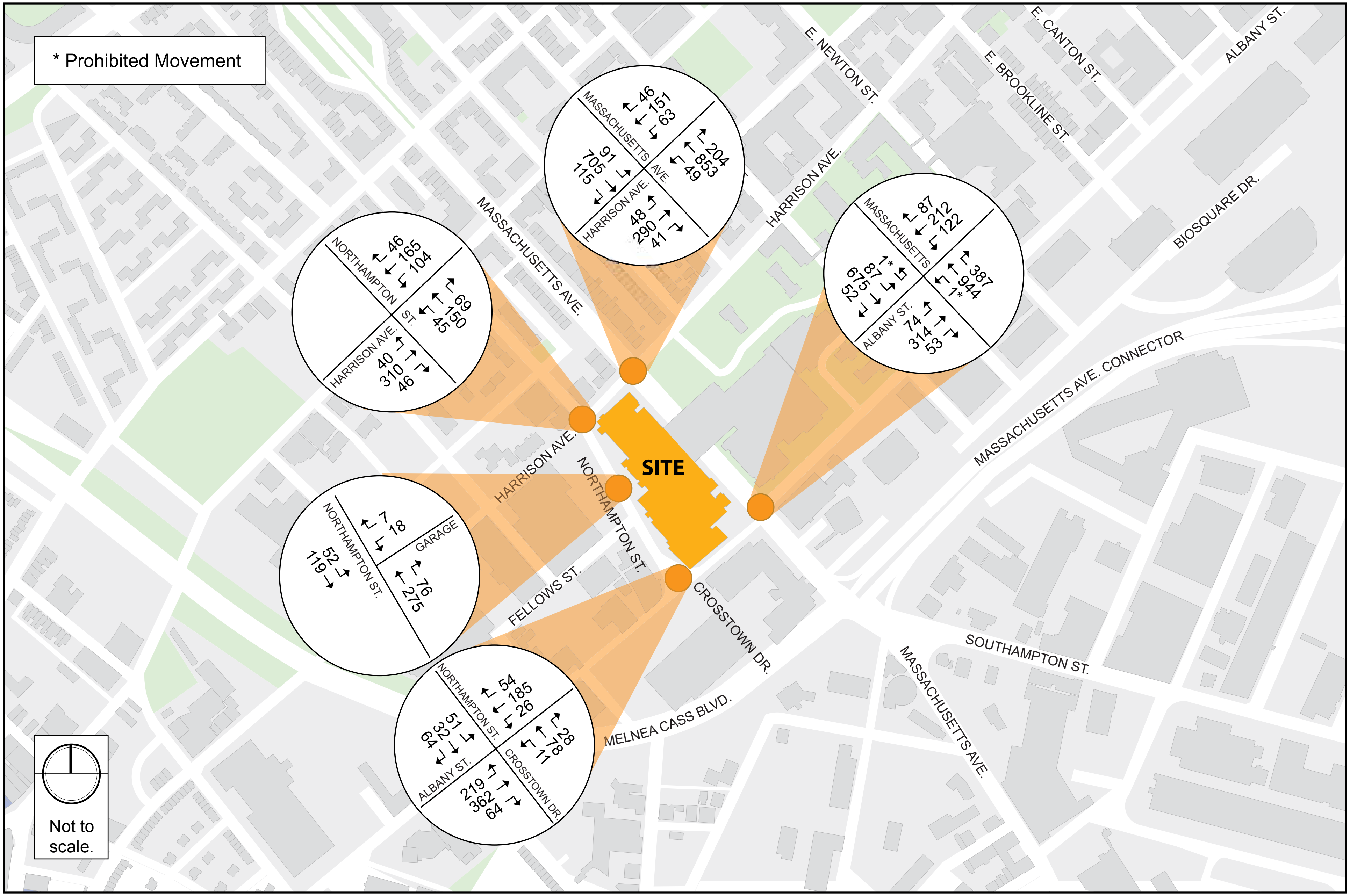
To minimize transportation impacts during the construction period, the following measures will be incorporated into the CMP:

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



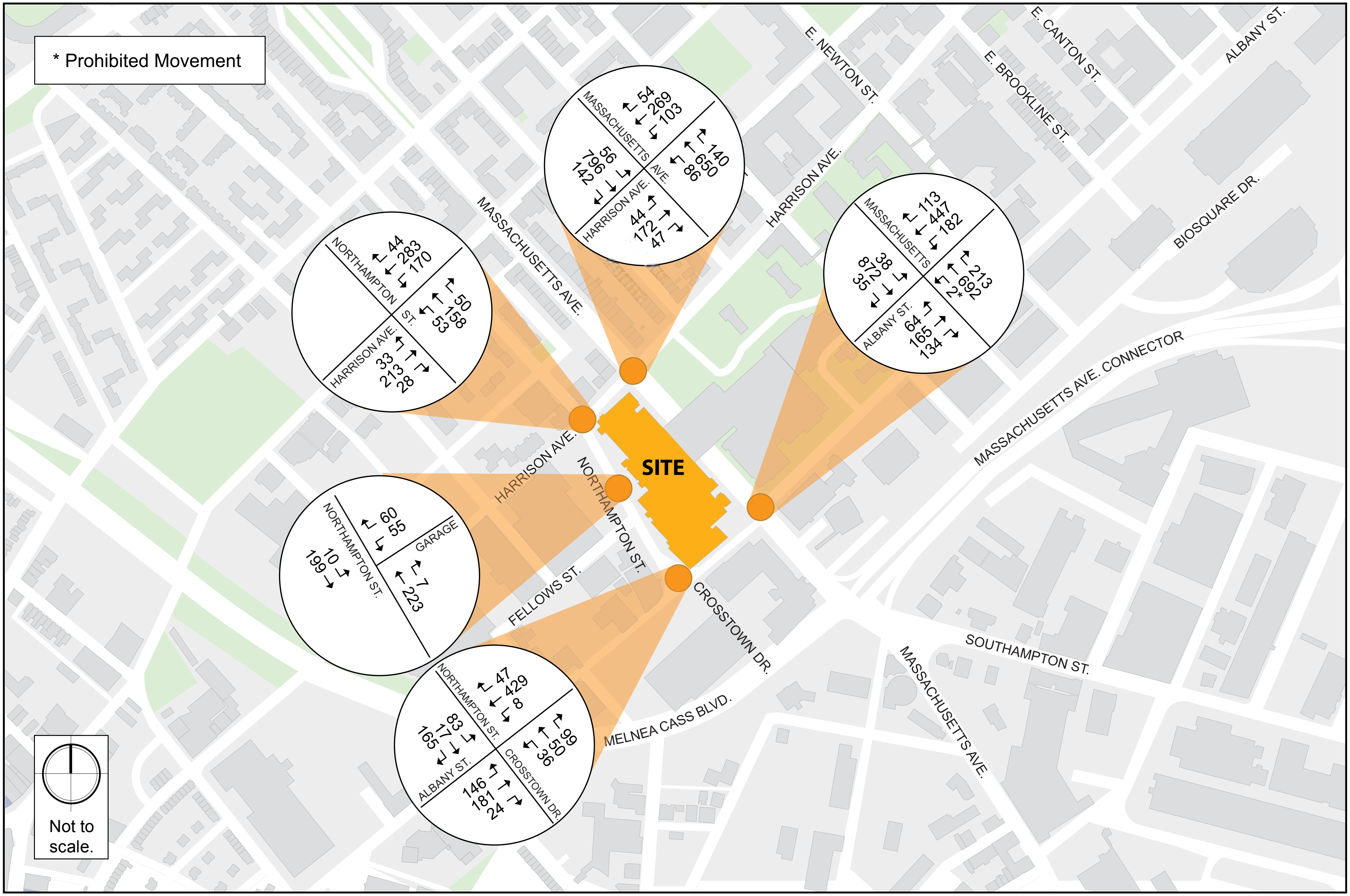
Northampton Square
Boston, Massachusetts

Figure 4-1
Study Area Intersections
Howard/Stein-Hudson Associates, Inc.



Northampton Square
Boston, Massachusetts

Figure 4-2
Existing Conditions (2013) Traffic Volumes, a.m. Peak Hour (7:45 - 8:45 a.m.)
Howard/Stein-Hudson Associates, Inc.



Northampton Square
Boston, Massachusetts

Figure 4-3
Existing Conditions (2013) Traffic Volumes, p.m. Peak Hour (4:45 - 5:45 p.m.)
Howard/Stein-Hudson Associates, Inc.

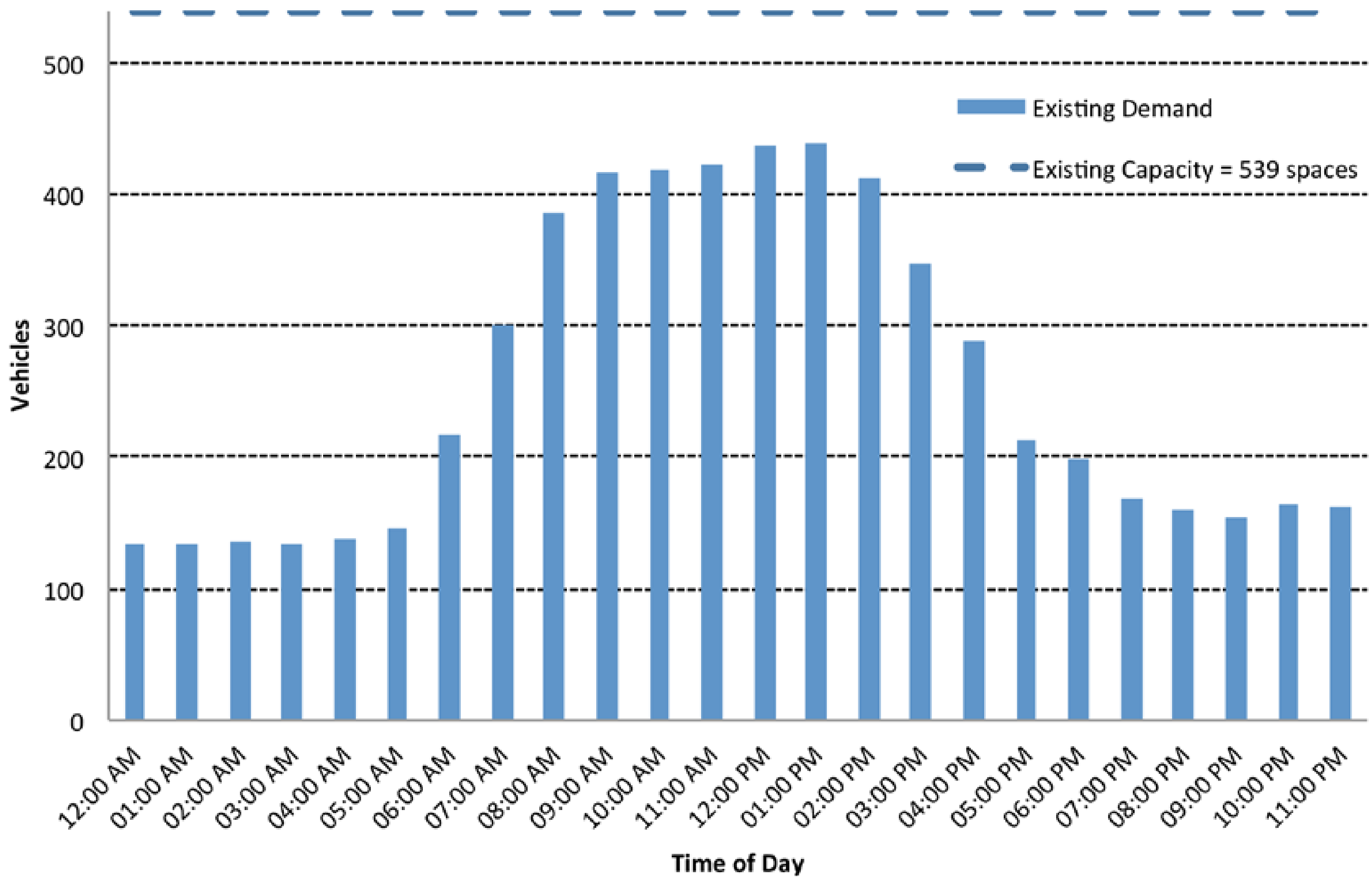


Figure 4-4
Existing Parking Demand: 35 Northampton Street Garage
Howard/Stein-Hudson Associates, Inc.

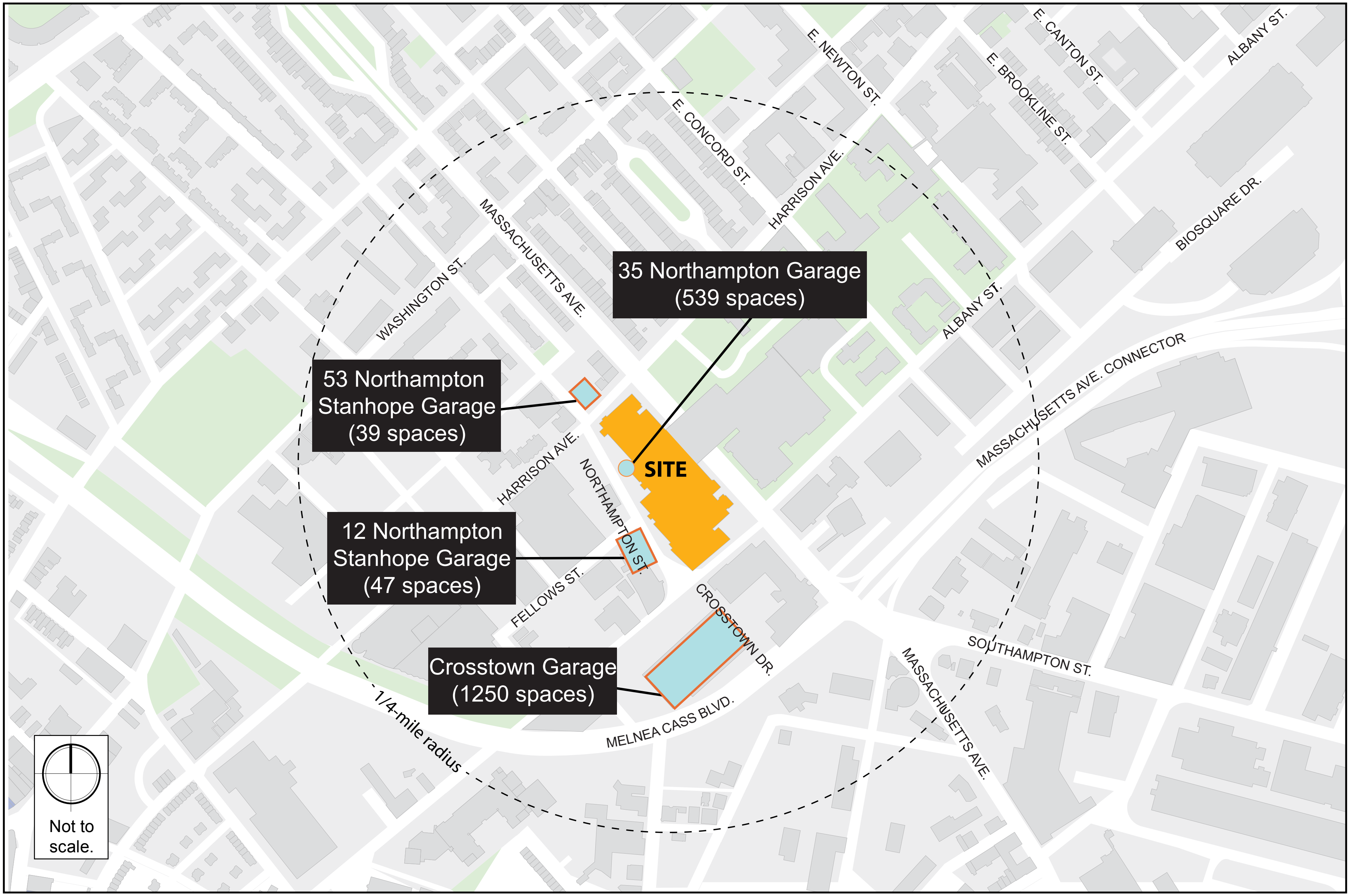


Figure 4-5
Off-Street Parking
Howard/Stein-Hudson Associates, Inc.

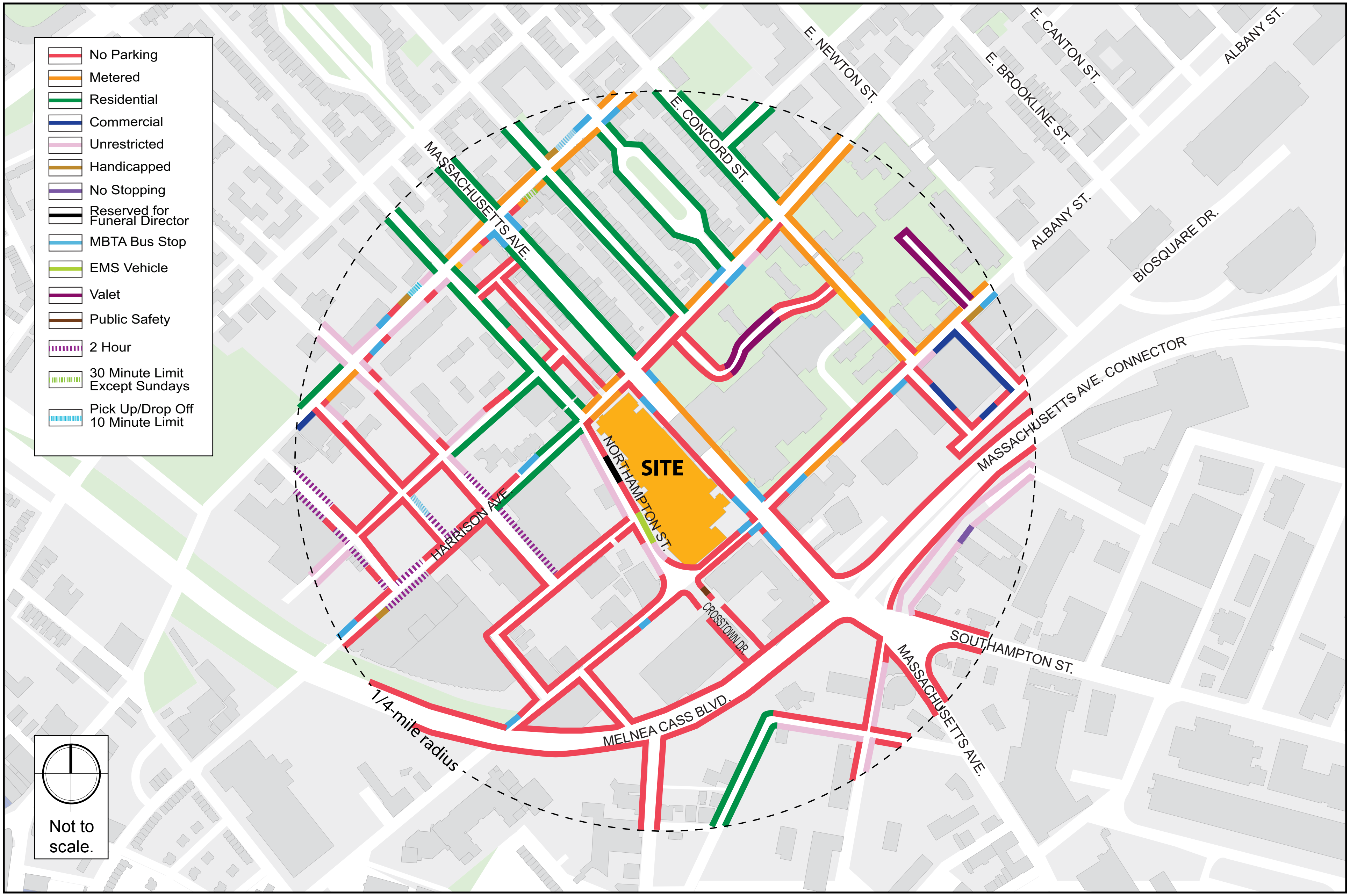


Figure 4-6
On-Street Parking in the Study Area
Howard/Stein-Hudson Associates, Inc.

Figure 4-7
On-Street Curbside Inventory
Howard/Stein-Hudson Associates, Inc.

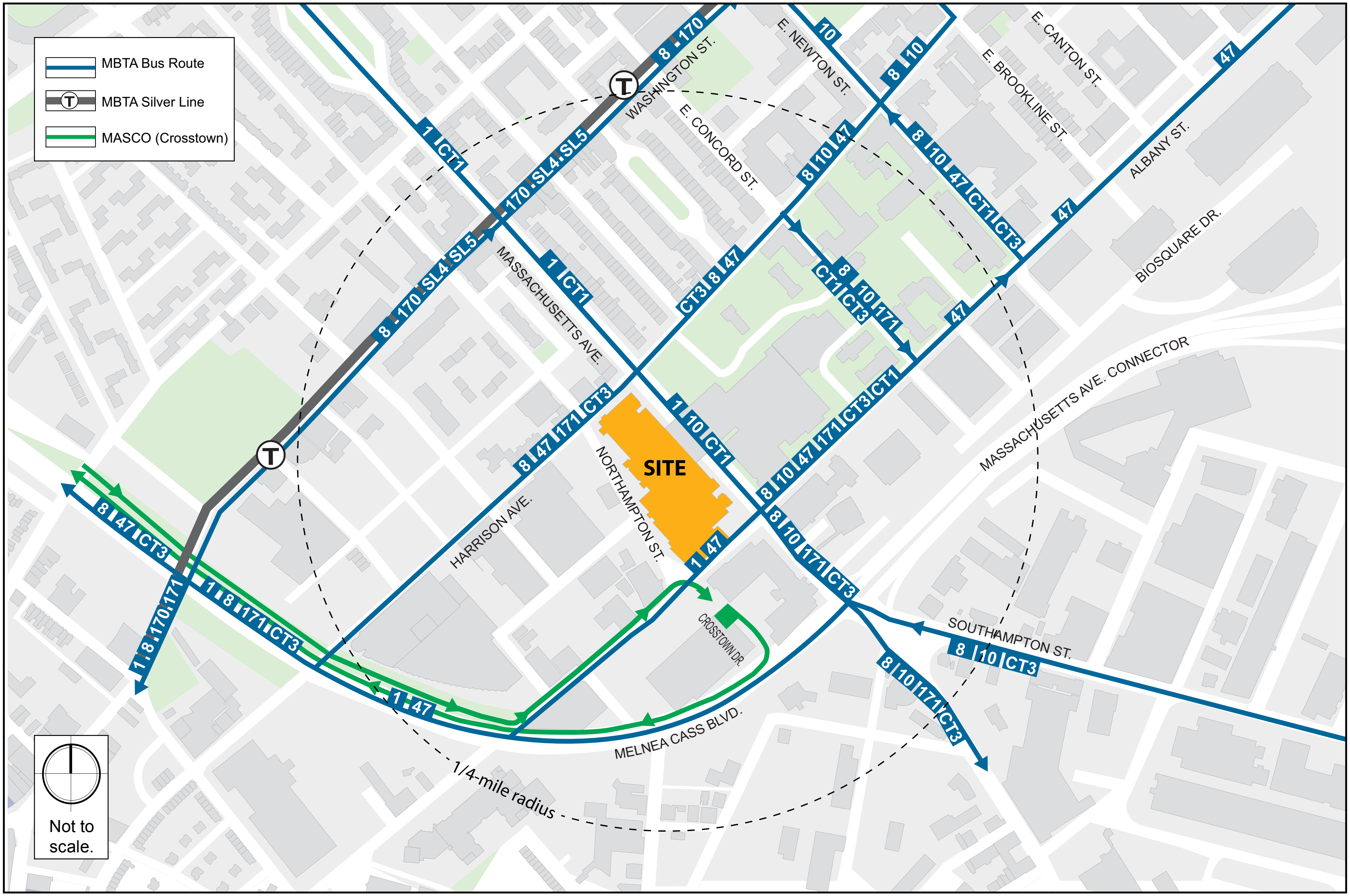
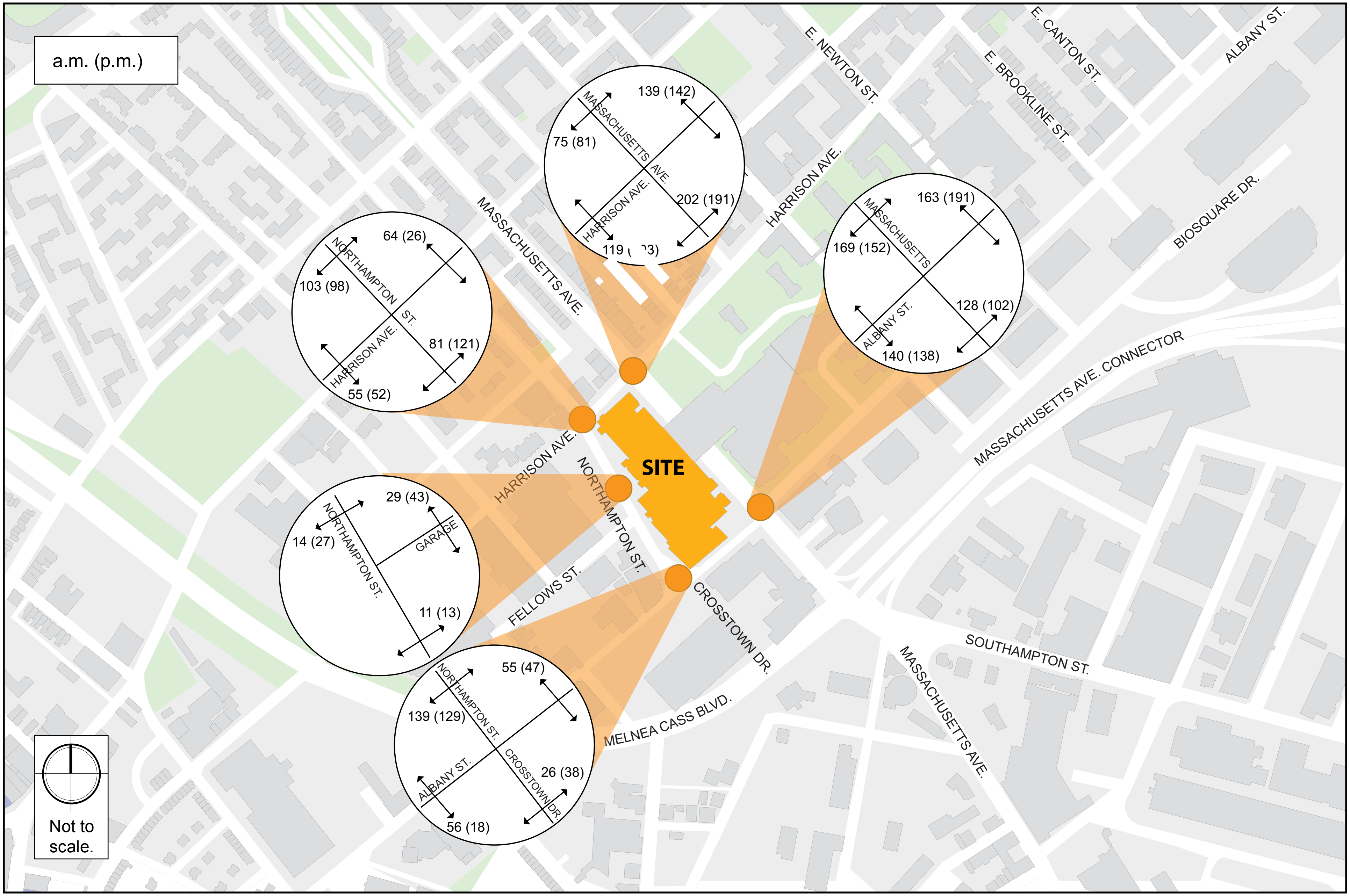
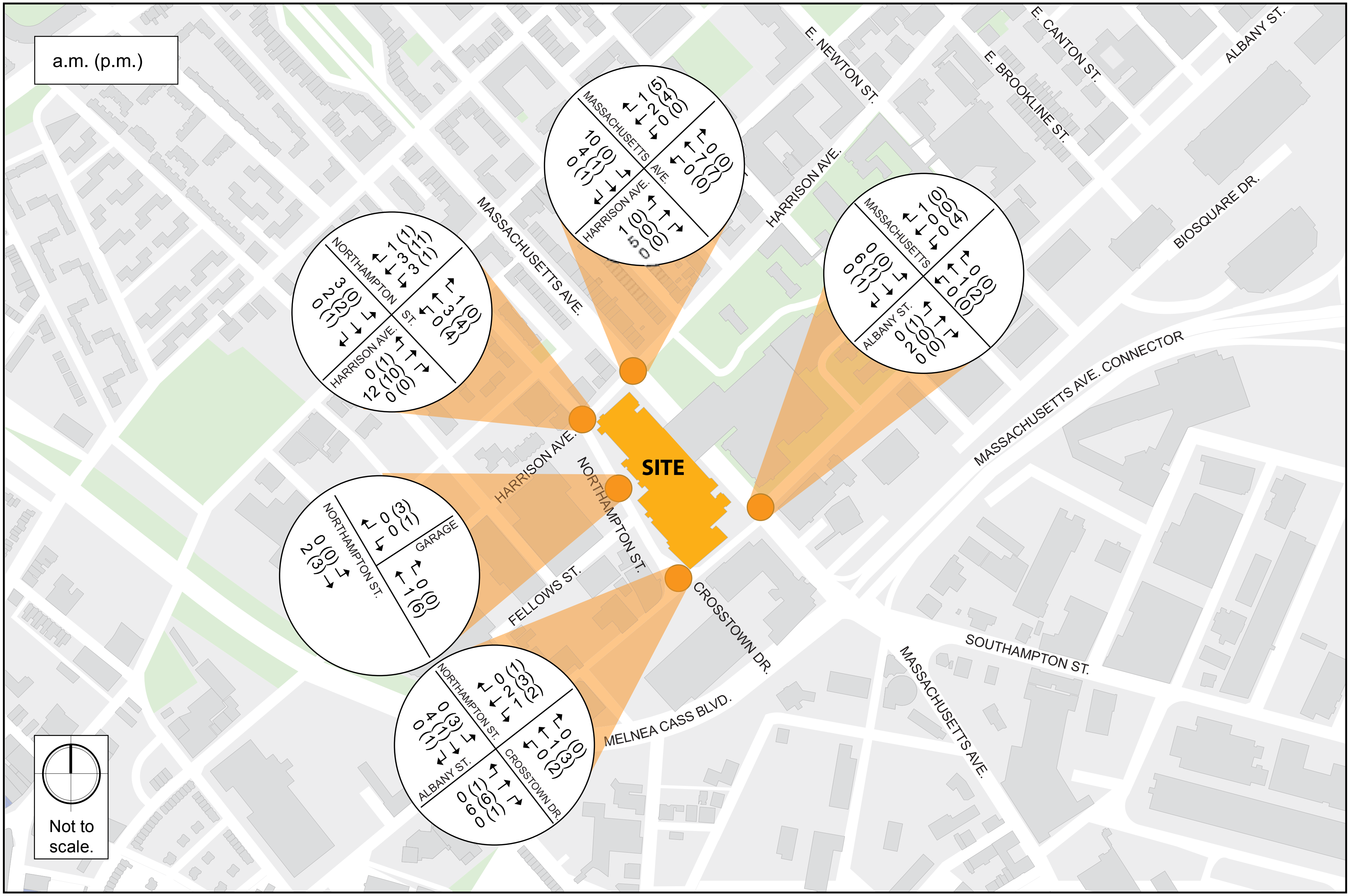


Figure 4-8
Public Transportation
Howard/Stein-Hudson Associates, Inc.



Northampton Square
Boston, Massachusetts

Figure 4-9
Existing Conditions (2013) Pedestrian Volumes, a.m. and p.m. Peak Hour
Howard/Stein-Hudson Associates, Inc.



Northampton Square
Boston, Massachusetts

Figure 4-10
Existing Conditions (2013) Bicycle Volumes, a.m. and p.m. Peak Hour
Howard/Stein-Hudson Associates, Inc.

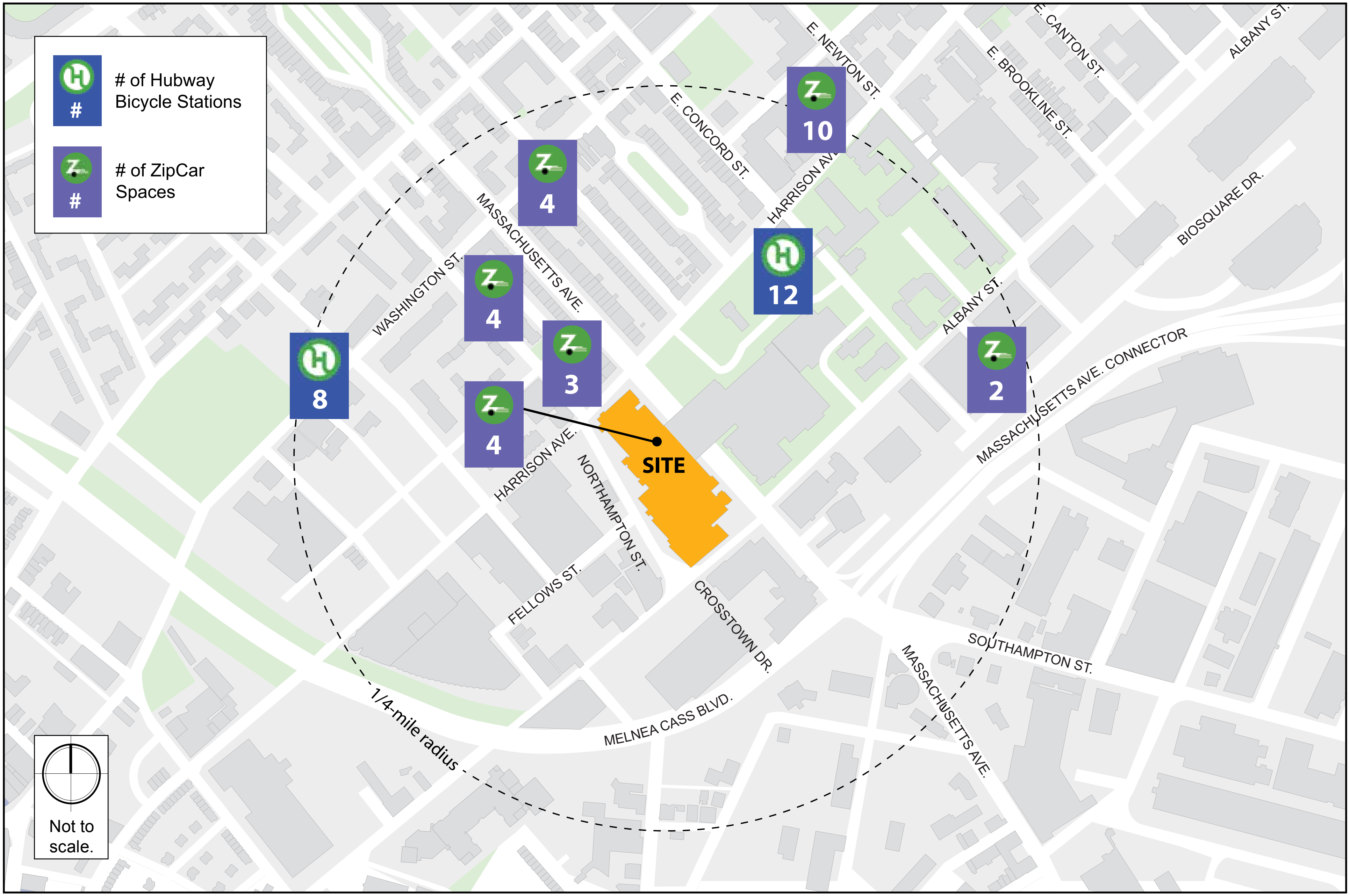


Figure 4-11
Bicycle and Car Sharing Locations
Howard/Stein-Hudson Associates, Inc.

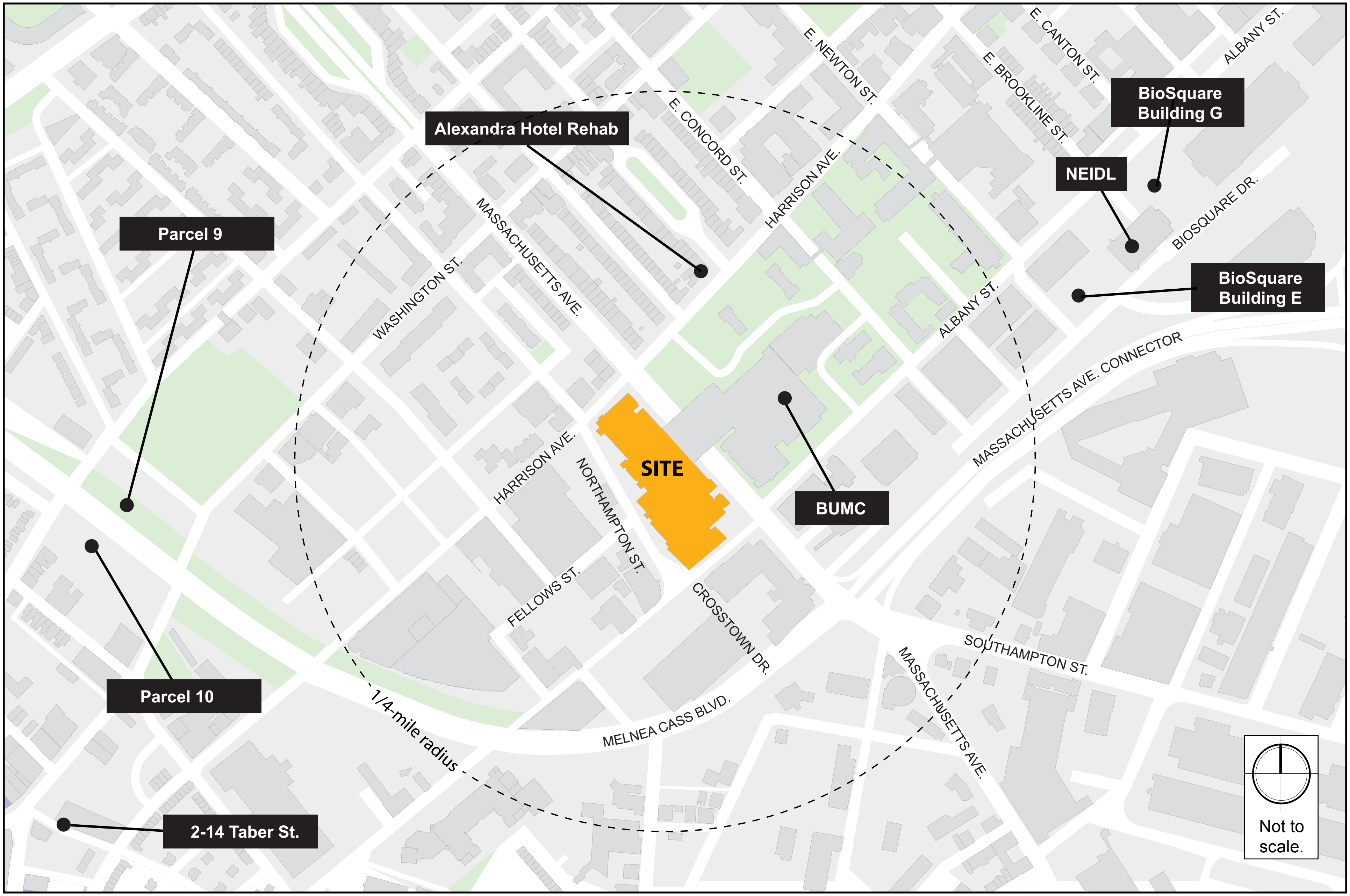
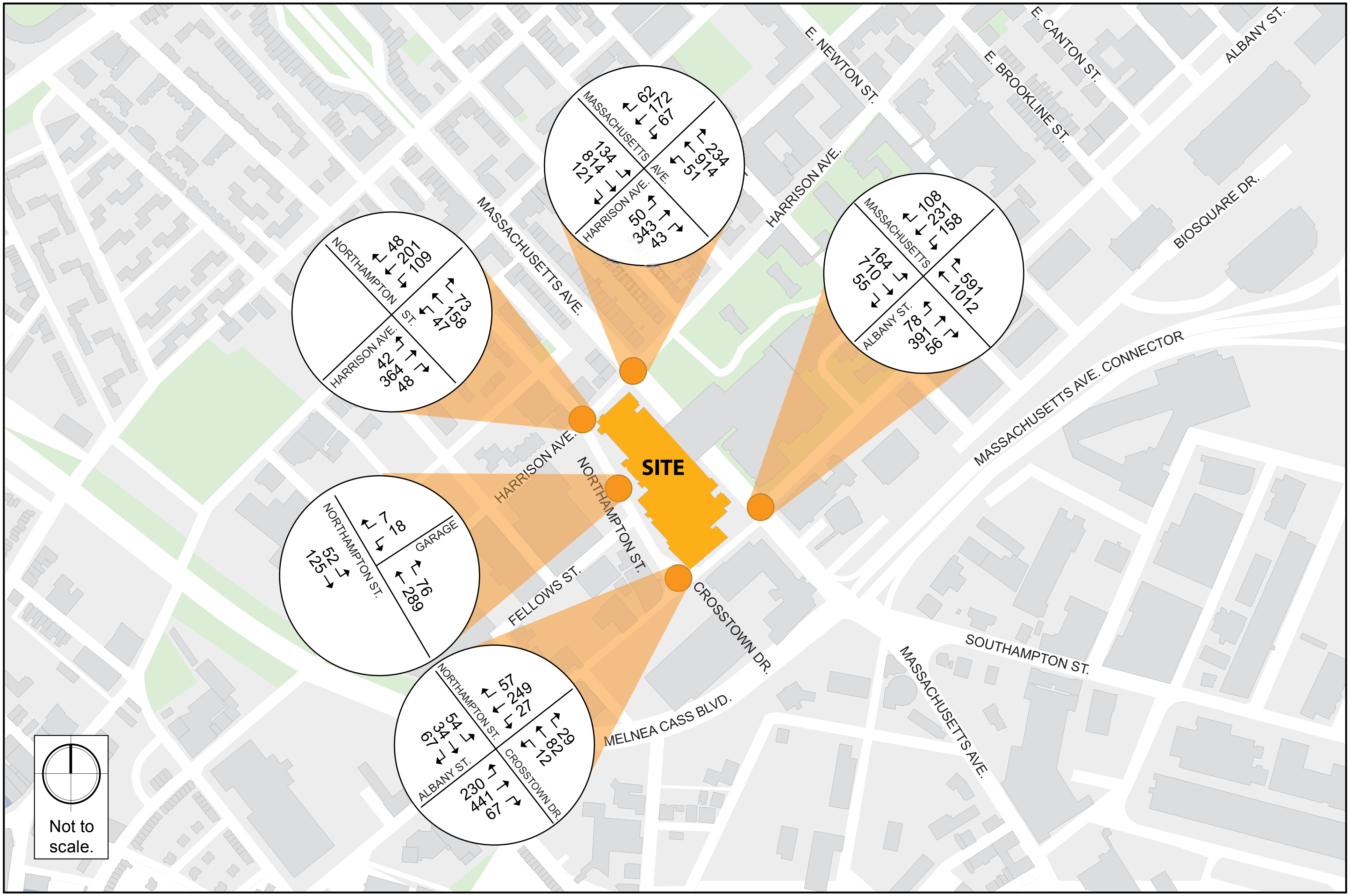
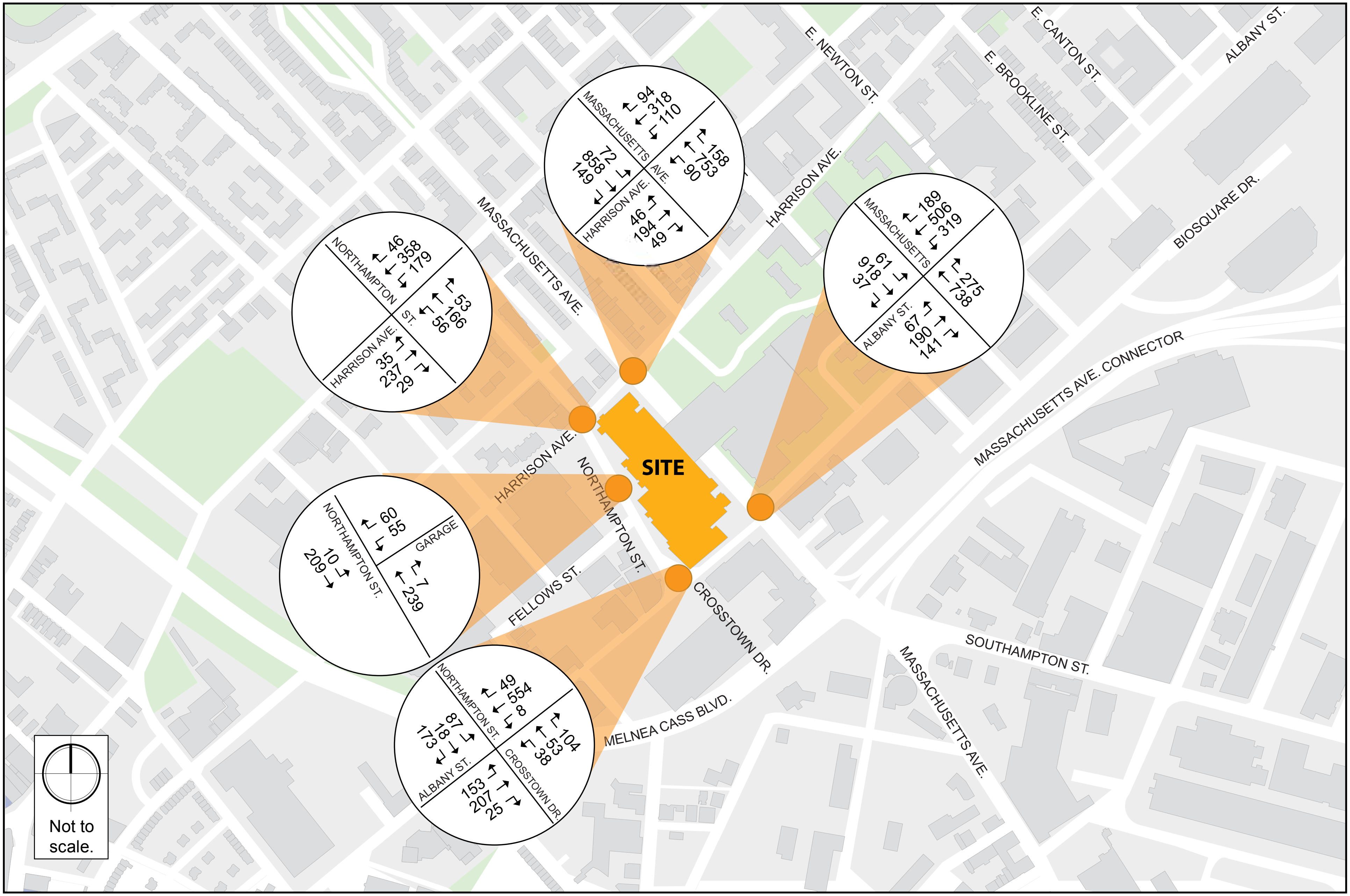


Figure 4-12
Area Development Projects
Howard/Stein-Hudson Associates, Inc.



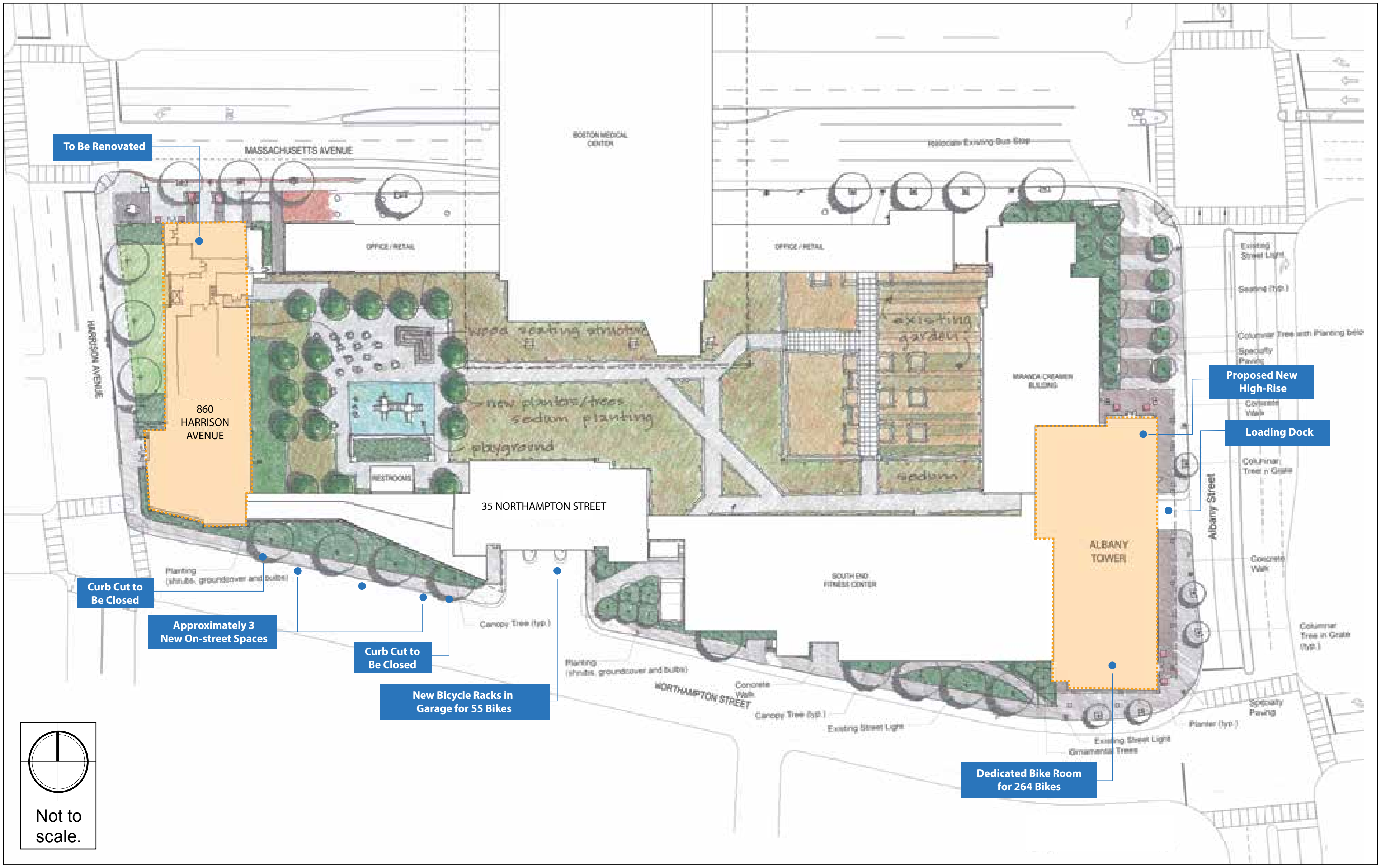
Northampton Square
Boston, Massachusetts

Figure 4-13
No-Build Conditions (2018) Traffic Volumes, a.m. Peak Hour
Howard/Stein-Hudson Associates, Inc.



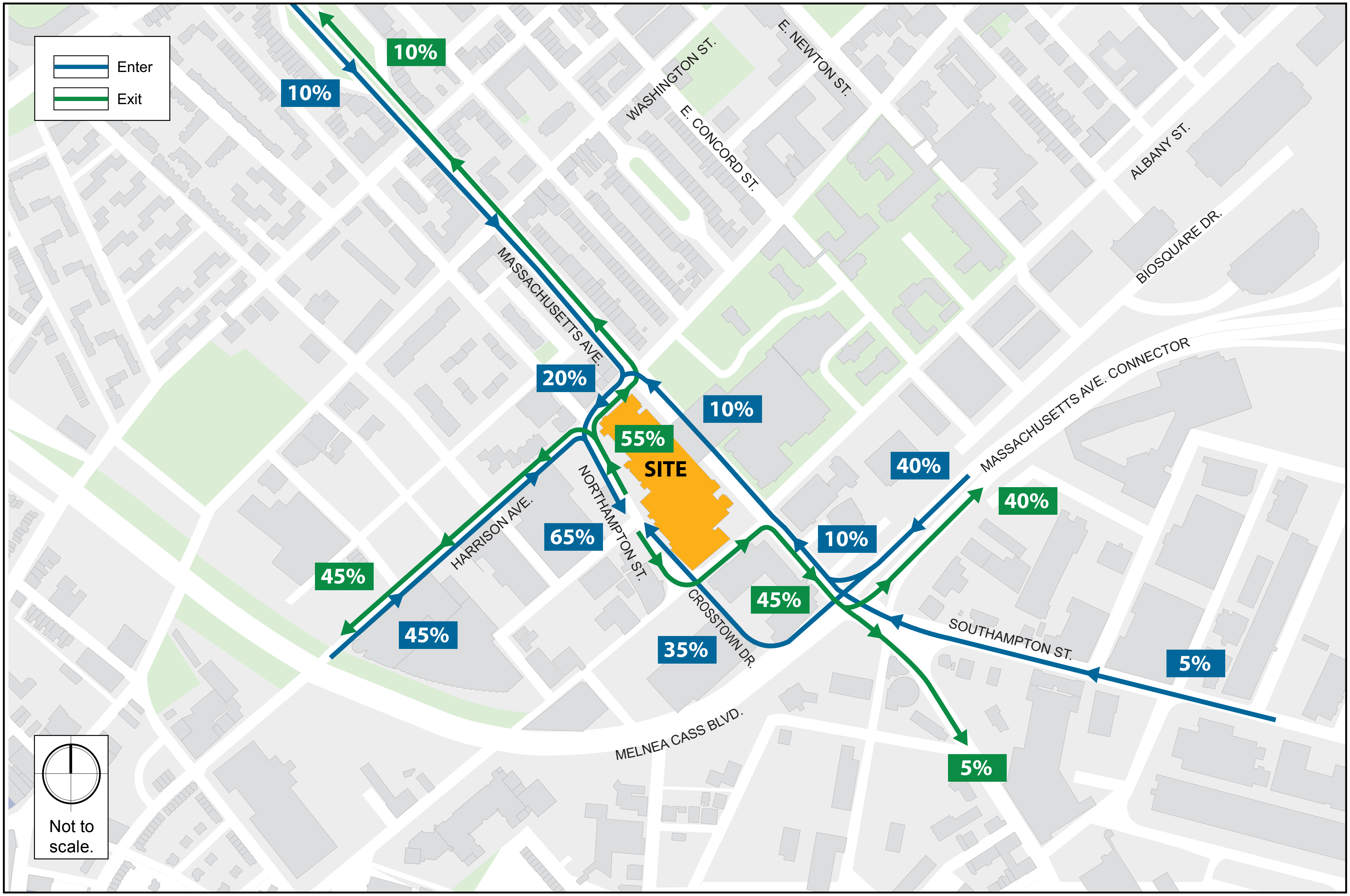
Northampton Square
Boston, Massachusetts

Figure 4-14
No-Build Conditions (2018) Traffic Volumes, p.m. Peak Hour
Howard/Stein-Hudson Associates, Inc.



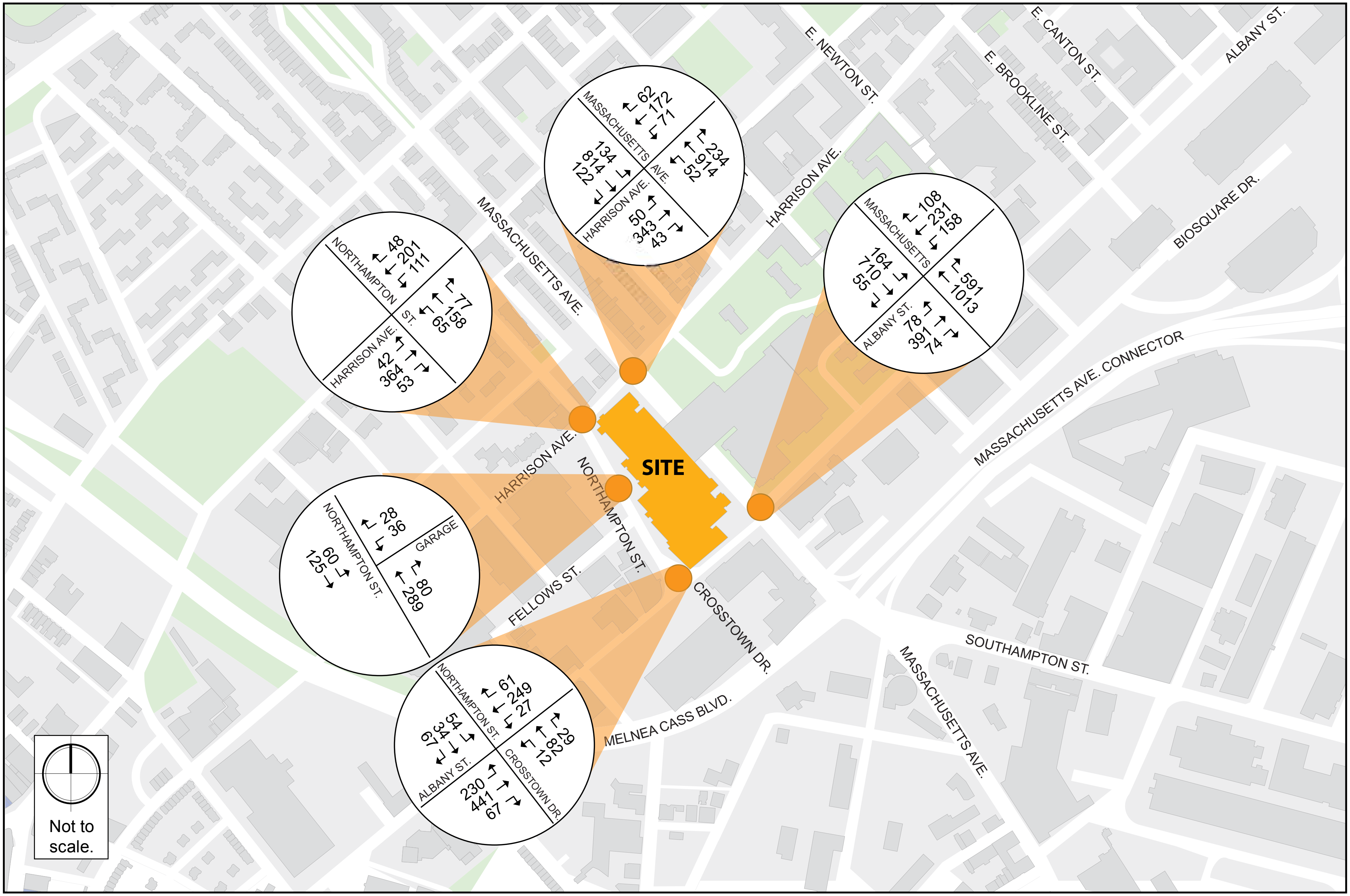
Northampton Square
Boston, Massachusetts

Figure 4-15
Site Plan
Howard/Stein-Hudson Associates, Inc.



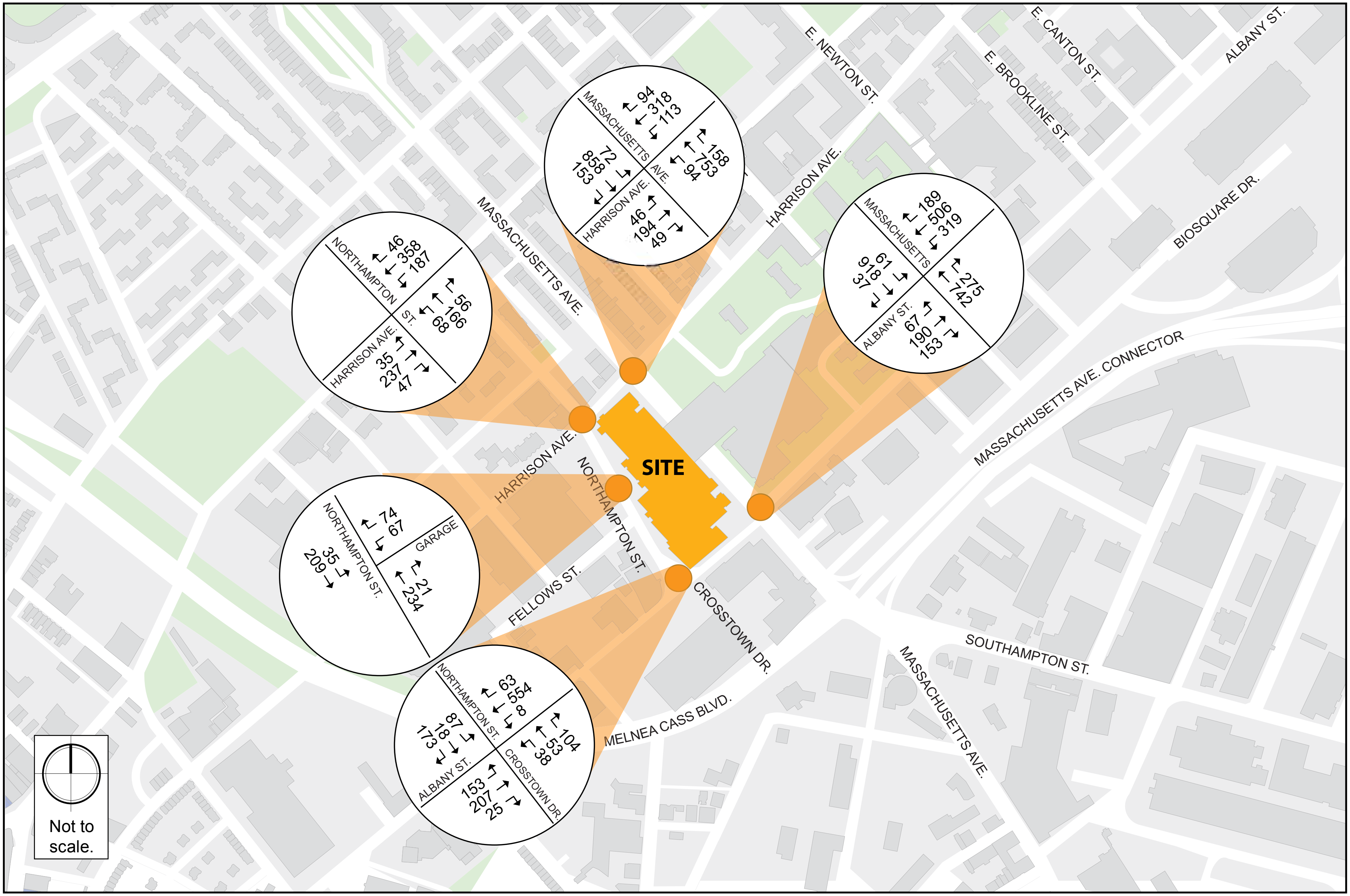
Northampton Square
Boston, Massachusetts

Figure 4-16
Trip Distribution, a.m. and p.m. Peak Hours
Howard/Stein-Hudson Associates, Inc.



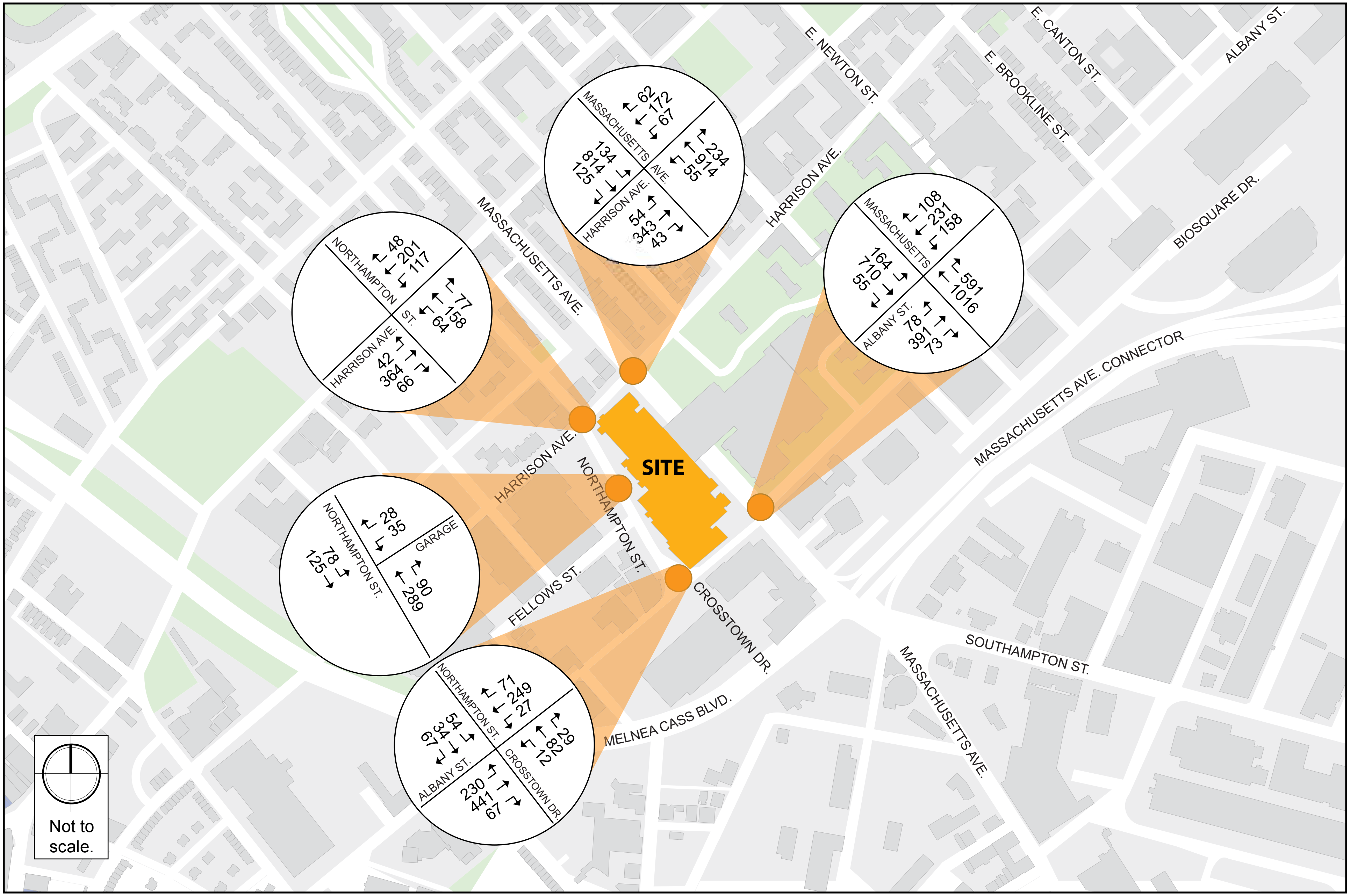
Northampton Square
Boston, Massachusetts

Figure 4-17
Proposed Project Build Conditions (2018) Traffic Volumes, a.m. Peak Hours
Howard/Stein-Hudson Associates, Inc.



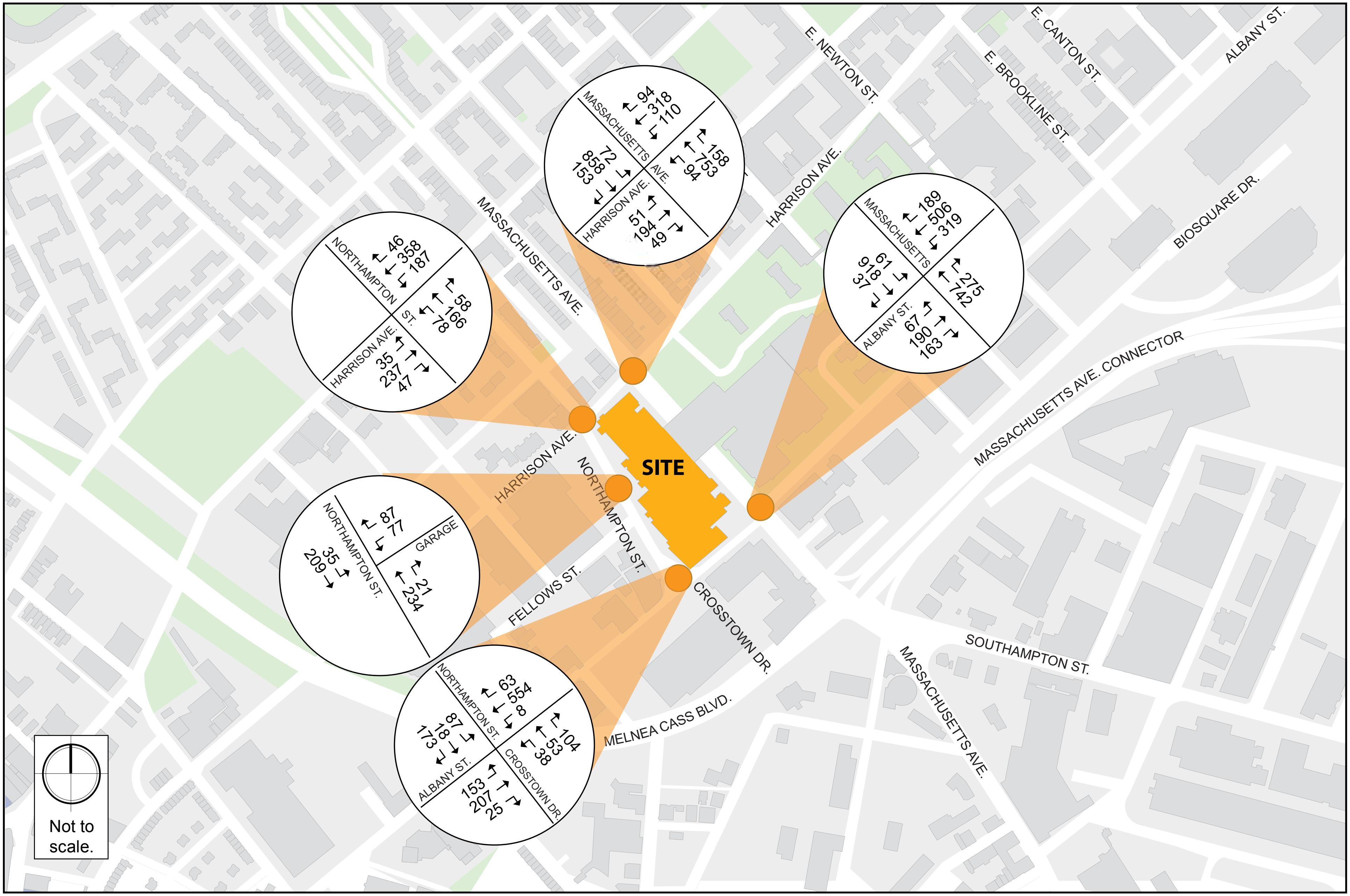
Northampton Square
Boston, Massachusetts

Figure 4-18
Proposed Project Build Conditions (2018) Traffic Volumes, p.m. Peak Hours
Howard/Stein-Hudson Associates, Inc.



Northampton Square
Boston, Massachusetts

Figure 4-19
Alternative One Build Conditions (2018) Traffic Volumes, a.m. Peak Hours
Howard/Stein-Hudson Associates, Inc.



Northampton Square
Boston, Massachusetts

Figure 4-20
Alternative One Build Conditions (2018) Traffic Volumes, p.m. Peak Hours
Howard/Stein-Hudson Associates, Inc.

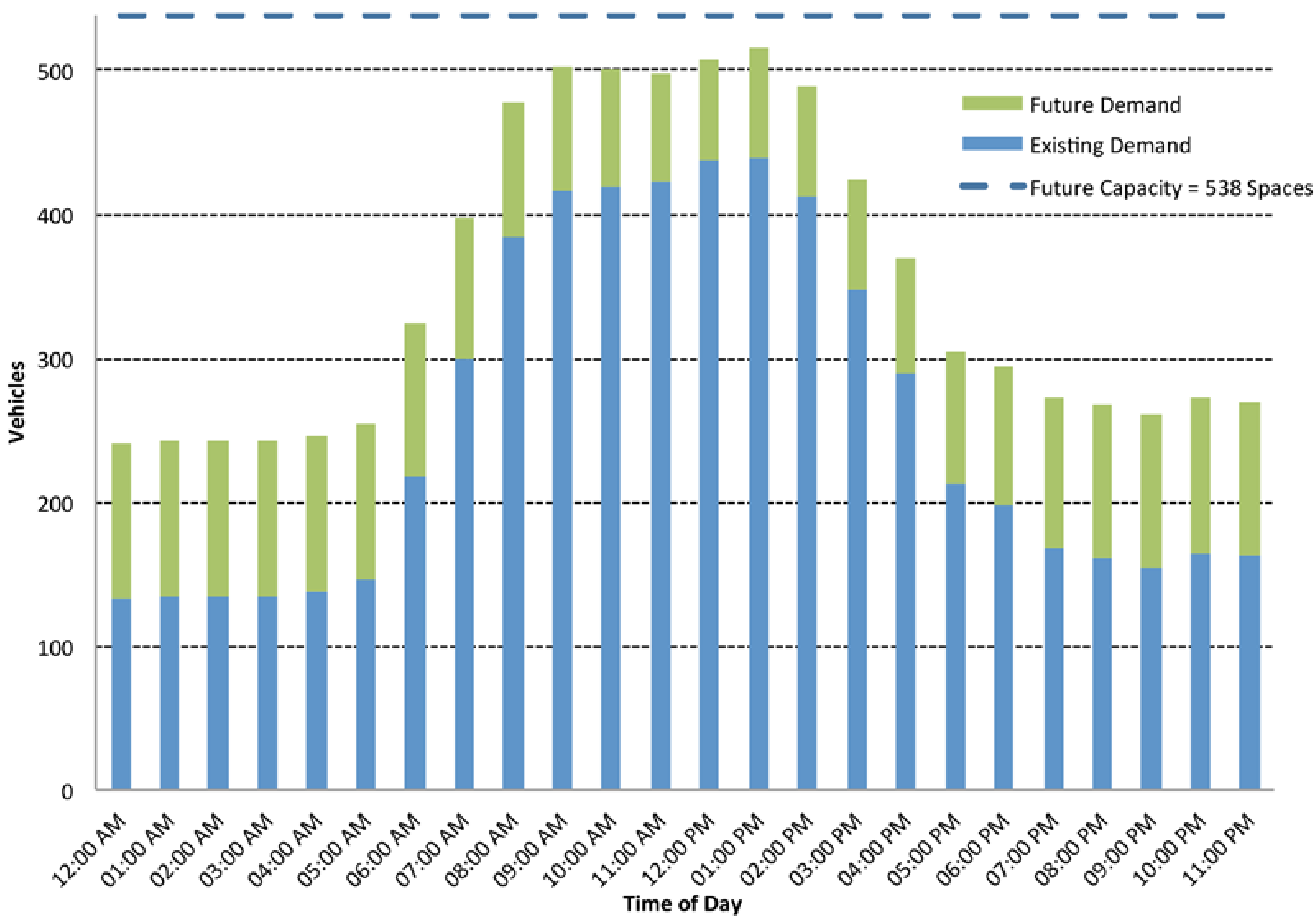


Figure 4-21
Proposed Project Build Parking Demand: 35 Northampton Street Garage
Howard/Stein-Hudson Associates, Inc.

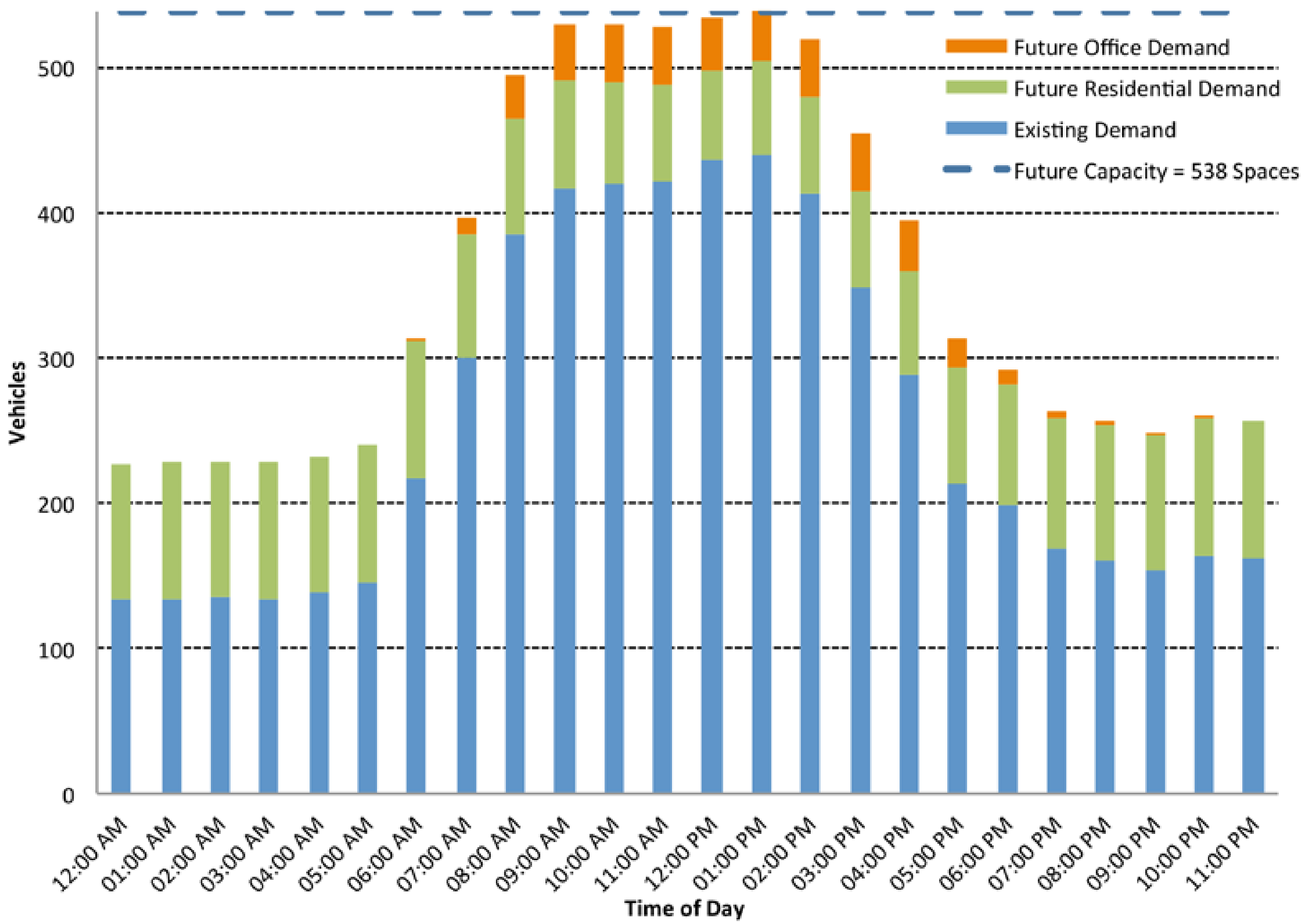


Figure 4-22
Alternative One Build Parking Demand: 35 Northampton Street Garage
Howard/Stein-Hudson Associates, Inc.

Chapter 5

ENVIRONMENTAL

5.0 ENVIRONMENTAL

5.1 INTRODUCTION

The redevelopment of Northampton Square Campus will substantially improve the environmental qualities of the site. Article 80 of the Boston Zoning Code specifies that the BRA may require the proponent, in its Scoping Determination, to study the direct and indirect environmental impacts attributable to the Project. When the potential for impacts exist, design measures may be required to mitigate the impacts to the extent feasible. This section describes the proposed Project and its impacts regarding wind, shadow, daylight, solar glare, air quality, noise, stormwater management and water quality, geotechnical, groundwater recharge, solid and hazardous materials, and construction impacts and plans. Furthermore, the development proposed on the site will be built in full compliance with applicable design guidelines and environmental regulations.

5.2 SHADOW

5.2.1 OVERVIEW

A shadow study was prepared for the Project, which includes the new 23-story building, to evaluate the potential shadow impacts in the vicinity of the site. The study identifies potential shadow impacts for existing and build conditions in the spring (March 21), summer (June 21), fall (September 21), and winter (December 21) months during the morning (9:00 AM), midday (12:00 Noon), and afternoon (3:00 PM) periods. Early evening (6:00 PM) shadow impacts are evaluated for the summer and fall. This section describes the shadow areas and their potential impacts on nearby properties. The results of the shadow analysis are graphically illustrated in Figure 5-1, Shadow Study: March 21, 9 am through Figure 5-14, Shadow Study: December 21, 3 pm.

Vernal Equinox – March 21st
At 9:00 a.m. (Figure 5-1) there is no new shadow cast by the proposed 23-story building.

At 12:00 noon (Figure 5-2), new shadow is cast in a northwesterly direction along parts of Northampton Street and the northern end of Fellows Street.

At 3:00 p.m. (Figure 5-3), new shadow is cast toward the north across an approximately 100-foot long portion of the sidewalk on the south side of Massachusetts Avenue.

Summer Solstice – June 21st
At 9:00 a.m. (Figure 5-4), shadow from the new development will extend in a southwesterly direction, extending in an approximately 100-foot wide path across Northampton, Fellows, and East Lenox streets.

At 12:00 noon (Figure 5-5) new shadow is cast in a westerly direction across Northampton Street and the northern end of Fellows Street.

At 3:00 p.m. (Figure 5-6), no new shadow is cast across any public ways.

At 6:00 p.m. (Figure 5-7), a shadow is cast eastward through portions of Albany Street and a small portion of Massachusetts Avenue.

Autumnal Equinox – September 21st
The shadow conditions for the autumnal equinox are nearly identical to those described for the vernal equinox, except for the slight differences due to the observance of daylight savings time.

At 9:00 a.m. (Figure 5-8), the morning sun projects shadows in a westerly direction. With the proposed building, there are no new shadows cast on public areas.

At 12:00 noon (Figure 5-9), new shadow is cast in a northwesterly direction along parts of Northampton Street and the northern end of Fellows Street.

At 3:00 p.m. (Figure 5-10), new shadow is cast toward the north across an approximately 100-foot long portion of the sidewalk on the south side of Massachusetts Avenue.

At 6:00 p.m. (Figure 5-11), a shadow is cast in an approximately 100-foot wide path in a northeasterly direction along Albany Street and across Massachusetts Avenue.

Winter Solstice – December 21st
The longest shadows of the year will occur during the winter solstice.

At 9:00 a.m. (Figure 5-12), new shadow is cast from the proposed building extends in small strips along a short strip of Northampton Street and Harrison Avenue.

At 12:00 noon (Figure 5-13), new shadow is cast in a northwesterly direction onto a small portion of Massachusetts Avenue.

At 3:00 p.m. (Figure 5-14), new shadow extends in a northerly direction across a small portion of Massachusetts Avenue.

5.2.2 CONCLUSION

The proposed 23-story tower is located in a dense urban area and is surrounded by mainly large institutional and commercial buildings. There are relative few new shadows on public areas due to the orientation of the building relative to its location with other multi-story buildings and the direction of the shadows cast by the existing and proposed buildings.

5.3 DAYLIGHT

The amount of daylight reaching the streets and the sidewalks after development of the Project will be less than would otherwise be the case compared to the existing conditions. The details of the daylight study from two viewpoints, Albany and Northampton streets, are described below.

5.3.1 METHODOLOGY

The daylight analysis was performed utilizing the Boston Redevelopment Authority Daylighting Analysis (BRADA) computer program. Using BRADA, a silhouette view of the building is taken at ground level from the middle of the adjacent city streets or pedestrian ways centered on the proposed building. The façade of the building facing the viewpoint, including heights, setbacks, corners and other features, is plotted onto a base map. 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. BRADA calculates this obstruction value based on the width of 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.

This daylight analysis studied existing and build conditions from two viewpoints, Northampton and Albany streets. Due to the complexity of the existing buildings and length of the entire block of buildings along Northampton Street, the viewpoint was taken from the approximate middle of the South End Fitness Center. If the viewpoint was in the middle of the entire block along Northampton Street, the proposed building would have been at the very end of the block and would not have been representative of the amount of obstruction if someone were in front of it.

5.3.2 CONCLUSION

The Project will result in greater daylight obstruction than the existing conditions on Albany and Northampton streets (see Table 5-1, and Figures 5-15 and 5-16). The results of the study show that there will be net increases of 48 percent and 35 percent obstruction from the viewpoints along Albany and Northampton streets, respectively.

While the proposed 23-story building will reduce the daylight penetration to these streets, the building design is consistent with the surrounding urban neighborhood context.

Table 5-1: Daylight Analysis Results (percentage obstructed)

Viewpoint	Existing Condition	Build Condition	Net Increase
Albany Street	33.1%	81.1%	48%
Northampton Street	55.9%	90.7%	35%

5.4 WIND

A quantitative pedestrian level wind study was conducted for the Project. The objective of the study was to assess the effect of the proposed development on local wind conditions in pedestrian areas on and around the study site and provide recommendations for minimizing adverse effects, if any.

The study involved wind simulation tests on a 1:400 scale model of the proposed building and surroundings. These simulations were conducted in a boundary-layer wind tunnel for the purpose of quantifying local wind speed conditions and comparing to appropriate criteria to assess wind comfort in pedestrian areas. The wind criteria and guidelines recommended by the Boston Redevelopment Authority (BRA) were applied in this study. The study methodology and results of the wind tunnel simulations are summarized below. The detailed results of the wind study are presented in Appendix 1.

5.4.1 METHODOLOGY

Information pertaining to the site and surroundings was derived from aerial imagery, information on surrounding buildings supplied by the architect and the BRA, and site plans and elevations of the proposed development provided by the design team (see Figures 5-17, Study Site and Surroundings and 5-18, Conceptual Landscape Site Plan). The following two configurations were simulated:

NO-BUILD CONFIGURATION

The No-Build Configuration included all existing buildings around the project site and those approved, proposed or under construction as directed by the BRA (see Figure 5-19, Annual Pedestrian Wind Conditions – No Build Configuration).

BUILD CONFIGURATION

The Build Configuration included the proposed Northampton Tower, as well as all existing surroundings and those approved, proposed or under construction as directed by the BRA (see Figure 5-20, Annual Pedestrian Wind Conditions – Build Configuration). A conceptual site plan of the grade-level and Level-3 terrace is included in Figure 5-18. The terrace is the large area above the 3-level parking garage that is available for use by the tenants of the Northampton Square project.

5.4.2 RESULTS

Common to the Boston region and its wind climate, wind conditions were most comfortable in the study area during summer and autumn, and were more active in the winter and spring. The presence of tall existing buildings near the development site has created elevated wind activity under ambient conditions whereby dangerous wind conditions were predicted at one existing location, under No-Build, and at three locations for the Build site conditions on an annual basis. During the winter, the number of locations rated as Dangerous for the No-Build and Build configurations was significantly higher. The presence of high levels of existing wind activity was also apparent as 18 No-Build locations did not meet the BRA Effective Gust Guideline, with 25 locations not meeting the criterion under the Build configuration on an annual basis.

Under the No-Build configuration, annual wind comfort along Albany Street was typically comfortable for walking (Category 3) with four locations predicted as being uncomfortable (Nos 1, 4, 11, and 29). For the Build test configuration, walking conditions also prevailed, noting that uncomfortable winds (Category 4) were predicted at five additional locations, annually.

Existing wind activity on Northampton Street adjacent to the proposed Albany Tower and across the street from the study site was typically uncomfortable (Category 4) for the No-Build configuration. Wind at two locations (No. 66 and 67) near the south side of the proposed tower, increased to dangerous (Category 5) in the build condition. Overall, in other areas along Northampton Street, the Build configuration typically had a positive or neutral effect on the No-Build wind conditions.

With a few exceptions, wind conditions along Massachusetts Avenue were generally satisfactory for walking (Category 3) or better for both test configurations. Two locations were uncomfortable under the No-Build configuration with one additional uncomfortable location predicted for the Build configuration.

The No-Build annual wind conditions along and near Fellows Street typically remained as they exist or were predicted to improve under the Build configuration. Several locations remained above the BRA Guideline.

Build wind conditions along Harrison Avenue were unaffected by the proposed Albany Tower and remained the same as the No-Build condition.

Overall, there is little difference between No-Build and Build wind conditions on the Level-3 terrace.

5.4.3 MITIGATION

The results of the wind study revealed two locations (Nos. 66 and 67) with unacceptable wind conditions in the Build condition, which are located at the south side of the proposed 23-story tower (see Figures 1-6 and 5-20). This area is the main entrance to the proposed building and is adjacent to the proposed pocket park on the west side. To mitigate the potential wind impacts, the following measures are proposed and will be tested to assure their effectiveness:

1. Increase street plantings with marcescent species along and near the corner of Northampton and Albany streets. Marcescent species, such as oak or beach, retain most of their leaves in the winter, which will mitigate wind on a year-round basis.
2. Incorporate a trellis structure in and/or along the edge of the pocket park, and
3. Extend the existing canopy over the front door further out over the entry area.

The strategic placement and design of these and other potential mitigation measures will be investigated as the building design and landscape plan evolve.

5.5 SOLAR GLARE

A solar glare analysis is intended to measure potential reflective glare from the proposed addition and renovation onto potentially affected streets, open spaces, and sidewalk areas in order to determine the likelihood of visual impairment or discomfort due to reflective spot glare.

Large portions of the proposed Albany Street building façade will be architectural precast with punched windows. As a result, these portions of the proposed building create minimal amounts of light reflection. The new glass curtainwall areas will be constructed with low reflective, clear glass, which will mitigate solar glare. It is not anticipated that there will be any significant solar glare impacts to the public way or adjacent buildings.

5.6 AIR QUALITY

The Northampton Square Complex includes outdated 50-year old buildings with inefficient building systems. The Project will rehabilitate the existing 12-story building by using highly efficient systems including HVAC, water facilities, windows, and mechanical systems. This rehabilitation will reduce the amount of greenhouse gas emissions from the project site due to the reduction in use of energy consuming utilities. Additional greenhouse gas emissions from the new 218-unit Albany Street building will be relatively modest because it will be designed and constructed in compliance with the Green Buildings Standards of Article 37 of the Boston Zoning Code and be a certifiable structure at the LEED NC Silver Level. It will designed to meet the Massachusetts Stretch Code design standards, which are approximately 20 percent more energy efficient than the current state building code.

While the new Albany Street building will create new vehicle trips to the Project Site from new residents and workers, the number of trips is expected to be modest. Due to the transit oriented location in a dense urban neighborhood, up to 43% of the new trips from the Project are anticipated to be walk, bike or transit trips. Less than 1,000 new daily vehicle trips are anticipated. In conjunction with the Boston Transportation Department (BTD), a Transportation Demand Management (TDM) program will be prepared to further reduce vehicle trips to the site and will include parking management, promotion of public transit, access to Zipcar car sharing services, and secure bicycle storage for residents.

5.7 NOISE

The primary sources of external mechanical noise will include air ventilations systems that are part of the Project's mechanical systems. It is not anticipated that the rooftop equipment will exceed maximum sound levels, and thus no mitigation is proposed. The existing mechanical systems serving 860 Northampton Street which are now located at ground level will be relocated to the roof, further reducing sound levels. During the final design of the Project, appropriate low-noise mechanical equipment in the mechanical penthouse and noise control measures will be selected for all sensitive locations to ensure compliance with the City of Boston and DEP noise regulations.

5.8 STORMWATER MANAGEMENT AND WATER QUALITY

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

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

5.8.1 DEP STORMWATER MANAGEMENT POLICY STANDARDS

In February of 2008, the DEP revised their Stormwater Management Standards to better address water quality and water quantity issues associated with project sites. The revisions promote increased stormwater recharge, treatment of more runoff from polluting land uses, low impact development (LID) techniques, pollution prevention, the removal of illicit discharges, and improved operation and maintenance of stormwater best management practices (BMPs). A brief explanation of each Standard and the system compliance is provided below.

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

Compliance: The proposed design will comply with this Standard. 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 must be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.

Compliance: The proposed design will provide a decrease in the impervious area compared to the pre-development condition, from 113,637 square feet (existing) to 107,531 square feet (proposed). Drainage and runoff collection and disposal systems will be designed to minimize impacts of the Project on the existing storm sewer systems. To mitigate the impacts, a portion of the Project's roof area will be vegetated, and/or a portion of the stormwater runoff will discharge into an underground stormwater recharge/detention system or will be collected in a rainwater reuse tank and used for site irrigation. These proposed measures will substantially improve stormwater runoff and water quality from the project site.

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

Compliance: The Project proposes a decrease (4%) to the site's impervious area. The Project will incorporate measures to maintain or improve the annual recharge to groundwater by utilizing pervious pavers and/or a below grade stormwater recharge system.

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 as determined in accordance with the Massachusetts Stormwater Handbook; and
c) Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.

Compliance: The Project will meet or exceed all standards.

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

Compliance: The Project is not associated with Higher Potential Pollutant Loads (per the Policy, Volume I, page 1-8). This Project complies with this standard.

Standard #6: Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges near or to any other critical area require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas as provided in the Massachusetts Stormwater Handbook. A discharge is *near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A "storm water discharge" as defined in 314 CMR 3.04(2)(a)1 or (b) to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00.5 Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of the public water supply.*

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

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

Compliance: The Project will meet or exceed all standards.

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

Compliance: The Project will comply with this standard. Sedimentation and erosion controls will be incorporated as part of the design of this Project and employed during Site 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: A long term Operations and Maintenance Plan shall be developed and maintained for this Project.

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

Compliance: There will be no illicit discharges associated with this Project.

5.8.2 MITIGATION MEASURES

Stormwater runoff from the site and roof of the building drains to the stormwater system in the adjacent streets and ultimately to Boston Harbor. The impervious area of the site will decrease as a result of the Project and consequently the peak rate of runoff in the proposed condition will be slightly less than that of the existing condition. To reduce stormwater impacts, a portion of the Project's roof will be vegetated, and/or a portion of the stormwater runoff will discharge into an underground stormwater recharge/detention system, and/or a portion of stormwater runoff will be collected in a rainwater reuse tank and used for site irrigation. The Proponent will also investigate the possibility of achieving LEED credit SS6.1 Stormwater Quantity which would require a reduction of the peak rate and volume of the runoff by 25% prior to it entering the city's stormwater system.

Within the Project's limit of work, ground cover will consist primarily of roof area and landscaping. The Project will investigate the possibility of achieving LEED credit SS6.2 Stormwater Quality, which would require water quality treatment of the runoff from the site prior to it entering the city's stormwater system. In addition, the Project will investigate the reuse of stormwater runoff from the roof of the building for use as landscape irrigation.

5.8.3 COORDINATION WITH THE BOSTON WATER & SEWER COMMISSION

Proposed connections to the Commission's water, sanitary sewer, and storm drain system will be designed in conformance with the Commission's 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 water mains, sanitary sewers, storm sewers, telephone, gas, electric, steam, and cable television. The plan will include the disconnections of the existing services as well as the proposed connections. See Chapter 6, Infrastructure for a discussion of existing and proposed water, sanitary sewer, and stormwater conditions and mitigation measures.

5.9 FEMA FLOOD ZONES

Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Map (FIRM) for the City of Boston (Community Panel 25025C0079G, updated September 2009) was reviewed to determine if the project site lies within the 100-year flood plain. The project site falls within a Zone C, defined by FEMA as an "area of minimal flooding." Thus, the Project will not lead to an increased flood or storm damage risk.

5.10 GEOTECHNICAL AND GROUNDWATER

5.10.1 GEOTECHNICAL

Fronting onto Northampton Street to the northeast, the subject property is bounded by Albany Street to the southeast, an active construction site to the southwest and commercial property to the northwest. Currently, the location of the new Albany Street building is partially vacant and partially occupied by the Miranda Creamer building.

The proposed scope of development will consist of a 23-story above grade multi-unit residential building. The first through fourth floors will be occupied by mechanical space, a trash service room, a residential lobby, residential amenities, a fitness center lobby, and residential units. Floors five through twenty three will consist of all residential units. Floors four through seven in Alternative One will have office uses. The proposed building footprint will occupy approximately 11,000 square feet at the ground level.

Based upon review of historical boring information and local foundation and construction experience, it is anticipated that the existing ground surface is underlain by a thickness of miscellaneous fill material associated with historic site filling. The thickness of the fill material is anticipated to range from about 6 to 16 feet in thickness. Based upon local geology, the fill material is underlain by an organic deposit consisting or organic silt and peat ranging in thickness from about 5 to 10 feet. Beneath the organic deposit, we anticipate a glacial outwash deposit, which generally consists of sand and gravel with trace to some silt that extends to a depth of about 25 to 30 feet below ground surface. Below the outwash is a marine clay deposit that varies from stiff near the surface to soft with increasing depth. The clay extends to a depth of about 80 to 90 feet below ground surface where it is underlain by a dense glacial till deposit overlying bedrock. The bedrock is anticipated to be a shale-like deposit known as Cambridge Argillite.

Due to the nature of the proposed development and the anticipated subsurface conditions underlying the subject site, foundation support will be provided by a pile foundation system bearing in the glacial till and/or bedrock with the lowest level slab being structurally supported.

Subsurface explorations will be performed to evaluate site specific conditions and a Foundation Engineering Report will be generated in accordance with the provisions of the Massachusetts State Building Code, 8th Edition.

There is an MWRA easement for an approximately 310-foot deep, 10-foot diameter main drainage tunnel located at the southeast corner of the Site. Work within this easement will require an 8(m) Permit from the MWRA.

5.10.2 GROUNDWATER

Although the project site is not located within the Groundwater Conservation Overlay District (GCOD), the Project will study the groundwater depths in order to determine the appropriate design and construction methodology for the proposed building.
The groundwater level in the area of the subject site is likely to range from depths of about 12 to 16 feet below existing ground surface. It is anticipated that future groundwater levels across the site may vary from those reported herein due to factors such as normal seasonal changes, runoff particularly during or following periods of heavy precipitation, and alterations of existing drainage patterns.

Dewatering effluent generated during temporary construction dewatering will be discharged in compliance with applicable regulations and discharge permits. Groundwater levels outside the excavation will be monitored and measures undertaken if impacts exceed contract requirements. Groundwater quality will also be monitored during construction as part of the discharge permit requirements.

Construction of the proposed development is not expected to have adverse short or long-term impact on groundwater conditions.

5.10.3 ENVIRONMENTAL SITE ASSESSMENT

A Phase I Environmental Site Assessment (ESA) will be conducted for the subject site. The Phase I ESA will be completed in accordance with ASTM E 1527-05 as referenced in 40 CFR Part 312 (the All Appropriate Inquiries Rule). In the event that Recognized Environmental Conditions (RECs) are identified during the Phase I ESA, a Phase II ESA will be completed in accordance with ASTM 1903-02.

A plan to conduct a program of soil and groundwater quality testing prior to construction to determine the options for reuse, recycling, disposal or treatment of soil within the limits of excavation will be implemented. Groundwater testing will be conducted in support of obtaining temporary construction dewatering permits.

Should conditions at the site warrant regulatory notification, notification and reporting to the DEP will be conducted in accordance with the provisions of the Massachusetts Contingency Plan (MCP). The Proponent will retain a Licensed Site Professional (L.S.P.) to manage the environmental aspects of the Project, including proper management and/or disposal of contaminated soil and/or groundwater during construction.

Excess soil will require characterization to assess its disposition for off-site reuse, disposal, treatment or recycling in accordance with DEP policy COMM-97-001 and the MCP. Therefore, a soil characterization program will be implemented to pre-characterize the soil and a Soil Management Plan will be prepared summarizing the results of chemical testing and providing soil disposal recommendations. The construction contractor will be responsible for proper off-site removal of contaminated soil, and disposal of solid waste and debris.

5.11 SOLID AND HAZARDOUS MATERIALS

5.11.1 BUILDING RENOVATIONS

The building at 860 Harrison Avenue was surveyed for hazardous materials. An Asbestos Containing Materials (ACM), Lead Based Paint (LBP), and Regulated Materials Survey Report was conducted by Vertex Environmental Services, Inc. in preparation of the renovation and demolition activities. VERTEX's asbestos inspectors performed the inspection to identify suspect ACMs associated with the interior and exterior portions of the building. Through sampling and analysis of all suspect materials, it was determined that ACMs, lead, and regulated materials (e.g. light ballasts, fluorescent tubes, and mercury switches) were found to exist within these buildings.

For renovation/demolition purposes all confirmed ACMs are required to be removed and disposed of in accordance with all local, state, and federal regulations or properly encapsulated in place. Areas where lead is expected to be disturbed will require compliance with OSHA regulations for worker protection. Regulated materials will have to be properly packaged, disposed, and, recycled in accordance with applicable regulations. Therefore, licensed abatement contractors will remove and dispose of ACMs, PCB light ballasts, mercury-containing fluorescent bulbs, lead paint, and other hazardous wastes. Proper dust control measures will be exercised. Solid waste generated by renovation will be collected and disposed off site by a licensed contractor. The Project will be designed to allow at-source separation of recyclables, including paper, metal, glass and plastics. The remainder of the materials (plaster, brick, cement concrete,) will be recycled in accordance with regulations. Any bituminous materials collected will also be recycled.

Renovation activity must comply with the Solid Waste and Air Quality regulations. According to the Solid Waste provision of M.G.L. Chapter 40, Section 54, a city of Boston building permit or license is required for demolition/renovation at the site. Debris generated from the development will disposed of at a licensed solid waste disposal facility.

5.11.2 OPERATING AND DISPOSAL PLAN

Hazardous materials collected from the site will be evaluated and classified in accordance with 40 CFR 261 to ensure safe removal and disposal. These materials will be removed by a licensed contractor. Hazardous waste manifests, Bills of Lading, and other appropriate documentation will be generated in accordance with local, state, and federal regulations.

5.12 CONSTRUCTION IMPACTS AND PLANS

The following section describes impacts likely to result from the Project's construction and steps that will be taken to avoid or minimize environmental and transportation-related impacts. The proponent will employ a construction manager who will be responsible for developing a construction phasing and staging plan and for coordinating construction activities with all appropriate regulatory agencies. The Project's geotechnical consultant will provide consulting services associated with foundation design recommendations, prepare geotechnical specifications, and review the construction contractor's proposed procedures.

5.12.1 CONSTRUCTION MANAGEMENT PLAN

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

Proper pre-construction planning with the neighborhood will be essential to the successful construction of this Project. Construction methodologies that will ensure safety will be employed. Signage will include construction manager contact information with emergency contact numbers.

5.12.2 CONSTRUCTION ACTIVITY SCHEDULE

The construction period for the proposed Project is expected to last approximately two and a quarter years, beginning by July 2014 and reaching completion by July 2015 for renovations at 860 Harrison Avenue and by October 2016 for construction of the Albany Tower. The Project will comply with City of Boston Noise and Work Ordinances. Normal work hours will be from 7:00 AM to 6:00 PM, Monday through Friday, along with any approved exceptions.

5.12.3 PERIMETER PROTECTION/PUBLIC SAFETY

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

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

5.12.4 CONSTRUCTION TRAFFIC IMPACTS

Estimated truck deliveries and routes will be identified and described in the supplemental transportation analysis being prepared for the Project. Specific truck routes will be established with BTD through the CMP.

5.12.5 CONSTRUCTION WORKER PARKING

The number of workers required for construction of the Project will vary during the construction period. However, it is anticipated that all construction workers will arrive and depart prior to peak traffic periods. No personal vehicles will be allowed to park in the nearby neighborhood. Further, public transit use will be encouraged with the proponent and construction manager to ensure the construction workers are informed of the public transportation options serving the area.

5.12.6 CONSTRUCTION AIR QUALITY

Construction activities may generate fugitive dust emission from construction activities, which will depend on such factors as the properties of the emitting surface (e.g. moisture content), meteorological variables, and construction practices employed. To reduce emission of fugitive dust and minimize impacts on the local environment the construction contractor will adhere to a number of strictly enforceable mitigation measures. These measures may include:

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

5.12.7 CONSTRUCTION NOISE IMPACTS

Intermittent increases in noise levels will occur in the short-term during construction. Construction work will comply with the requirements of the City of Boston noise ordinance. Because there are occupied residential buildings with the site, this issue will be carefully addressed. To reduce the noise impacts of construction, a number of noise mitigation measures will be included in the CMP. Some of the measures that may be taken to ensure a low level of noise emissions include:

- Initiating a proactive program for compliance with the City of Boston's noise limitation impact;
- Using mufflers on all equipment and ongoing maintenance of intake and exhaust mufflers;
- Muffling enclosures on running equipment;
- Scheduling construction activities so as to avoid the simultaneous operation of the noisiest construction activities;
- Turning off all idling equipment;
- Locating noisy equipment away from abutters and residents; and
- Shielding the noise generator by distance or enclosure.

5.12.8 UTILITY PROTECTION DURING CONSTRUCTION

During construction, the City's infrastructure will be protected using sheeting and shoring, temporary relocations, and construction staging as required. The contractor will be required to coordinate all protection measures, temporary supports, and temporary shutdowns of all utilities with the appropriate utility owners and/or agencies. The contractor will also be required to provide adequate notification to the utility owner/operator prior to any work commencing on their utility. Also, in the event a utility cannot be maintained in service during a switch-over to a temporary or permanent system, the contractor will be required to coordinate the shutdown with the utility owners/operators and Project abutters to minimize impacts and inconveniences accordingly.

5.12.9 RODENT CONTROL

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

5.13 HISTORIC RESOURCES

The Project Site is located on Massachusetts Avenue between Harrison Avenue and Albany Street in the South End /Lower Roxbury neighborhood of Boston, MA. It is not located within any historic district. A review of the MACRIS system database did not reveal any historic properties within the area of potential effect of the project site. Furthermore, the Massachusetts Historical Commission issued a Determination of No Adverse Effect on the South End Historic District in response to the ENF that was submitted to MEPA for this Project.

The Site, however, is located within the South End Landmark District and Protection Area. See Figure 5-21 for a view of this Area. Demolition and construction of buildings with the Protection Area must have approval of the South End Landmarks Commission (SELC). The Commission reviews construction projects based on their setbacks, height, topography, and landscaping. The SELC issued a positive determination for the Phase 1 portion of the Project (renovation of 35 Northampton Street) in October 2012, stating the proposed work was exempt from review. The Proponent will be submitting an Application for Certificate of Appropriateness within the next month for the Proposed Project.

5.14 TIDELANDS

The Project is considered landlocked Tidelands. The Secretary of Energy and Environmental Affairs confirmed in the MEPA Certificate (No. 14854) that no additional Public Benefits Review is required due to the affordable housing nature of the Project.

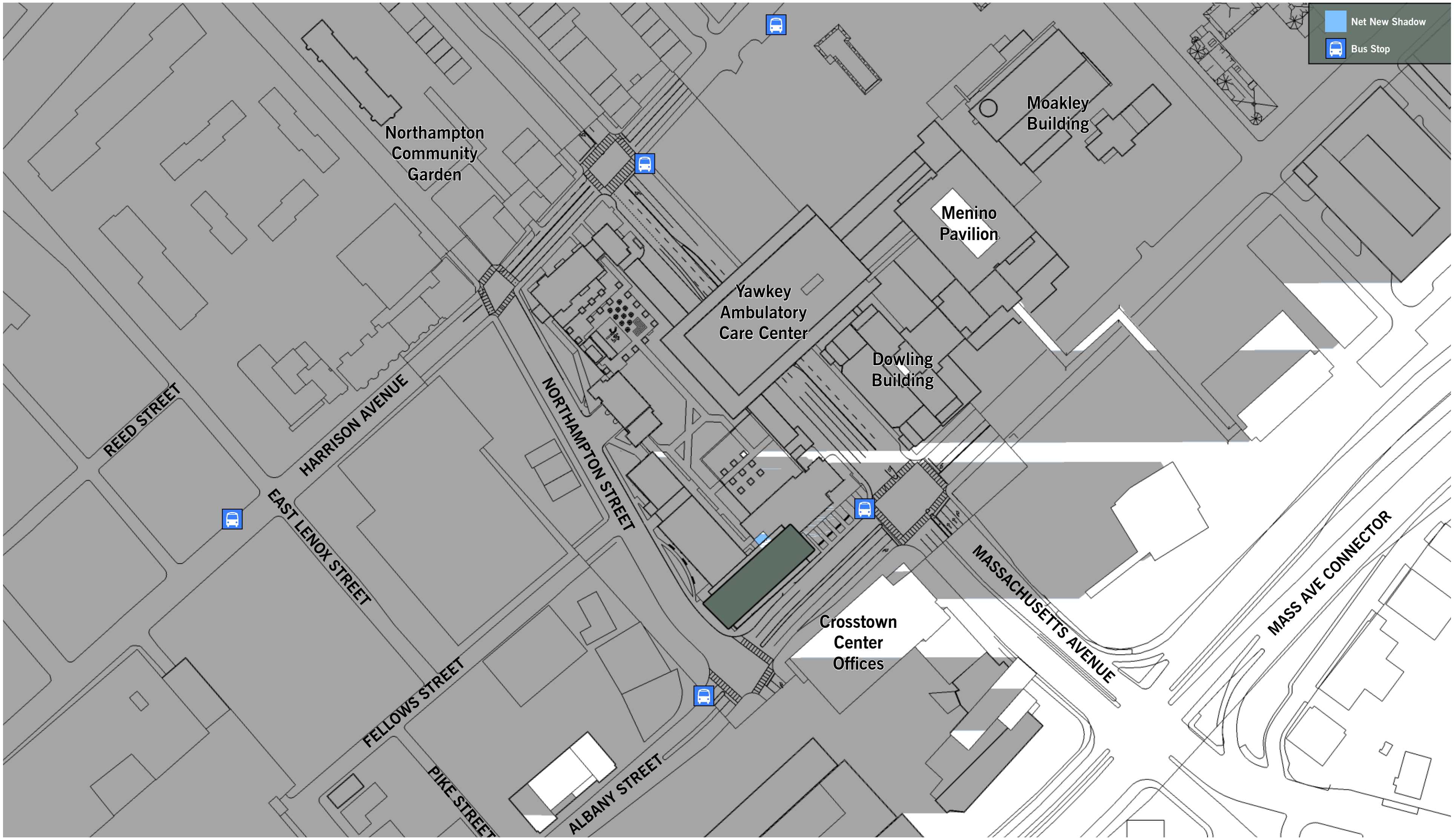
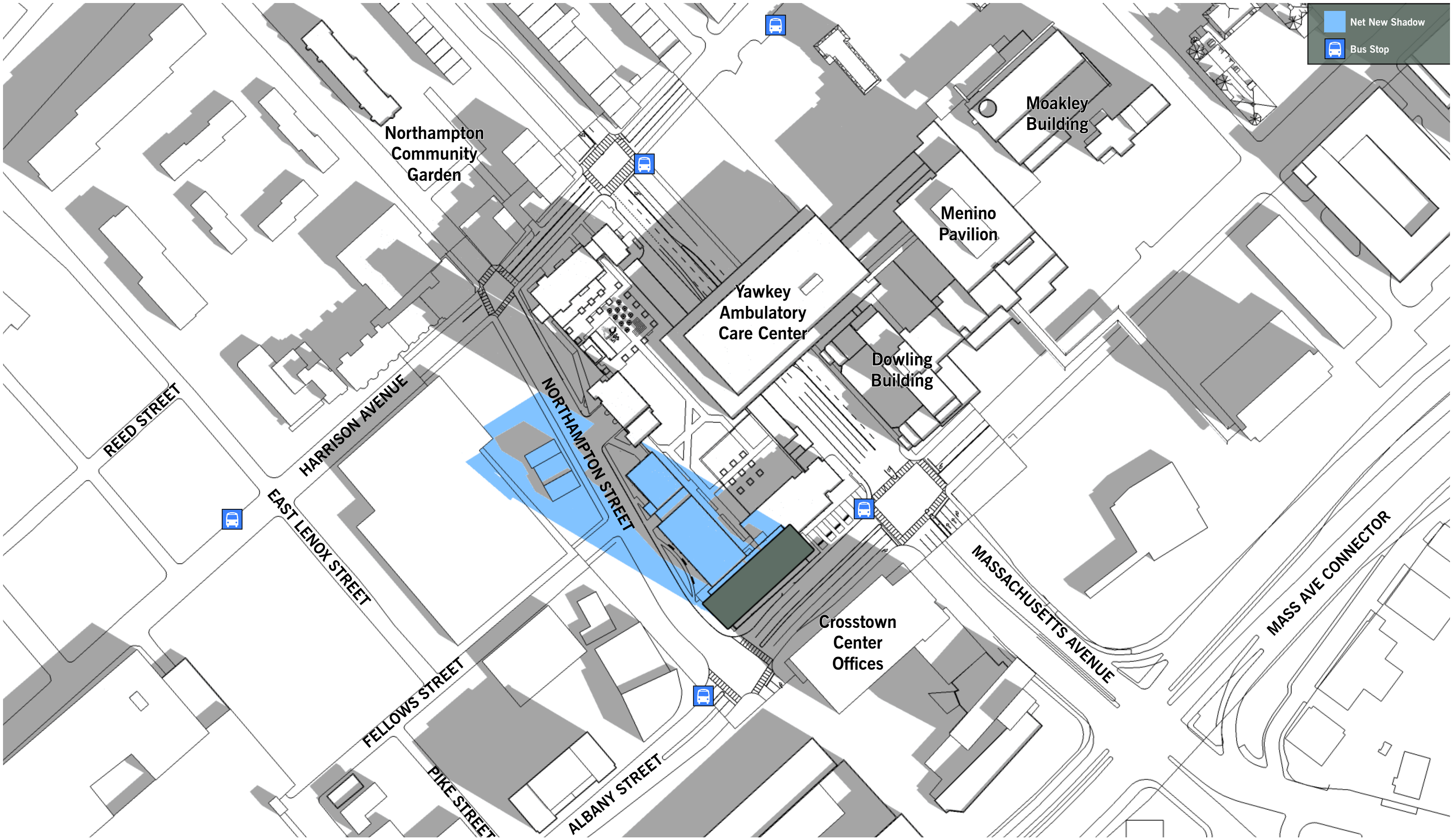
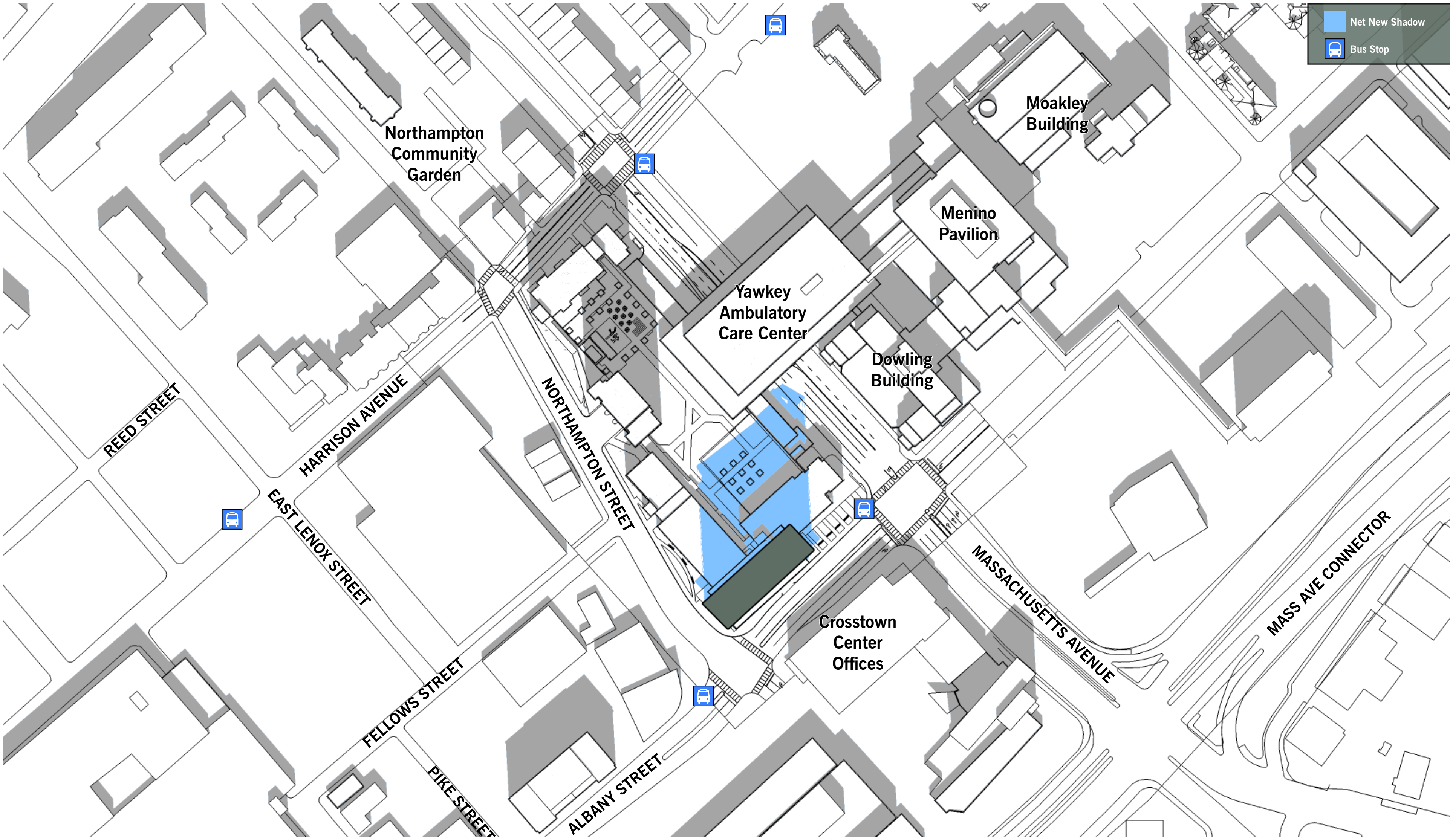


Figure 5-1
Shadow Study Vernal Equinox: March 21, 9:00 am
Source: The Architectural Team, 2013



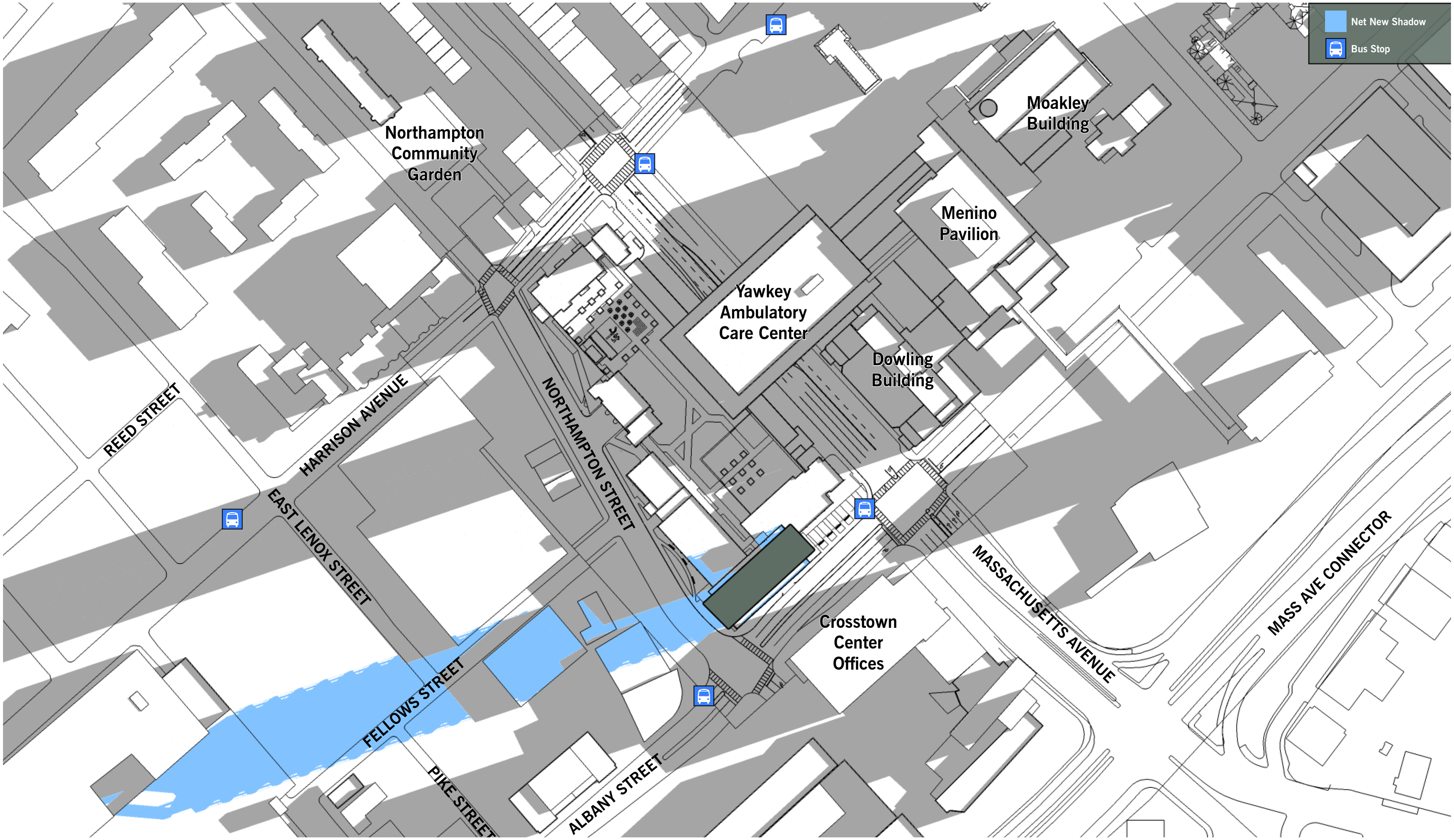
Northampton Square
Boston, Massachusetts

Figure 5-2
Shadow Study Vernal Equinox: March 21, Noon
Source: The Architectural Team, 2013



Northampton Square
Boston, Massachusetts

Figure 5-3
Shadow Study Vernal Equinox: March 21, 3:00 pm
Source: The Architectural Team, 2013



Northampton Square
Boston, Massachusetts

Figure 5-4
Shadow Study Summer Solstice: June 21, 9:00 am
Source: The Architectural Team, 2013

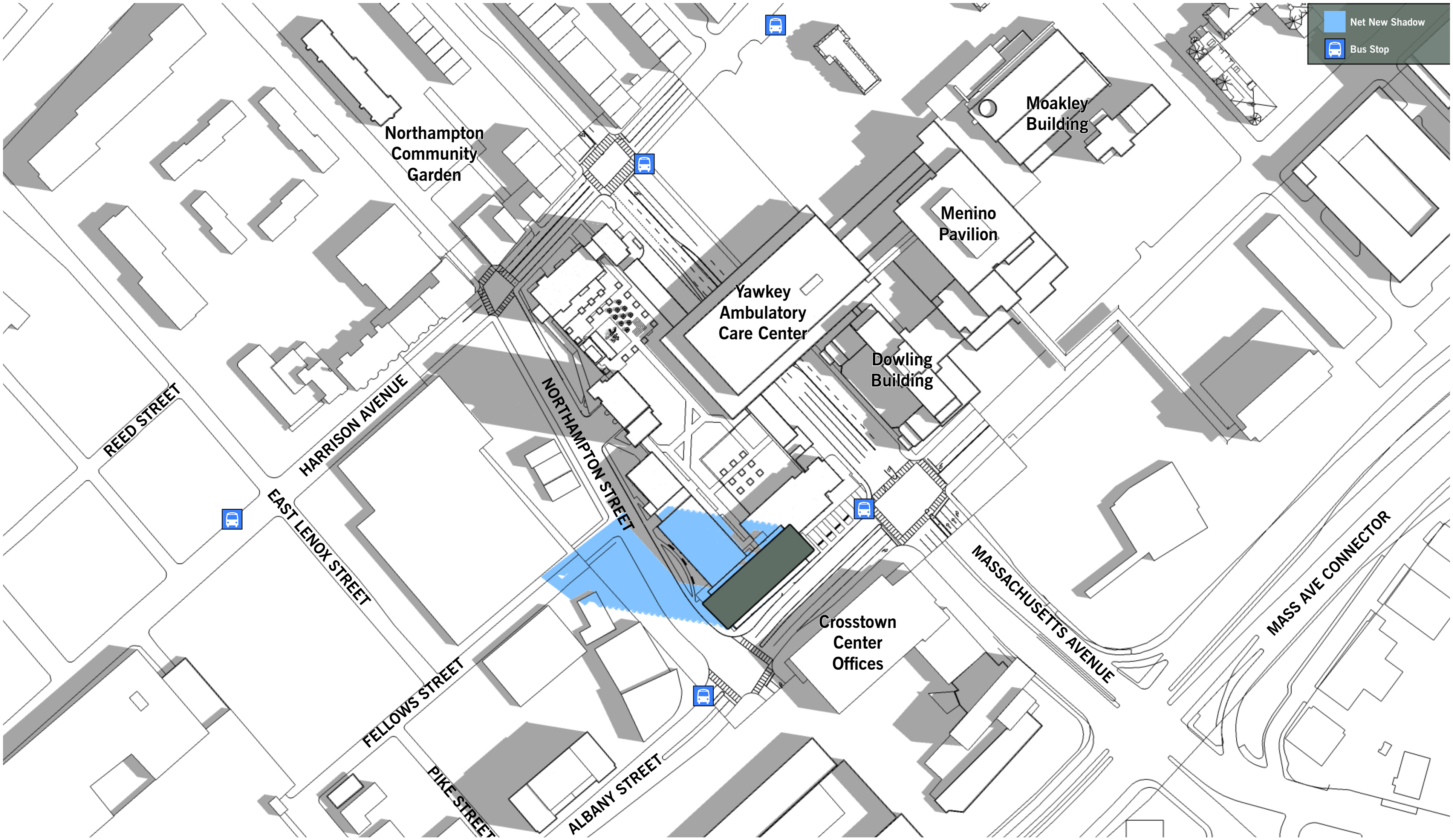


Figure 5-5
Shadow Study Summer Solstice: June 21, Noon
Source: The Architectural Team, 2013

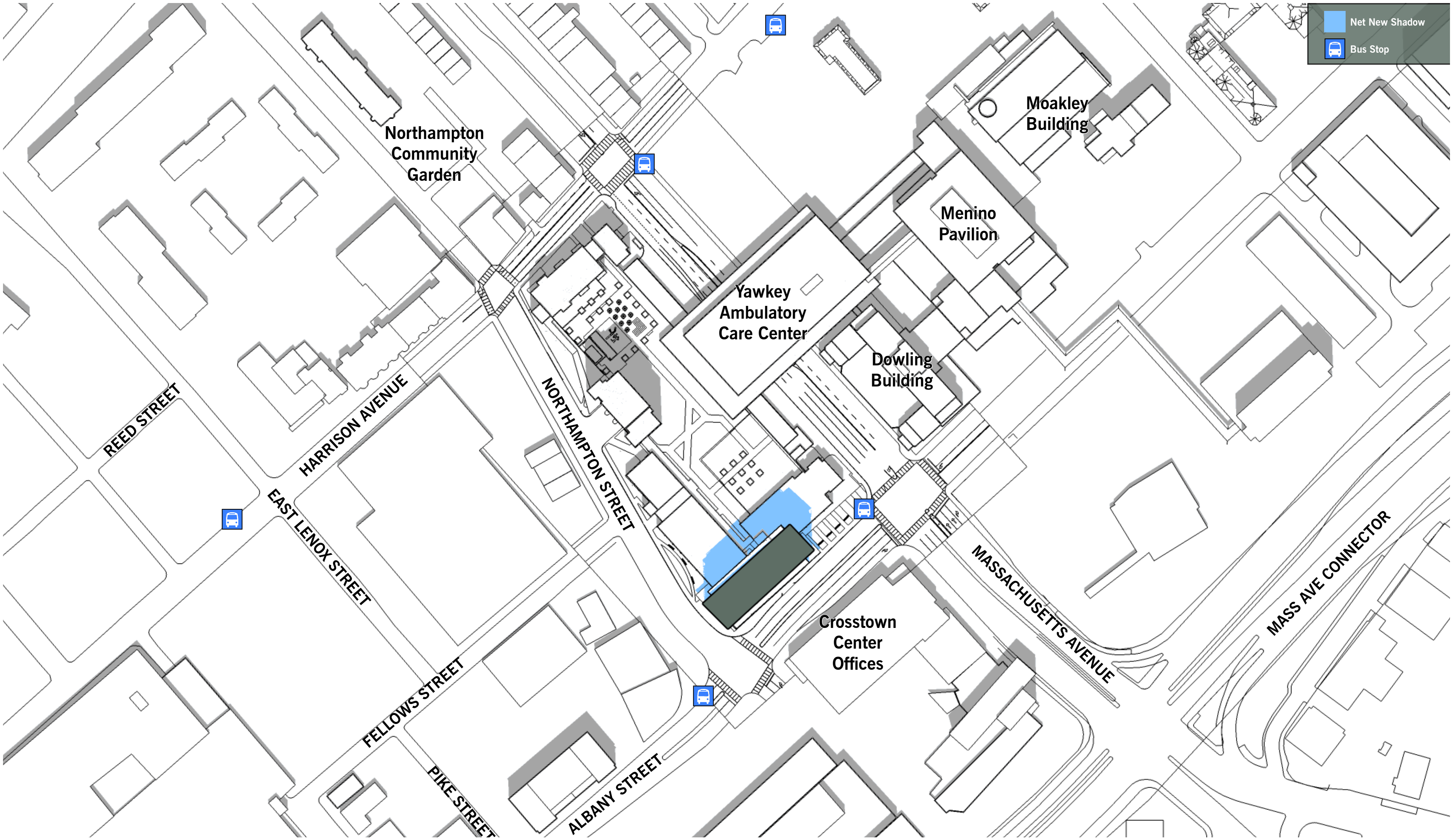


Figure 5-6
Shadow Study Summer Solstice: June 21, 3:00 pm
Source: The Architectural Team, 2013

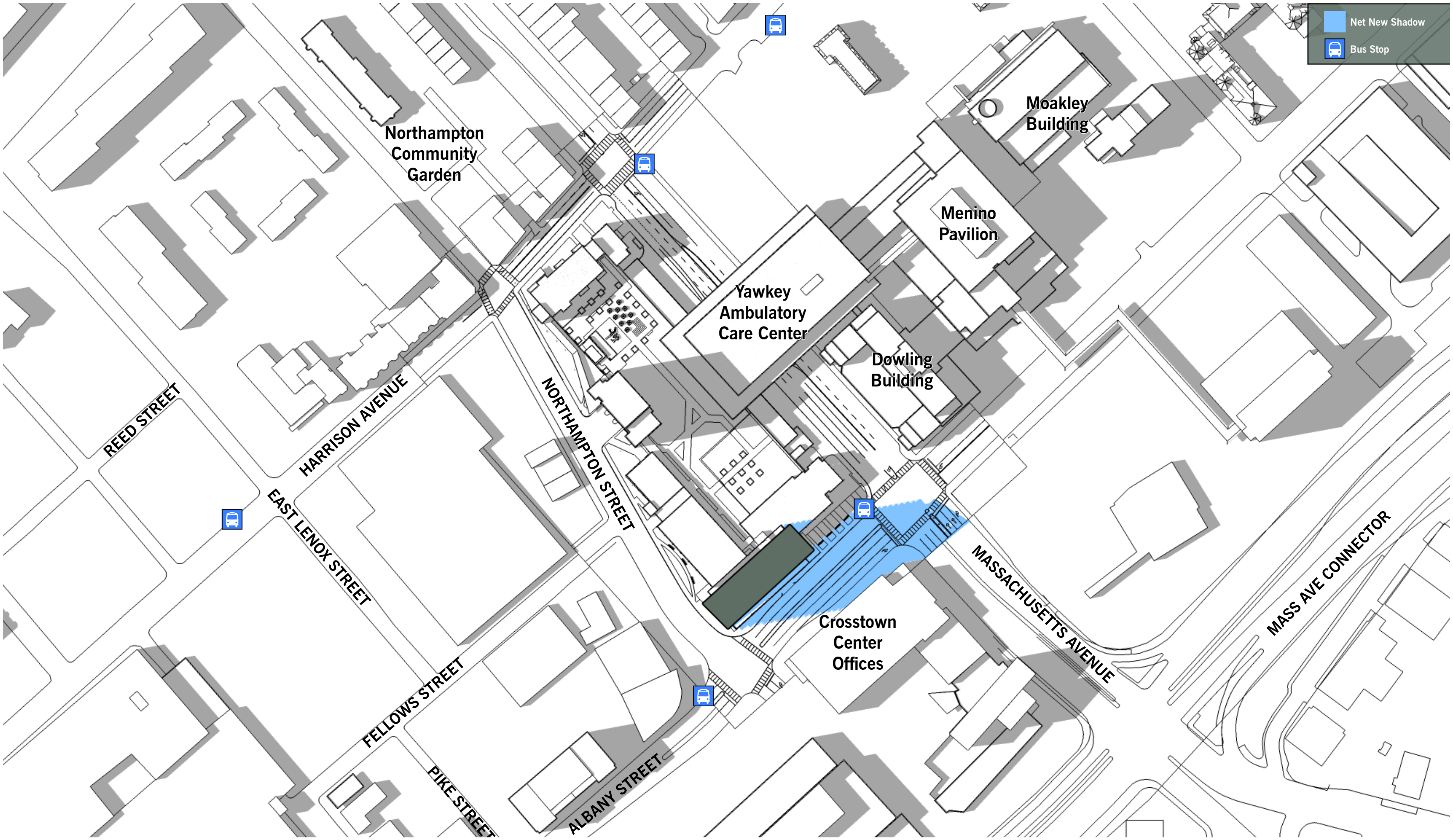


Figure 5-7
Shadow Study Summer Solstice: June 21, 6:00 pm
Source: The Architectural Team, 2013

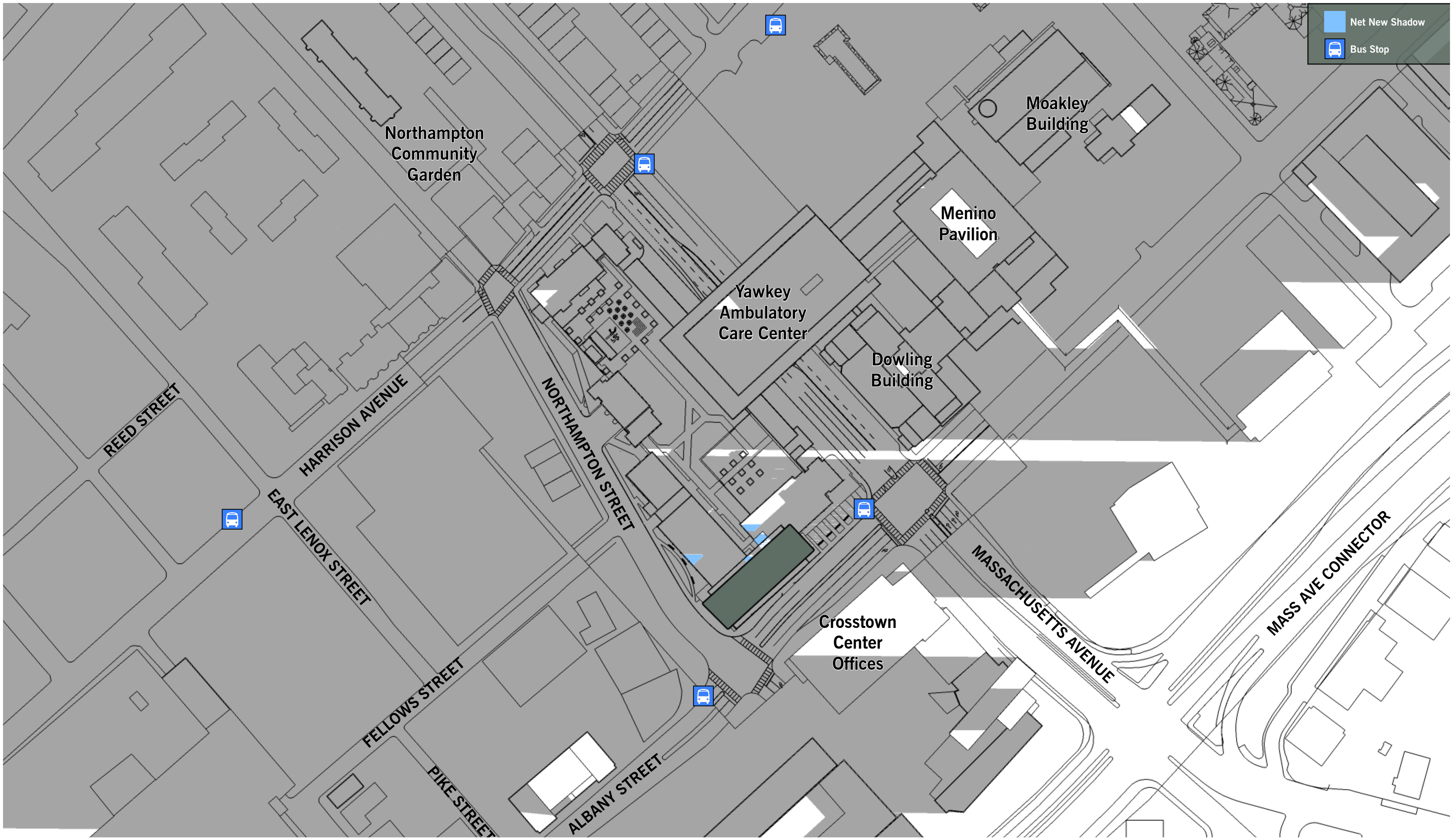


Figure 5-8
Shadow Study Autumnal Equinox: September 21, 9:00 am
Source: The Architectural Team, 2013

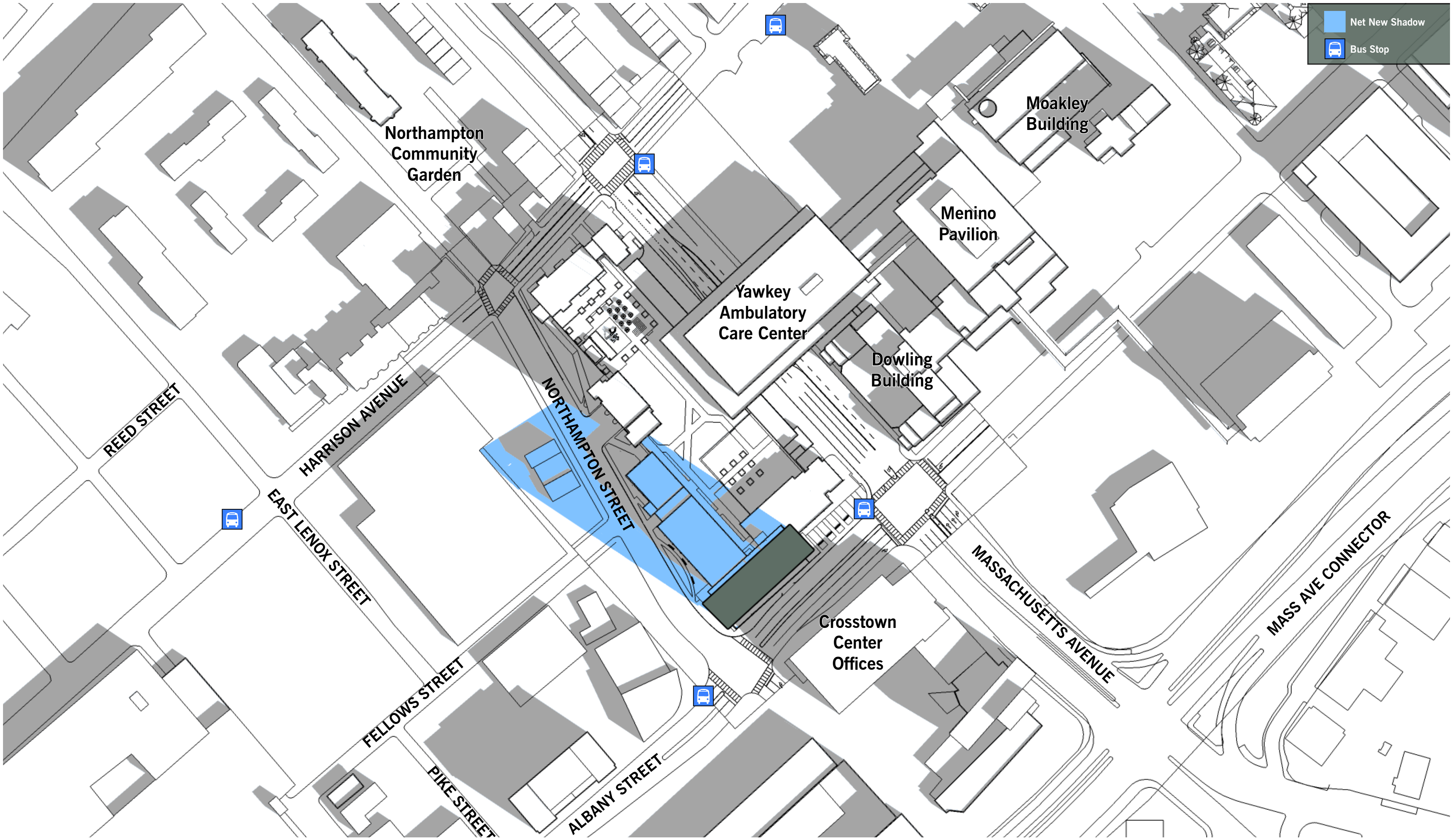


Figure 5-9
Shadow Study Autumnal Equinox: September 21, Noon
Source: The Architectural Team, 2013

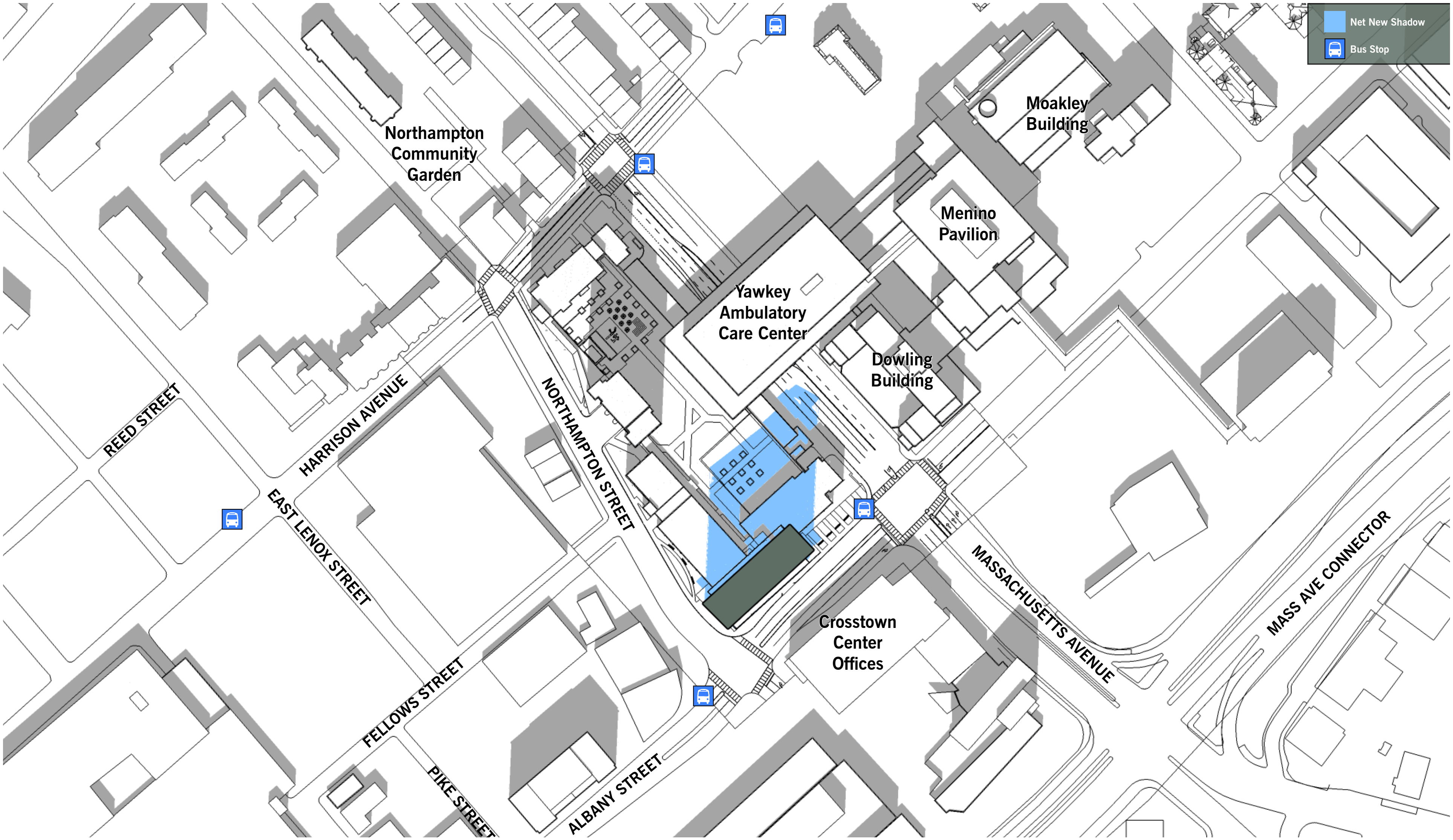


Figure 5-10
Shadow Study Autumnal Equinox: September 21, 3:00 pm
Source: The Architectural Team, 2013

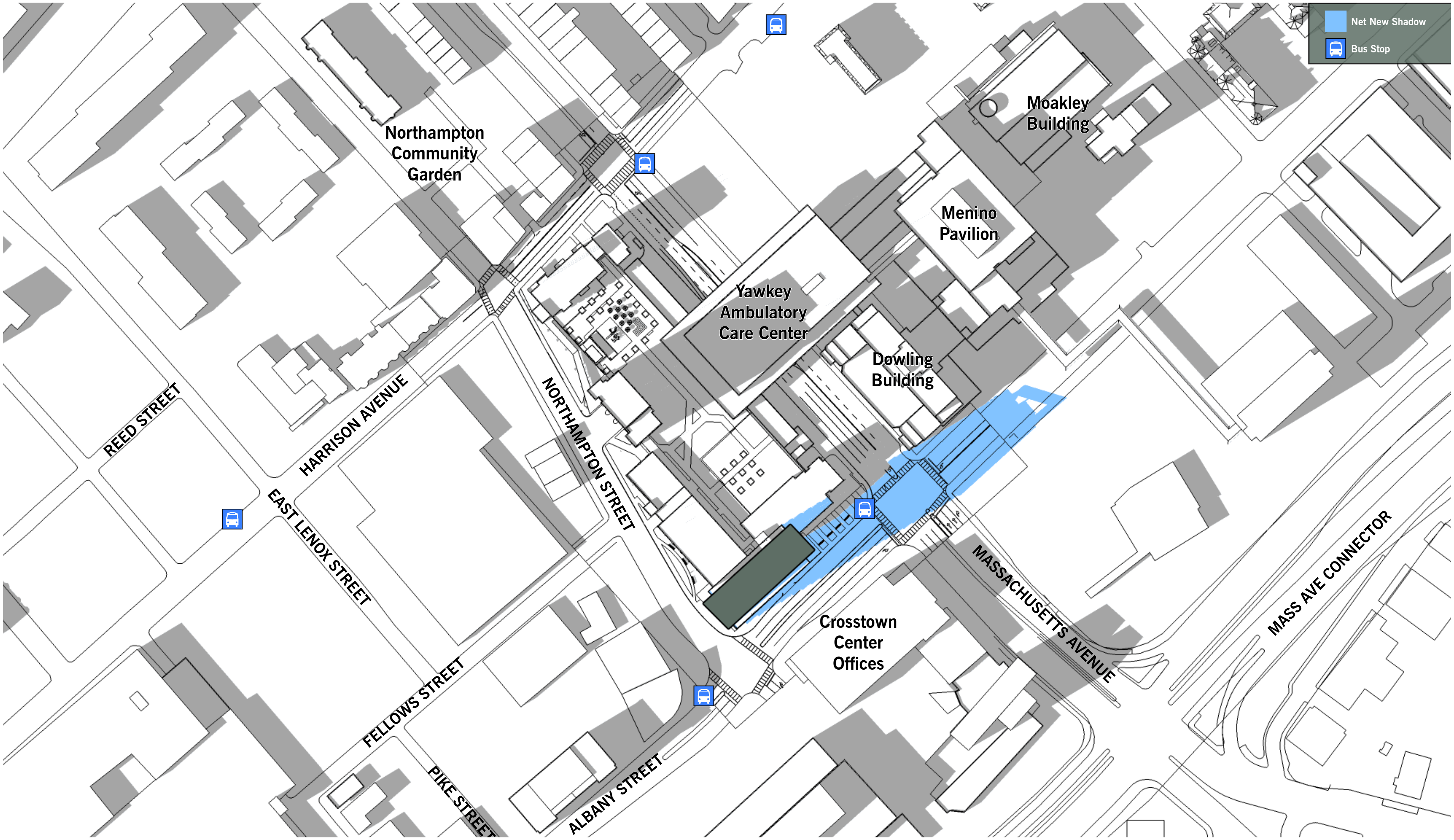


Figure 5-11
Shadow Study Autumnal Equinox: September 21, 6:00 pm
Source: The Architectural Team, 2013

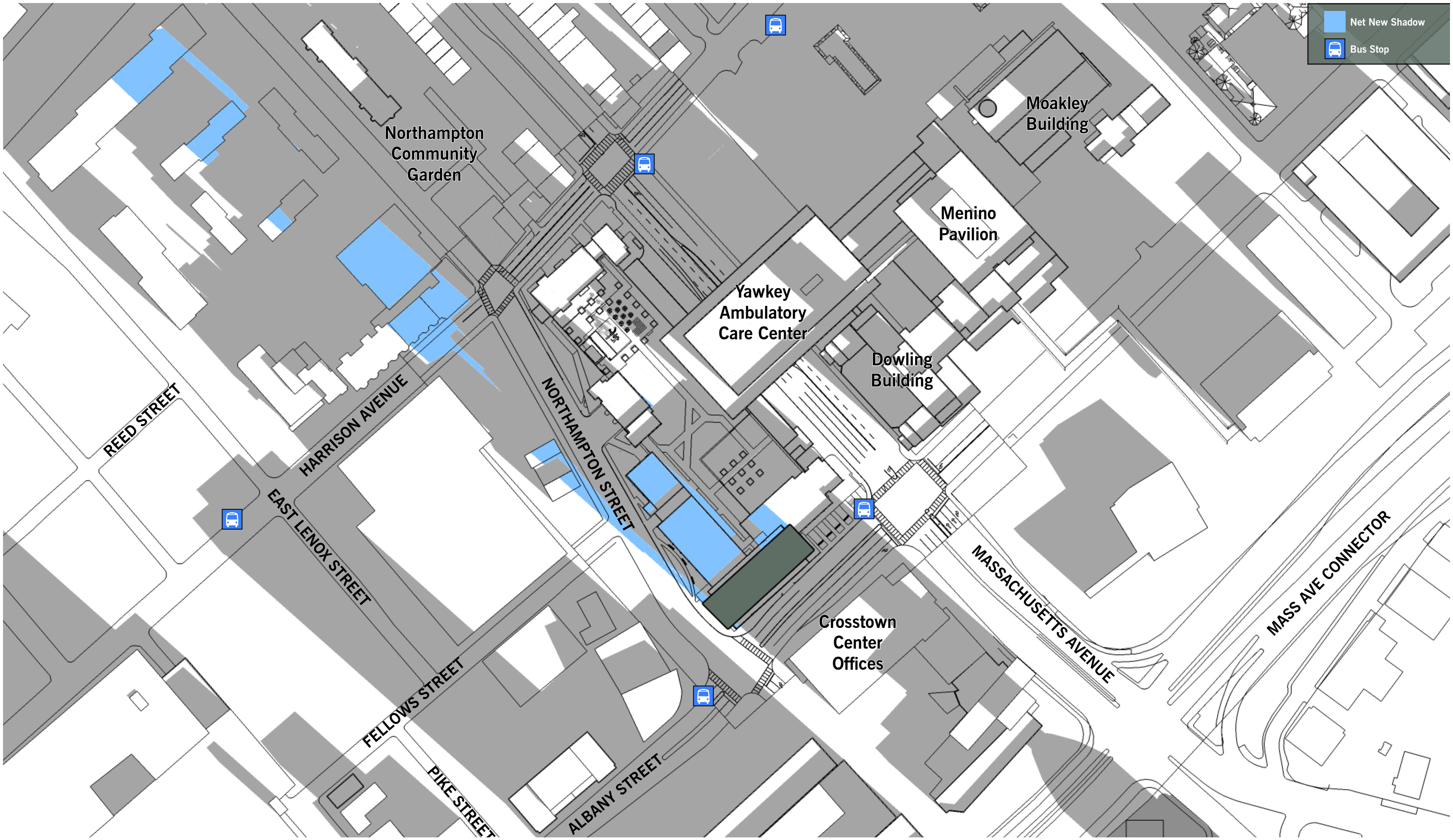


Figure 5-12
Shadow Study Winter Solstice: December 21, 9:00 am
Source: The Architectural Team, 2013

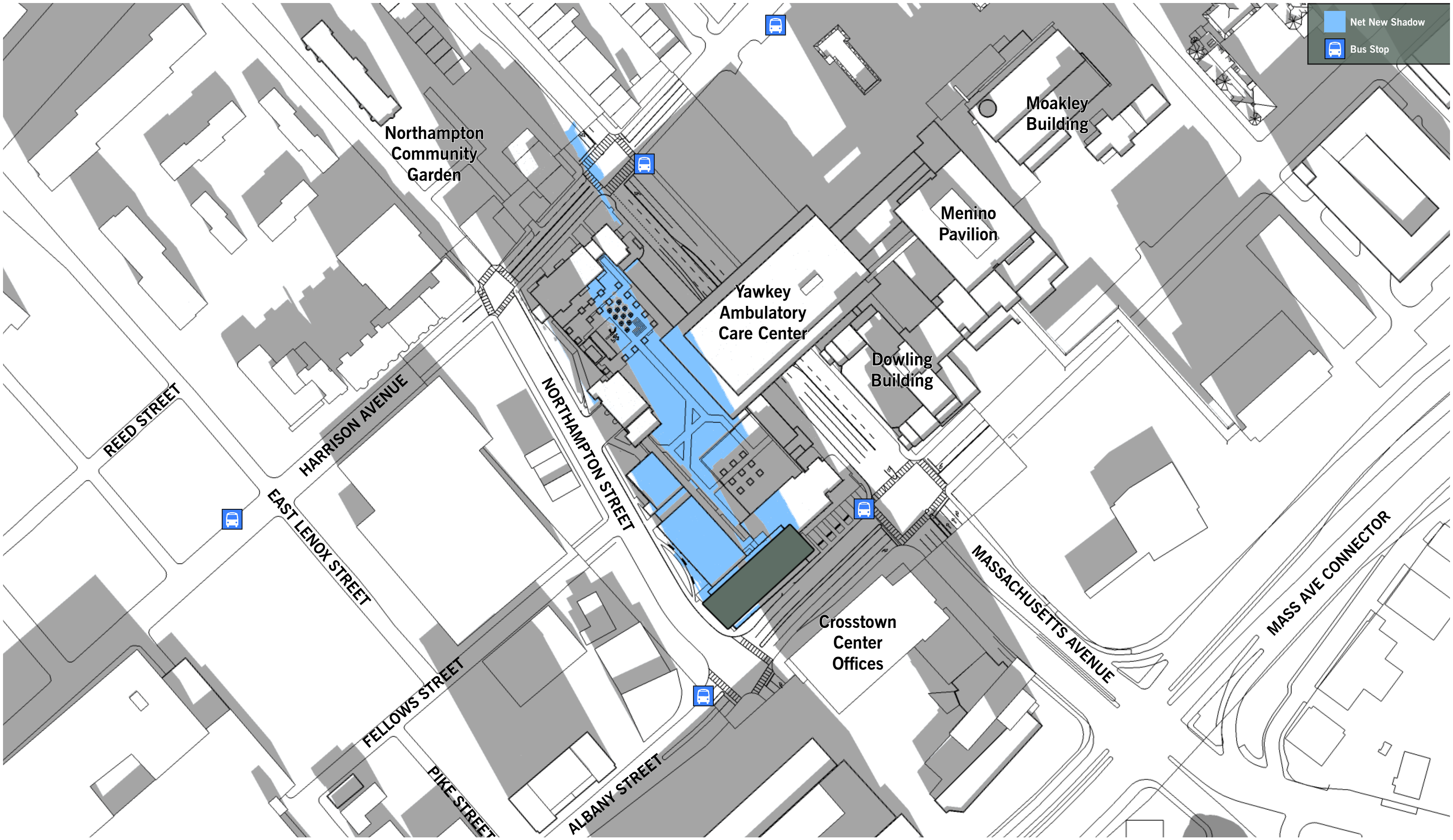
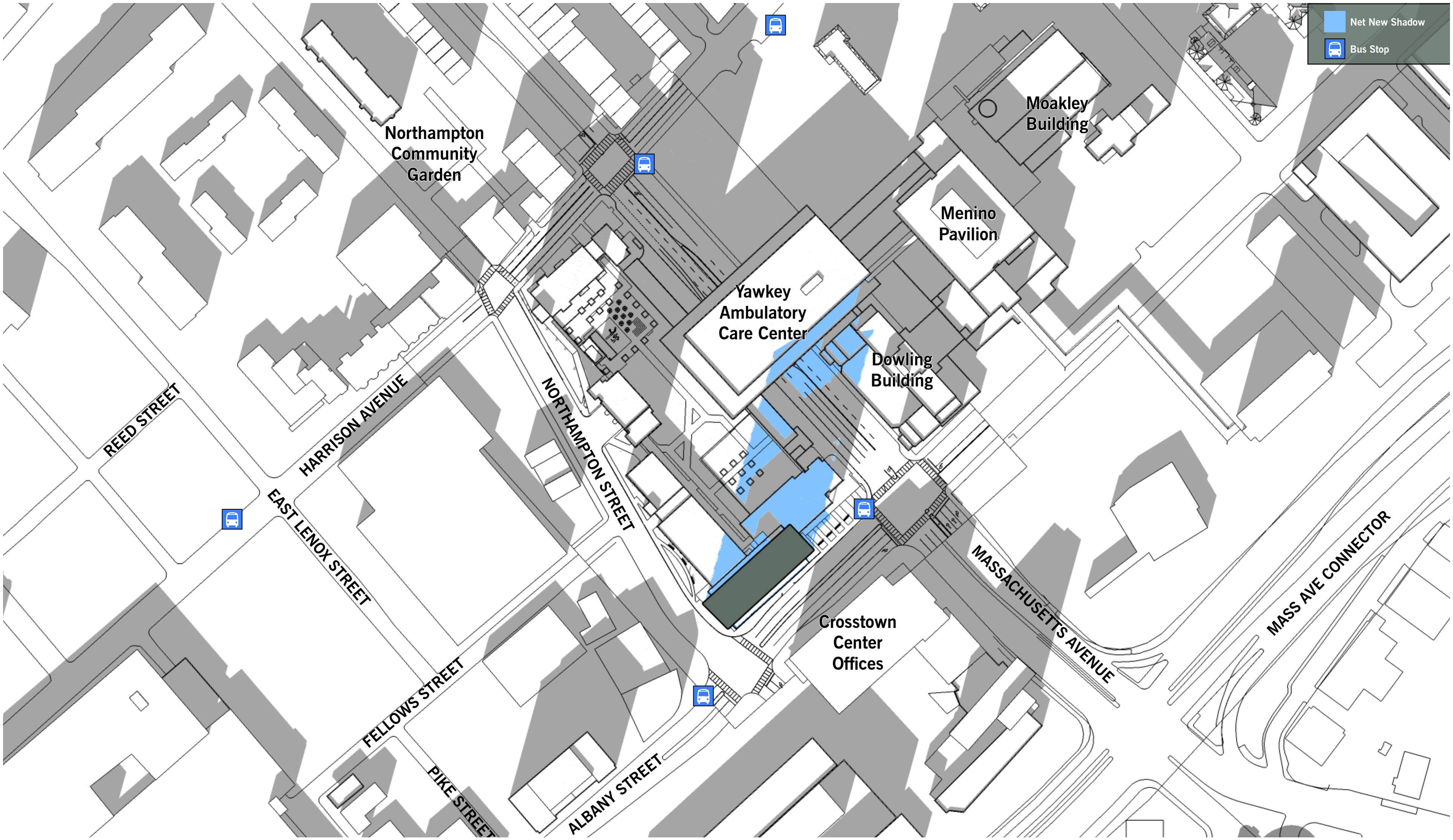
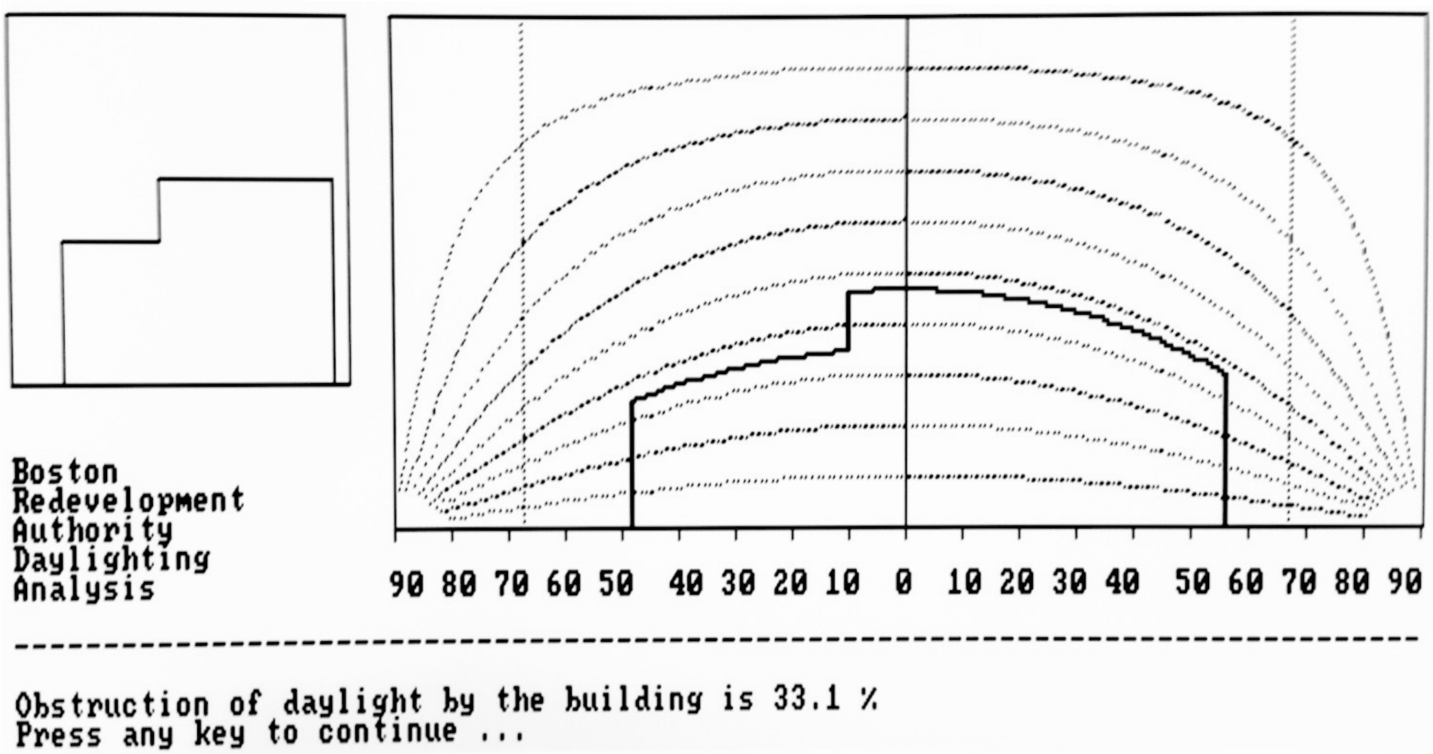


Figure 5-13
Shadow Study Winter Solstice: December 21, Noon
Source: The Architectural Team, 2013

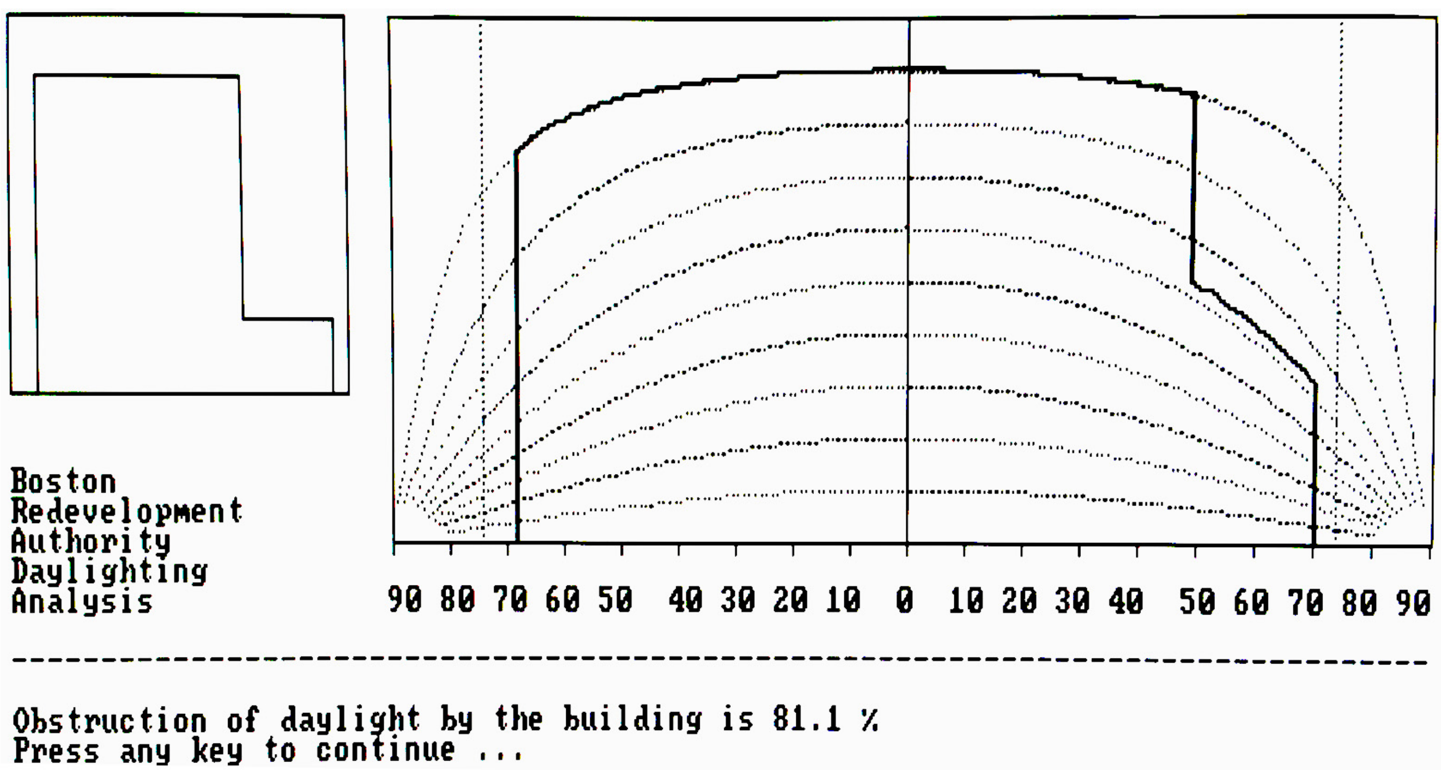


Northampton Square
Boston, Massachusetts

Figure 5-14
Shadow Study Winter Solstice: December 21, 3:00 pm
Source: The Architectural Team, 2013

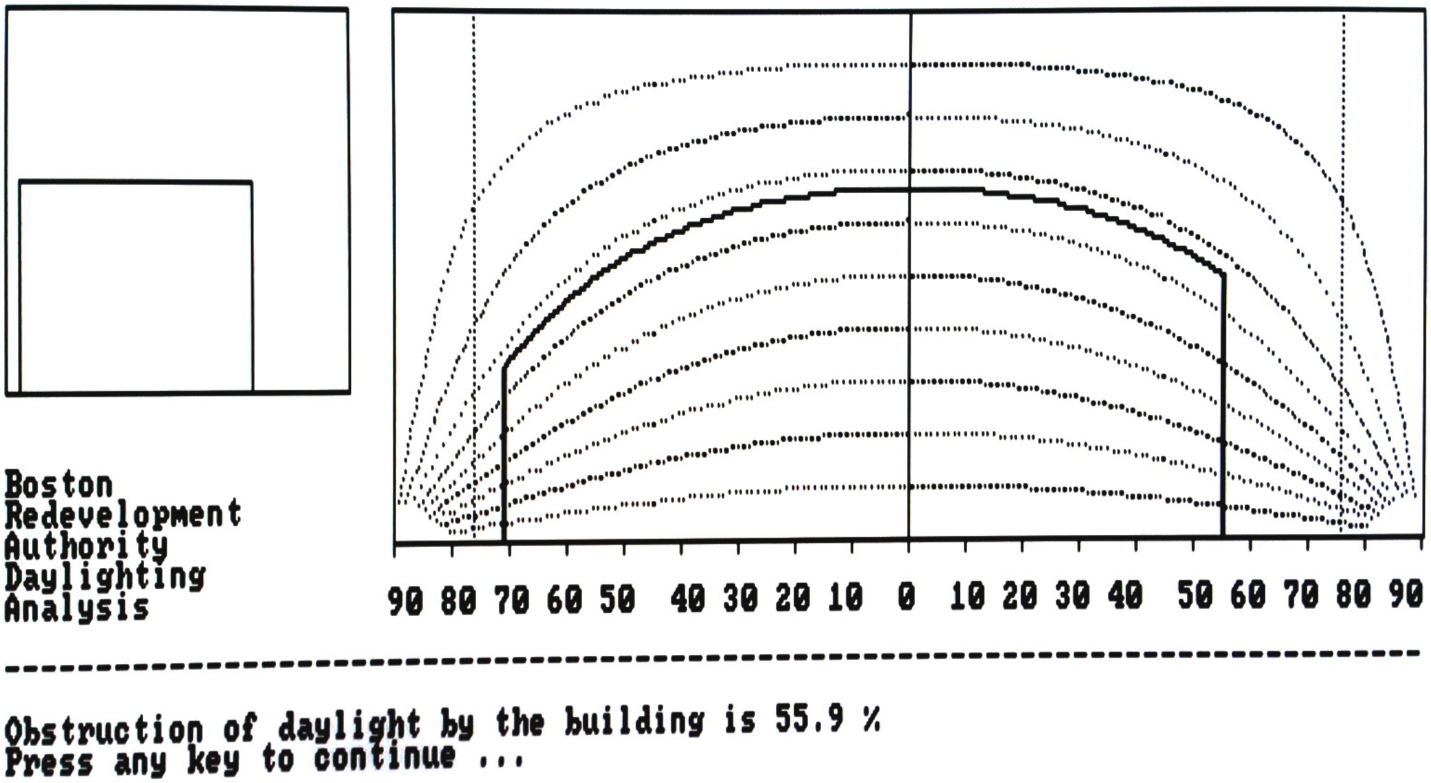


Existing Condition

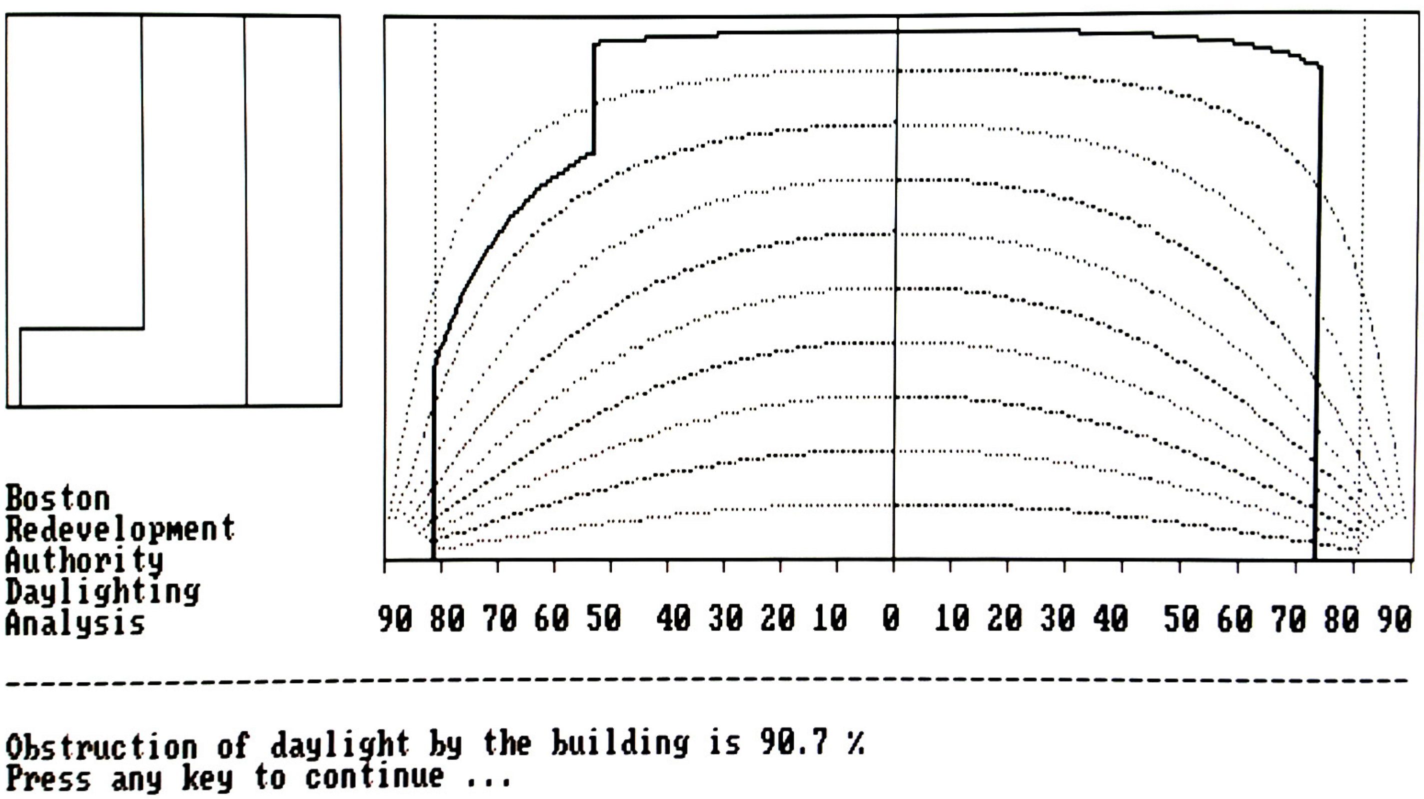


Proposed Condition

Figure 5-15
Daylight Obstruction from Albany Street
Source: BRA/FPA, 2013



Existing Condition



Proposed Condition

Figure 5-16
Daylight Obstruction from Northampton Street
Source: BRA/FPA, 2013

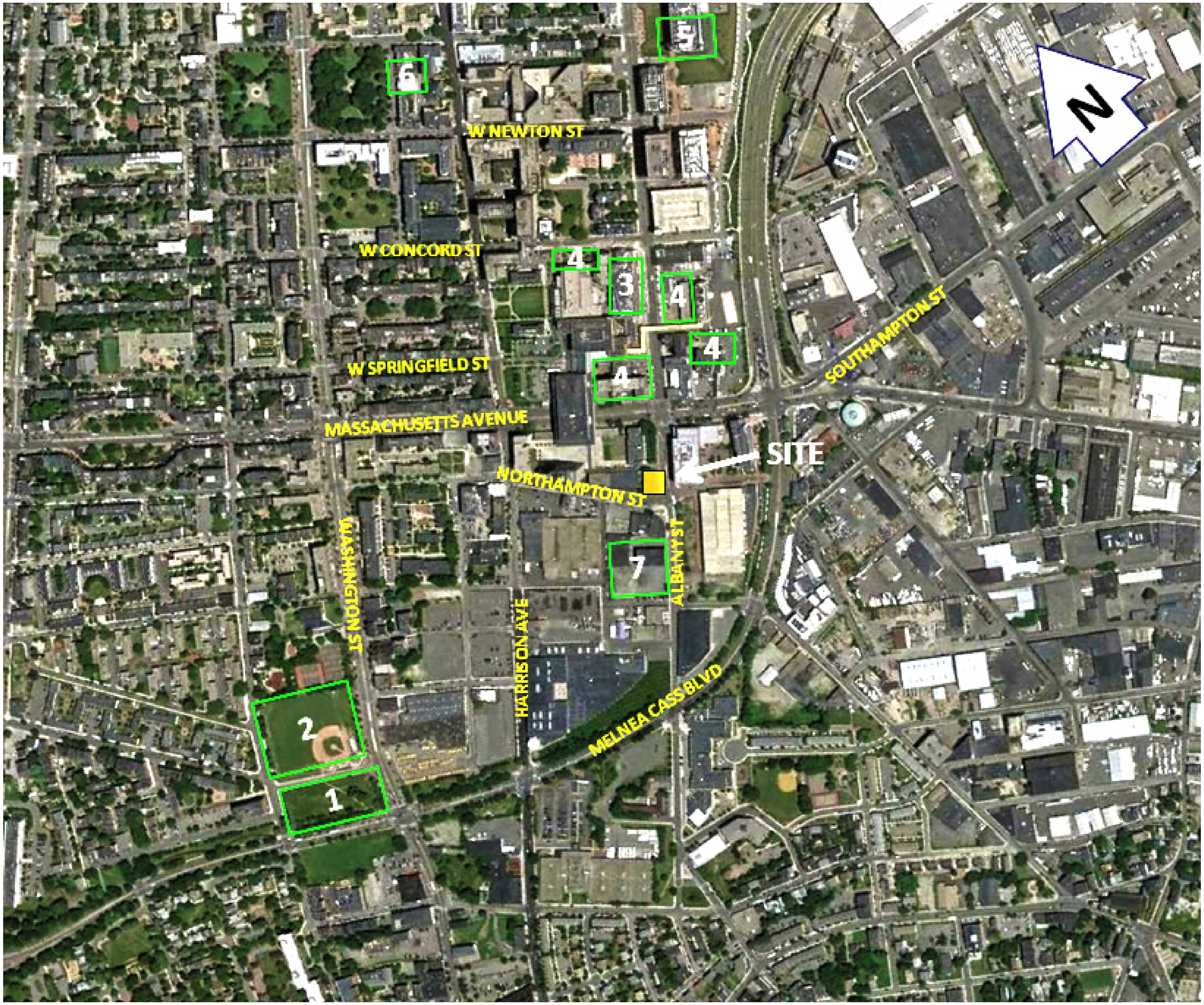


Figure 5-17
Study Site and Surroundings
Source: The Architectural Team, 2013

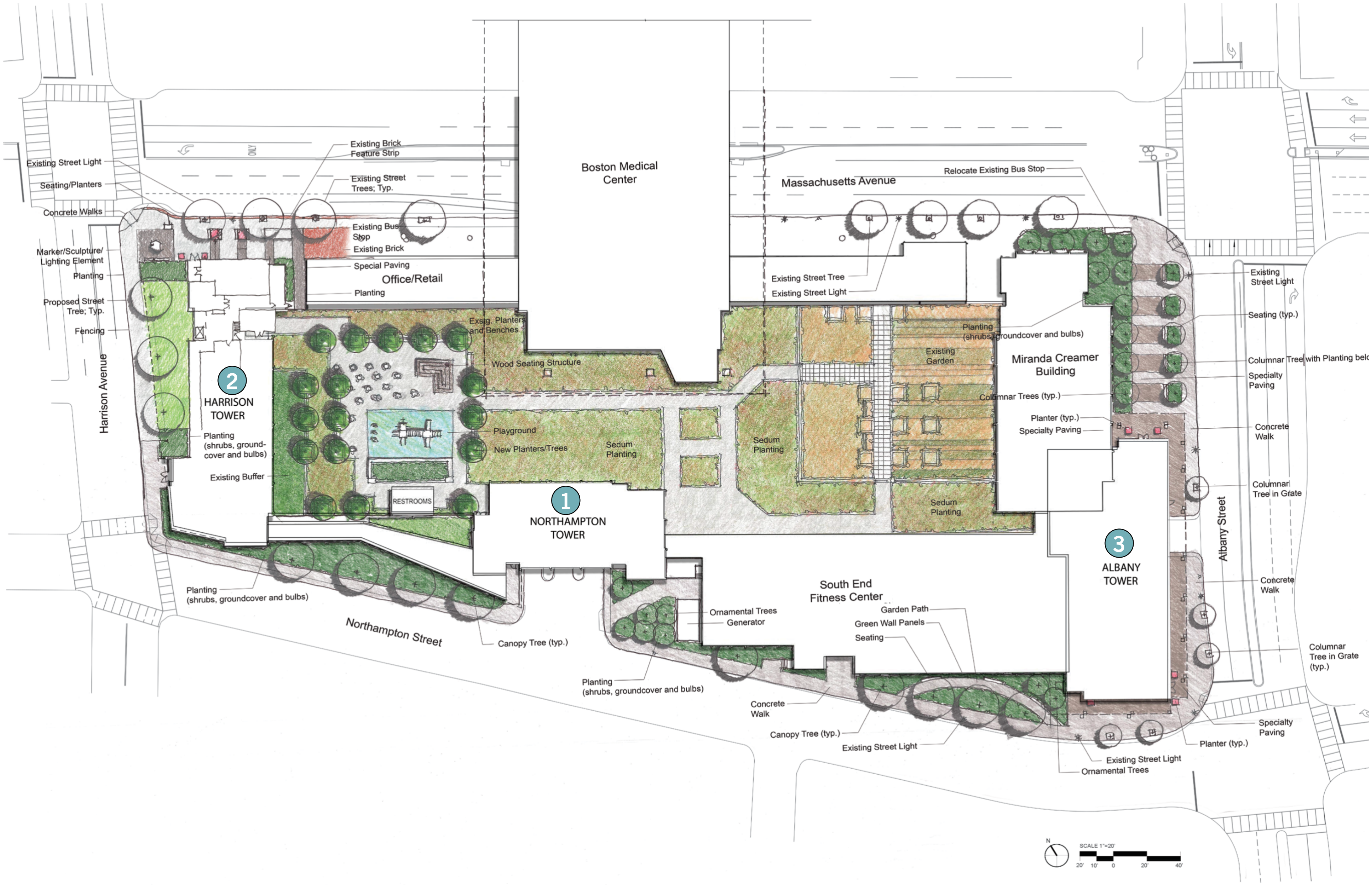


Figure 5-18
Conceptual Landscape Site Plan
Source: The Architectural Team, 2013

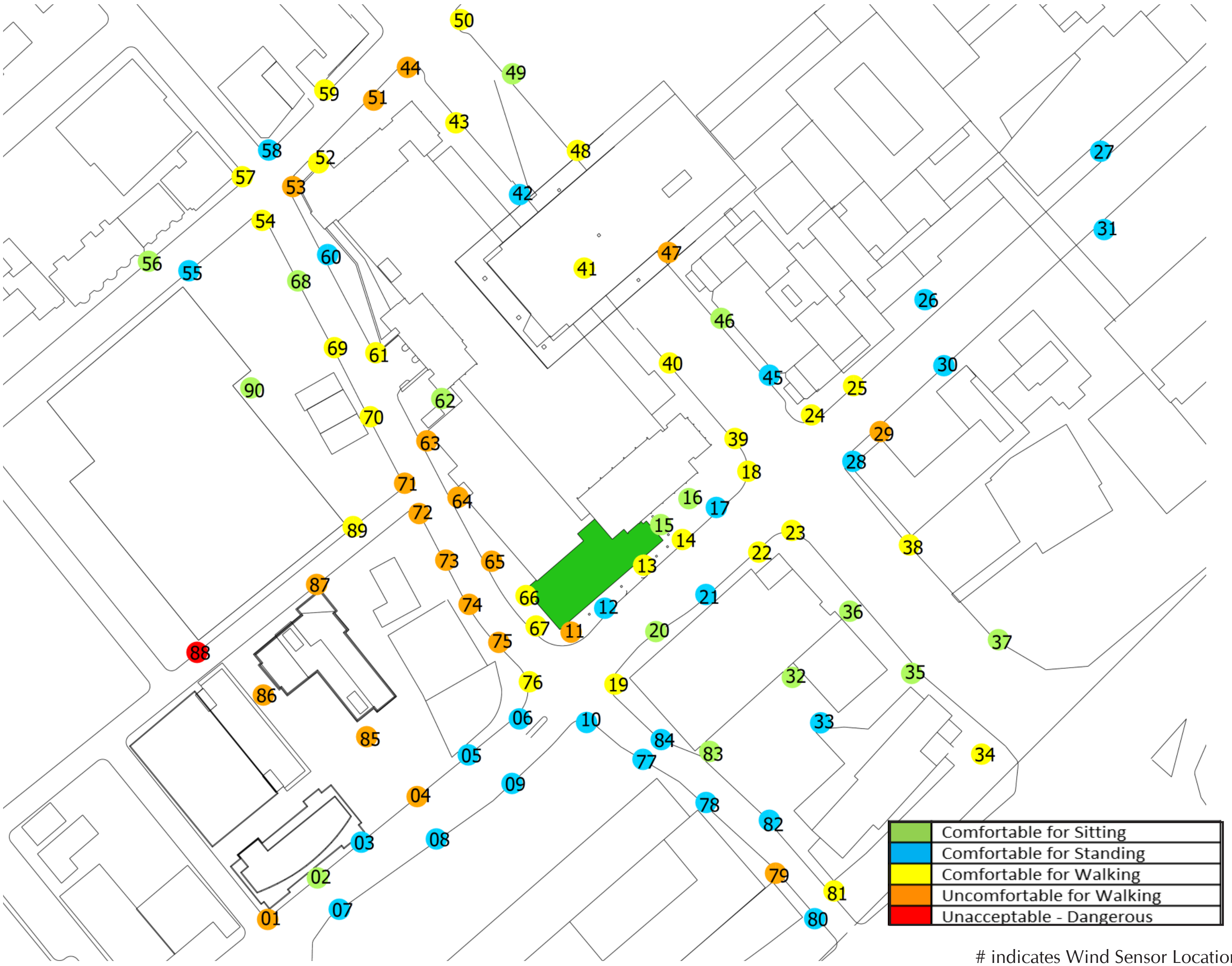
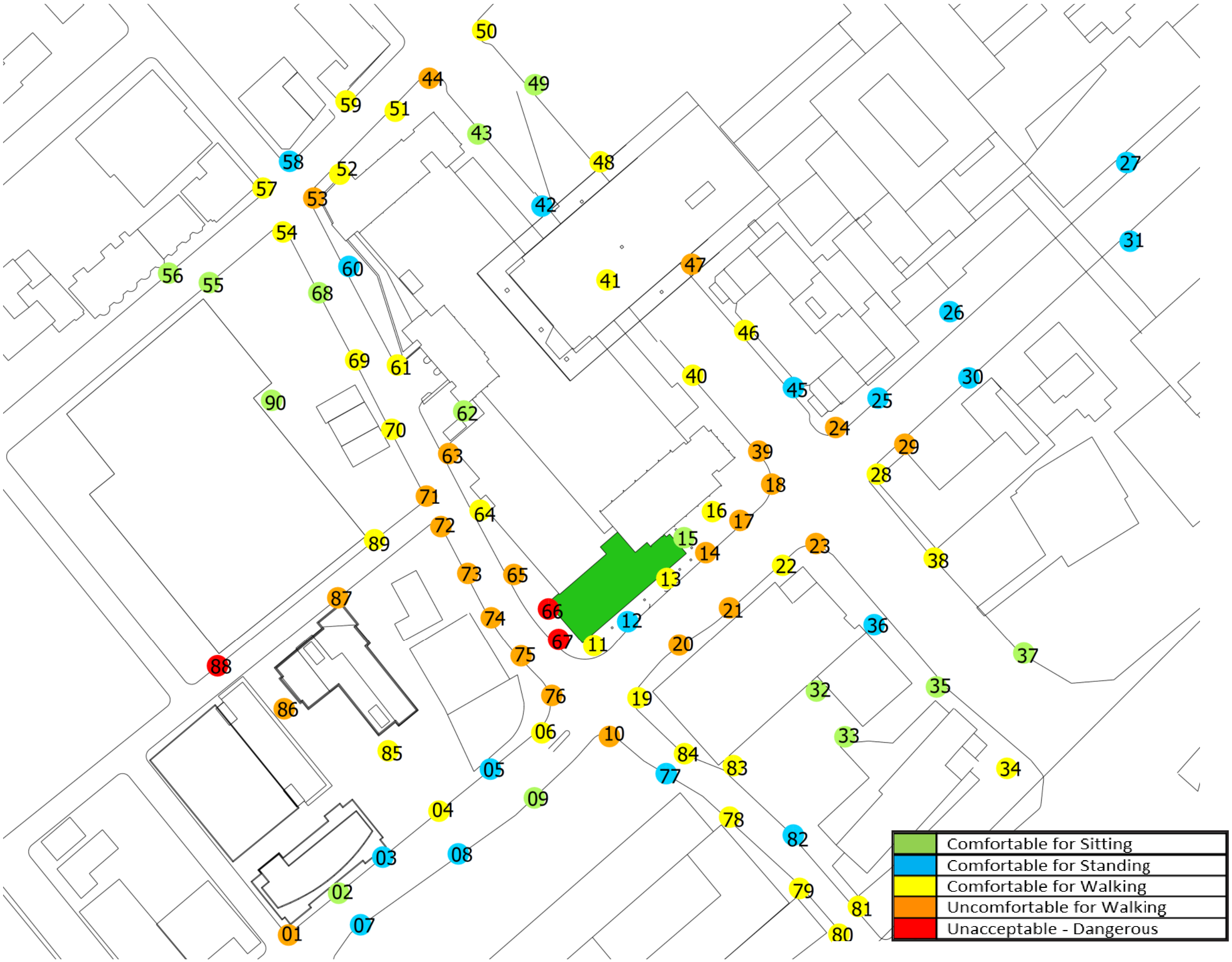


Figure 5-19
Annual Pedestrian Wind Conditions – No Build Configuration
Source: Novus Environmental, 2013



# indicates Wind Sensor Location

Figure 5-20
Annual Pedestrian Wind Conditions – Build Configuration
Source: Novus Environmental, 2013

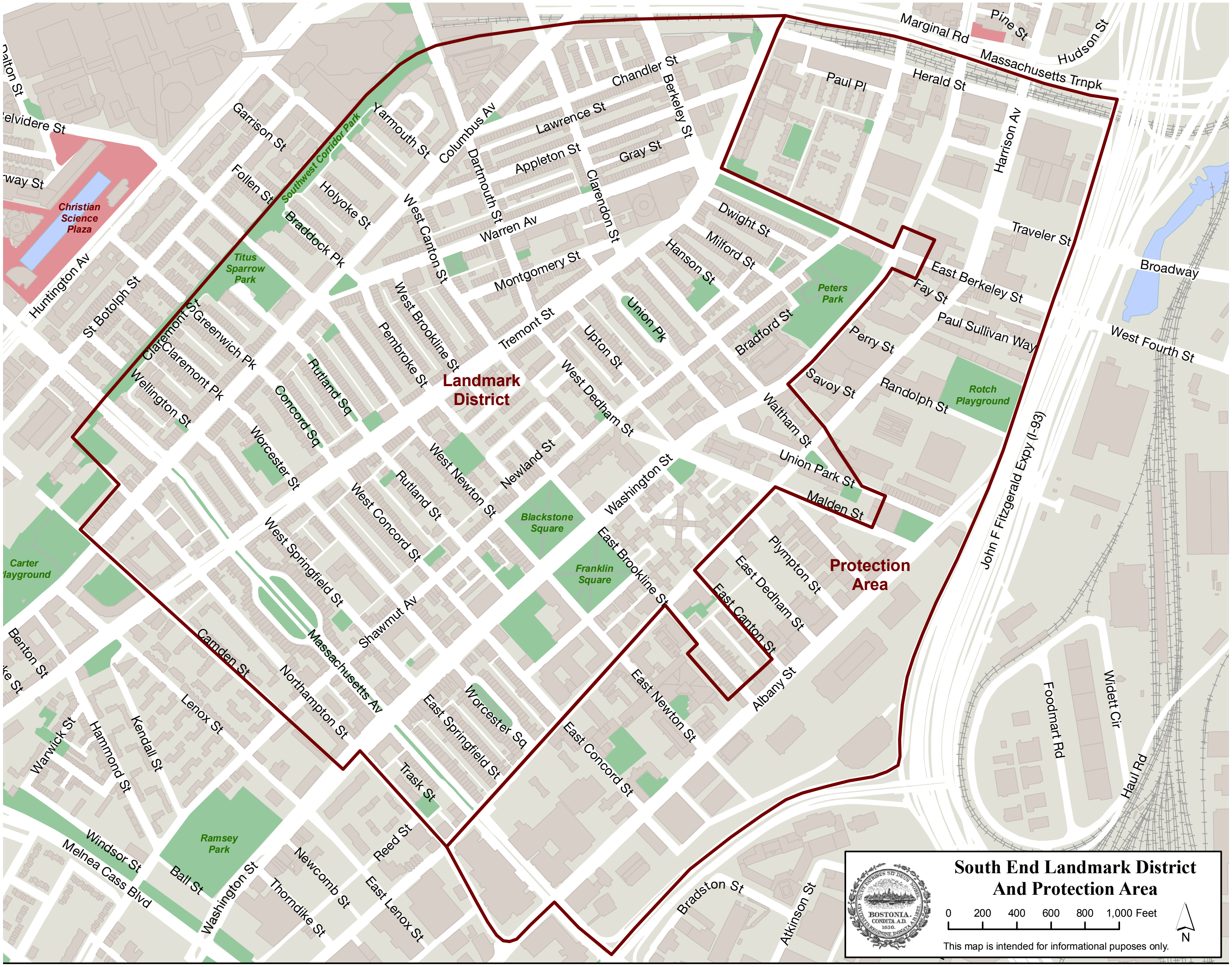


Figure 5-21
South End Landmark District and Protection Area
Source: City of Boston, 2012

Chapter 6

Infrastructure

6.0 INFRASTRUCTURE

6.1 INTRODUCTION

The Northampton Square Project has adequate water, sanitary, stormwater, energy, and telecommunications infrastructure to serve the proposed development. This section explains the existing and proposed conditions of each infrastructure element. All appropriate permits and approvals will be acquired prior to construction. Utility connections will be designed to minimize impacts to the surrounding area.

There are two primary building components for the proposed Project that consist of:

1. Renovation of 860 Harrison Avenue – 102 units to remain,
2. Construction of new residential building at Northampton and Albany streets – 218 new units.

Taken together, the building improvements will create an additional 279 bedrooms resulting in an increase in demand for water consumption and sewer discharge. To lower the impact of the increase in demand on these services, the existing 102 units being rehabbed will be upgraded to low flow water fixtures, which will help decrease the impact from the Project site, even though this decrease is not accounted for in the estimated water consumption or sewer discharge rates as dictated by 310 CMR 15.203. The potential impact of each building on the infrastructure is further detailed in the following utility sections.

An alternative plan is also included as part of this EPNF. Instead of 28 residential units on floors 4 through 7 within the proposed new tower, these floors will be for office use. This plan will result in a slight less amount of water be used and sewer being discharged as described below.

6.2 SANITARY SEWER SYSTEM

The Project's future sewage generation rates were estimated using the Massachusetts State Environmental Code, 310 CMR 15.203. A summary of the anticipated sewage flow is listed below in Table 6-1.

The building at 860 Harrison Avenue may be able to reuse the existing sanitary service laterals currently serving the buildings. A video inspection will be performed on each service to determine the condition of the service, and the design engineers will determine, in consultation with the Boston Water and Sewer Commission (BWSC), if the existing service is in good condition and properly sized for the proposed flow. If a new service is required, there are one or more BWSC sanitary mains located in the right of way adjacent to each building.

Table 6-1: Estimated New Sewage Discharges – Proposed Use

Building	Existing Use Description	Existing Flow (gpd)	Proposed Use Description	Proposed Estimated Flow (gpd)	Proposed Increase of Flow (gpd)
860 Harrison	Residential 139 Bedrooms	22,491	128 Bedrooms 110 gpd/Bedroom 6,500 sf office 75 gpd/1000 sf	14,568	-7,923
New Albany Street Building	N/A	0	279 Bedrooms 110 gpd/Bedroom 5,000 sf Office 75 gpd/1000 sf	31,065	31,065
Totals		***22,491***		***45,633***	***23,142***

*All rehabbed and new units will have low flow fixtures, so actual flows will be lower than these calculations.

The proposed alternative will have 40,000 sf of space on floors 4 through 7 utilized for office use, and therefore there will be a reduction of 36 bedrooms from the proposed new building (see Table 6-2). This change from residential to office use will result in a reduction of 1,335 gpd of sewer discharge.

Table 6-2: Estimated New Sewage Discharges – Alternative Use with Office

Building	Existing Use Description	Existing Flow (gpd)	Proposed Use Description	Proposed Estimated Flow (gpd)	Proposed Increase of Flow (gpd)
860 Harrison	Residential 139 Bedrooms	22,491	128 Bedrooms 110 gpd/Bedroom 6,500 sf office 75 gpd/1000 sf	14,568	-7,923
New Albany Street Building	N/A	0	243 Bedrooms 110 gpd/Bedroom 40,000 office 75 gpd/1000 sf	29,730	29,730
Totals		***22,491***		***44,298***	***21,807***

*All rehabbed and new units will have low flow fixtures, so actual flows will be lower than these calculations.

For the construction of the new 218-unit building at Northampton and Albany Streets, a new sewer service must be connected to the BWSC sewer system within either Northampton Street or Albany Street. There appears to be sufficient capacity in the 42-inch sanitary main located in Northampton Street, although further design and review is required by the design engineers in consultation with BWSC. If necessary, a second or alternate sanitary service may connect to the existing sanitary main in Albany Street. The sewer main in Albany Street appears to be 18 inches in diameter. The actual size and location may be determined by further field survey.

Based on the sewage flow estimates and the current sewer information available, sufficient sewer service can be provided to the proposed development. The net increase of estimated sewage generation from the proposed development will require a compliance certification with the Massachusetts Department of Environmental Protection (MassDEP).

6.2.1 I/I MITIGATION

In accordance with the DEP Policy regarding new projects subject to MEPA in communities with combined sewers, the Project will participate in a 4:1 infiltration/inflow (I/I) removal program. This program requires that the applicant remove four gallons of infiltration and inflow into the sewer system for every one gallon of average daily flow proposed by the Project. The BWSC is the entity that identifies the proposed mitigation project.

Table 6-3 provides the calculations used by the BWSC to determine the monetary value of the I/I mitigation contribution for the net new flows proposed by the Project. Alternative One is based on the use of 40,000 sf on the 4th through 7th floors of the proposed 23-story building for office space instead of the use of 36 bedrooms.

Table 6-3: I/I Mitigation Contribution

	Proposed Project	Alternative One (with office)
Estimated Wastewater flow	23,142 gpd	21,807 gpd
Cost Multiplier ($9.72)	$224,940	$211,964

The proponent will be having discussions with the BWSC and MassDEP regarding a commitment to provide infiltration/inflow (I/I) mitigation. It is anticipated that the Project will contribute a payment in the amount of $224,940 for the proposed Project or $211,964 for Alternative One.

6.3 WATER SUPPLY SYSTEM

Water consumption on the site averages 12,342 gpd, which is based on the FY2011 water consumption records provided by the current owner, the Boston Public Health Commission. The increase in water consumption is expected to be 24,507 gallons per day (gpd), based on the Project's estimated increase of sewage generation. A factor of 1.1 (conservative) is applied to the estimated wastewater discharge rate to estimate daily water use.

Currently, water services are available in every street surrounding the Project, each owned and maintained by BWSC. The design engineers will be determining whether the existing domestic and fire protection water service laterals are adequate for the renovated buildings in consultation with BWSC or if new services will be required for the development.

The existing fire protection service at 860 Harrison Avenue will need to be modified to accommodate the reconfiguration of spaces proposed for the first floor. When complete, the fire protection system will meet all codes and standards.

The proposed building will require new domestic and fire protection water services. The actual size and location of these services will be proposed by the design engineers in consultation with BWSC. Adjacent to the proposed building, there are 12-inch low pressure services in Northampton Street and Albany Street. A flow test will be required on each water main near each service lateral to determine if adequate pressure is available for the proposed building.

The proposed alternative will have 40,000 sf of space on floors 4 through 7 utilized for office use, and therefore there will be a reduction of 36 bedrooms (28 units) from the proposed new building (see Table 6-2). This change from residential to office use will result in a reduction of 1,470 gpd of water use.

6.4 STORMWATER

6.4.1 EXISTING DRAINAGE CONDITIONS

Most of the Project area is currently impervious due to building and parking garage coverage and paved vehicular areas serving the site. There are small landscaped areas surrounding the outer portions of the building complex adjacent to the street. There are no existing stormwater catch basins on the site although there are at least two stormwater drains servicing the property, connected to the stormwater system in Massachusetts Avenue.

Stormwater on the existing landscaped areas between the buildings and streets discharges via sheet flow into the surrounding street drainage systems. All of the stormwater drains connect to the Roxbury Canal Conduit, which discharges into the Fort Point Channel and ultimately Boston Harbor. It is unknown at this time where the roof drains connect to the storm drain system.

6.4.2 PROPOSED DRAINAGE CONDITIONS

During the renovations of 860 Harrison Avenue, many of the roof areas will remain unchanged. However, there are a few sizable improvements that will improve the stormwater drainage conditions when the construction of this development is complete.

The parking garage in the middle of the site will be substantially improved by creating a green roof on the large roof deck, thereby reducing the peak rate of stormwater runoff from the existing conditions. Further information regarding this improvement will be provided by the architects and design engineers.

The proposed building at Northampton and Albany streets will extend into current landscaped area adjacent to Albany Street. All stormwater runoff from the proposed 24-story building will be collected via a closed drainage system and, treated with best management practices. This runoff is intended to be discharged into the existing stormwater drainage system.

Overall, the site will have a decrease in impervious area of approximately 6,100 sf. Drainage and runoff collection and disposal systems will be designed to minimize impacts of the Project on the existing storm sewer systems. To mitigate the impacts, a portion of the Project's parking garage roof area will be vegetated, and/or a portion of the stormwater runoff will discharge into an underground stormwater recharge/detention system or will be collected in a rainwater reuse tank and used for site irrigation. These proposed measures will substantially improve stormwater runoff and water quality from the project site.

6.5 ENERGY AND TELECOMMUNICATIONS

The site is currently serviced with electric, telephone, cable, and gas services. All proposed utility connections will be coordinated with each respective utility provider.

Gas

Gas service to the property is provided by National Grid Energy Delivery.

Ample capacity is available from the gas main in Northampton Street. Changes to the gas service at 860 Harrison are not anticipated in the renovation for this Project.

A new gas service will be required for the new Albany Street building at Northampton and Albany streets. Ample capacity is available from the both gas mains in either Northampton Street or Albany Street.

Electric

Electrical service is provided to the property by NSTAR. All improvements will be able to be accommodated upon further coordination with NSTAR.

The renovation at 860 Harrison Avenue will include new electrical services to accommodate new 100-amp 120/208 volt load centers installed in each of the residential units. Also included in the renovation are Energy Star rated light fixtures that will be installed throughout the building. All features of the electrical system will be renovated to all codes and standards.

New electrical service will be brought into the proposed building at Northampton and Albany streets. An electric utility vault will most likely be constructed inside the building to accommodate the transformer and switchgear needed to service the residential units. Coordination with NSTAR will be required to determine actual location, size, and type of service.

Telecommunications

The Proponent is working with Verizon and Comcast Cable with the goal of providing residents with a choice between the two services.

Appendix 1

Transportation Study

N/S: Massachusetts Avenue
E/W: Albany Street
City, State: Boston, MA
Client: HSH/ R. Burgess

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

File Name : 133243 A
Site Code : 2012165.
Start Date : 3/5/2013

Groups Printed- Cars - Heavy Vehicles

	Massachusetts Avenue From North				Albany Street From East				Massachusetts Avenue From South				Albany Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	6	131	18	0	13	50	18	0	78	235	0	0	8	49	15	0	621
07:15 AM	14	141	9	0	24	42	21	0	83	241	1	0	13	62	13	0	664
07:30 AM	11	161	26	0	18	53	34	0	78	225	0	0	19	68	22	0	715
07:45 AM	10	170	20	0	18	44	32	0	95	226	1	0	14	77	16	0	723
Total	41	603	73	0	73	189	105	0	334	927	2	0	54	256	66	0	2723
08:00 AM	11	166	26	0	16	46	25	0	102	254	0	0	12	73	18	0	749
08:15 AM	9	168	21	0	20	39	36	0	96	250	0	0	10	89	16	0	754
08:30 AM	12	171	20	1	33	42	29	0	92	208	0	0	17	75	24	0	724
08:45 AM	13	147	24	0	24	58	29	0	75	219	0	0	10	73	25	0	697
Total	45	652	91	1	93	185	119	0	365	931	0	0	49	310	83	0	2924
Grand Total	86	1255	164	1	166	374	224	0	699	1858	2	0	103	566	149	0	5647
Apprch %	5.7	83.3	10.9	0.1	21.7	49	29.3	0	27.3	72.6	0.1	0	12.6	69.2	18.2	0	
Total %	1.5	22.2	2.9	0	2.9	6.6	4	0	12.4	32.9	0	0	1.8	10	2.6	0	
Cars	62	1159	151	1	151	345	185	0	652	1712	2	0	94	513	115	0	5142
% Cars	72.1	92.4	92.1	100	91	92.2	82.6	0	93.3	92.1	100	0	91.3	90.6	77.2	0	91.1
Heavy Vehicles	24	96	13	0	15	29	39	0	47	146	0	0	9	53	34	0	505
% Heavy Vehicles	27.9	7.6	7.9	0	9	7.8	17.4	0	6.7	7.9	0	0	8.7	9.4	22.8	0	8.9

	Massachusetts Avenue From North					Albany Street From East					Massachusetts Avenue From South					Albany Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	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	10	170	20	0	200	18	44	32	0	94	95	226	1	0	322	14	77	16	0	107	723
08:00 AM	11	166	26	0	203	16	46	25	0	87	102	254	0	0	356	12	73	18	0	103	749
08:15 AM	9	168	21	0	198	20	39	36	0	95	96	250	0	0	346	10	89	16	0	115	754
08:30 AM	12	171	20	1	204	33	42	29	0	104	92	208	0	0	300	17	75	24	0	116	724
Total Volume	42	675	87	1	805	87	171	122	0	380	385	938	1	0	1324	53	314	74	0	441	2950
% App. Total	5.2	83.9	10.8	0.1		22.9	45	32.1	0		29.1	70.8	0.1	0		12	71.2	16.8	0		
PHF	.875	.987	.837	.250	.987	.659	.929	.847	.000	.913	.944	.923	.250	.000	.930	.779	.882	.771	.000	.950	.978
Cars	32	626	81	1	740	80	163	104	0	347	361	874	1	0	1236	46	288	60	0	394	2717
% Cars	76.2	92.7	93.1	100	91.9	92.0	95.3	85.2	0	91.3	93.8	93.2	100	0	93.4	86.8	91.7	81.1	0	89.3	92.1
Heavy Vehicles	10	49	6	0	65	7	8	18	0	33	24	64	0	0	88	7	26	14	0	47	233
% Heavy Vehicles	23.8	7.3	6.9	0	8.1	8.0	4.7	14.8	0	8.7	6.2	6.8	0	0	6.6	13.2	8.3	18.9	0	10.7	7.9

N/S: Massachusetts Avenue
E/W: Albany Street
City, State: Boston, MA
Client: HSH/ R. Burgess

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Site Code : 2012165.
Start Date : 3/5/2013
Page No : 1

Groups Printed- Cars

	Massachusetts Avenue From North				Albany Street From East				Massachusetts Avenue From South				Albany Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	3	117	16	0	10	46	13	0	71	214	0	0	7	46	10	0	553
07:15 AM	9	134	9	0	21	38	16	0	79	214	1	0	13	52	9	0	595
07:30 AM	9	150	24	0	17	48	31	0	74	204	0	0	19	66	17	0	659
07:45 AM	7	162	19	0	17	40	28	0	86	205	1	0	10	70	13	0	658
Total	28	563	68	0	65	172	88	0	310	837	2	0	49	234	49	0	2465
08:00 AM	9	154	25	0	14	45	19	0	97	238	0	0	11	67	16	0	695
08:15 AM	8	153	20	0	18	37	31	0	91	238	0	0	9	84	11	0	700
08:30 AM	8	157	17	1	31	41	26	0	87	193	0	0	16	67	20	0	664
08:45 AM	9	132	21	0	23	50	21	0	67	206	0	0	9	61	19	0	618
Total	34	596	83	1	86	173	97	0	342	875	0	0	45	279	66	0	2677
Grand Total	62	1159	151	1	151	345	185	0	652	1712	2	0	94	513	115	0	5142
Apprch %	4.5	84.4	11	0.1	22.2	50.7	27.2	0	27.6	72.4	0.1	0	13	71.1	15.9	0	
Total %	1.2	22.5	2.9	0	2.9	6.7	3.6	0	12.7	33.3	0	0	1.8	10	2.2	0	

	Massachusetts Avenue From North					Albany Street From East					Massachusetts Avenue From South					Albany Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	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	7	162	19	0	188	17	40	28	0	85	86	205	1	0	292	10	70	13	0	93	658
08:00 AM	9	154	25	0	188	14	45	19	0	78	97	238	0	0	335	11	67	16	0	94	695
08:15 AM	8	153	20	0	181	18	37	31	0	86	91	238	0	0	329	9	84	11	0	104	700
08:30 AM	8	157	17	1	183	31	41	26	0	98	87	193	0	0	280	16	67	20	0	103	664
Total Volume	32	626	81	1	740	80	163	104	0	347	361	874	1	0	1236	46	288	60	0	394	2717
% App. Total	4.3	84.6	10.9	0.1		23.1	47	30	0		29.2	70.7	0.1	0		11.7	73.1	15.2	0		
PHF	.889	.966	.810	.250	.984	.645	.906	.839	.000	.885	.930	.918	.250	.000	.922	.719	.857	.750	.000	.947	.970

N/S: Massachusetts Avenue
E/W: Albany Street
City, State: Boston, MA
Client: HSH/ R. Burgess

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Start Date : 3/5/2013
Page No : 1

Groups Printed- Heavy Vehicles

	Massachusetts Avenue From North				Albany Street From East				Massachusetts Avenue From South				Albany Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	3	14	2	0	3	4	5	0	7	21	0	0	1	3	5	0	68
07:15 AM	5	7	0	0	3	4	5	0	4	27	0	0	0	10	4	0	69
07:30 AM	2	11	2	0	1	5	3	0	4	21	0	0	0	2	5	0	56
07:45 AM	3	8	1	0	1	4	4	0	9	21	0	0	4	7	3	0	65
Total	13	40	5	0	8	17	17	0	24	90	0	0	5	22	17	0	258
08:00 AM	2	12	1	0	2	1	6	0	5	16	0	0	1	6	2	0	54
08:15 AM	1	15	1	0	2	2	5	0	5	12	0	0	1	5	5	0	54
08:30 AM	4	14	3	0	2	1	3	0	5	15	0	0	1	8	4	0	60
08:45 AM	4	15	3	0	1	8	8	0	8	13	0	0	1	12	6	0	79
Total	11	56	8	0	7	12	22	0	23	56	0	0	4	31	17	0	247
Grand Total	24	96	13	0	15	29	39	0	47	146	0	0	9	53	34	0	505
Apprch %	18	72.2	9.8	0	18.1	34.9	47	0	24.4	75.6	0	0	9.4	55.2	35.4	0	
Total %	4.8	19	2.6	0	3	5.7	7.7	0	9.3	28.9	0	0	1.8	10.5	6.7	0	

	Massachusetts Avenue From North					Albany Street From East					Massachusetts Avenue From South					Albany Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	3	14	2	0	19	3	4	5	0	12	7	21	0	0	28	1	3	5	0	9	68
07:15 AM	5	7	0	0	12	3	4	5	0	12	4	27	0	0	31	0	10	4	0	14	69
07:30 AM	2	11	2	0	15	1	5	3	0	9	4	21	0	0	25	0	2	5	0	7	56
07:45 AM	3	8	1	0	12	1	4	4	0	9	9	21	0	0	30	4	7	3	0	14	65
Total Volume	13	40	5	0	58	8	17	17	0	42	24	90	0	0	114	5	22	17	0	44	258
% App. Total	22.4	69	8.6	0		19	40.5	40.5	0		21.1	78.9	0	0		11.4	50	38.6	0		
PHF	.650	.714	.625	.000	.763	.667	.850	.850	.000	.875	.667	.833	.000	.000	.919	.313	.550	.850	.000	.786	.935

N/S: Massachusetts Avenue
E/W: Albany Street
City, State: Boston, MA
Client: HSH/ R. Burgess

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File Name : 133243 A
Site Code : 2012165.
Start Date : 3/5/2013

Groups Printed- Peds and Bicycles

	Massachusetts Avenue From North				Albany Street From East				Massachusetts Avenue From South				Albany Street From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
07:00 AM	0	1	0	25	0	0	0	39	0	1	0	22	0	0	0	26	114
07:15 AM	0	0	0	24	1	0	0	36	0	2	0	18	0	1	0	19	101
07:30 AM	0	0	0	30	0	0	0	31	1	0	0	24	0	0	0	27	113
07:45 AM	0	3	0	38	0	0	0	48	0	1	0	29	0	0	0	24	143
Total	0	4	0	117	1	0	0	154	1	4	0	93	0	1	0	96	471
08:00 AM	0	0	0	40	0	0	0	35	0	0	0	26	0	0	0	40	141
08:15 AM	0	0	0	46	0	0	0	37	0	0	0	35	0	0	0	30	148
08:30 AM	0	3	1	45	0	0	0	43	0	0	0	38	0	2	0	46	178
08:45 AM	0	0	0	42	0	0	0	69	0	0	0	23	0	0	1	43	178
Total	0	3	1	173	0	0	0	184	0	0	0	122	0	2	1	159	645
Grand Total	0	7	1	290	1	0	0	338	1	4	0	215	0	3	1	255	1116
Apprch %	0	2.3	0.3	97.3	0.3	0	0	99.7	0.5	1.8	0	97.7	0	1.2	0.4	98.5	
Total %	0	0.6	0.1	26	0.1	0	0	30.3	0.1	0.4	0	19.3	0	0.3	0.1	22.8	

	Massachusetts Avenue From North					Albany Street From East					Massachusetts Avenue From South					Albany Street 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
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	0	0	0	40	40	0	0	0	35	35	0	0	0	26	26	0	0	0	40	40	141
08:15 AM	0	0	0	46	46	0	0	0	37	37	0	0	0	35	35	0	0	0	30	30	148
08:30 AM	0	3	1	45	49	0	0	0	43	43	0	0	0	38	38	0	2	0	46	48	178
08:45 AM	0	0	0	42	42	0	0	0	69	69	0	0	0	23	23	0	0	1	43	44	178
Total Volume	0	3	1	173	177	0	0	0	184	184	0	0	0	122	122	0	2	1	159	162	645
% App. Total	0	1.7	0.6	97.7		0	0	0	100		0	0	0	100		0	1.2	0.6	98.1		
PHF	.000	.250	.250	.940	.903	.000	.000	.000	.667	.667	.000	.000	.000	.803	.803	.000	.250	.250	.864	.844	.906

N/S: Massachusetts Avenue
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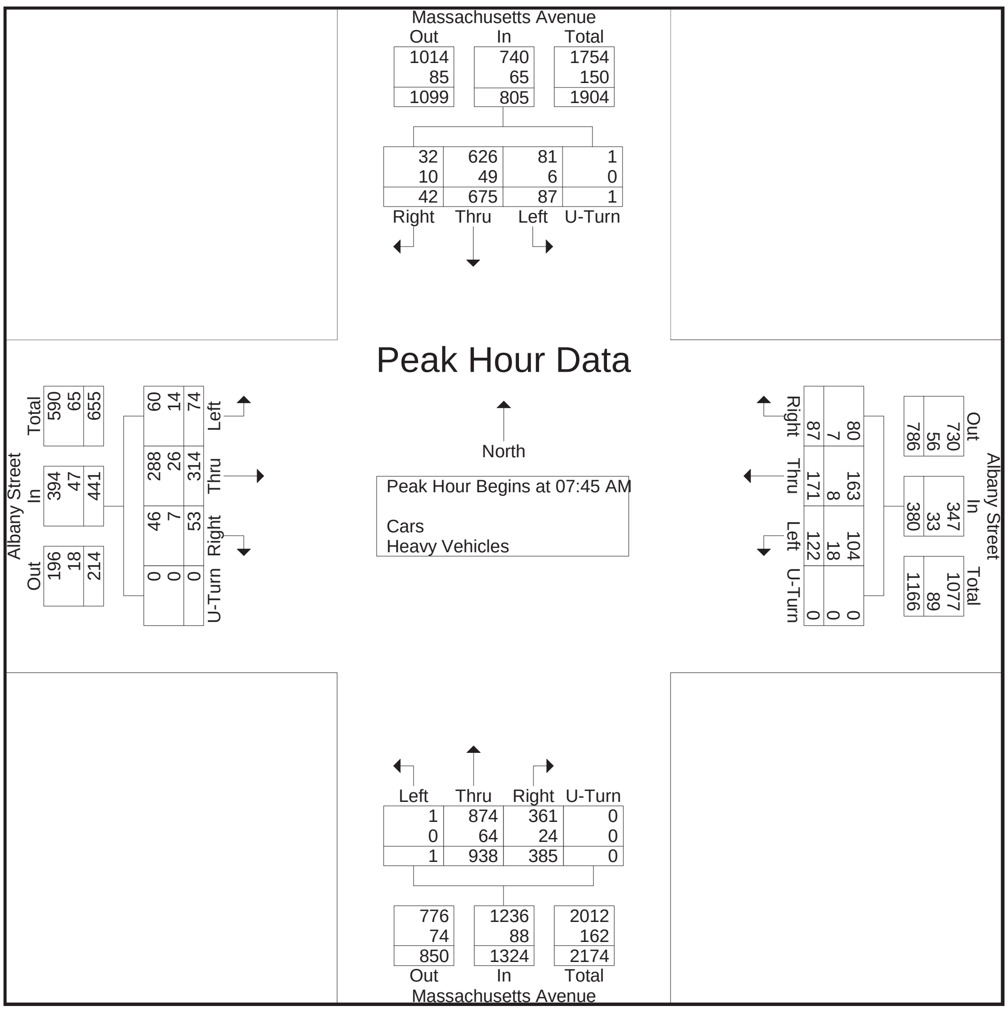
	Massachusetts Avenue From North					Albany Street From East					Massachusetts Avenue From South					Albany Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis 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	10	170	20	0	200	18	44	32	0	94	95	226	1	0	322	14	77	16	0	107	723
08:00 AM	11	166	26	0	203	16	46	25	0	87	102	254	0	0	356	12	73	18	0	103	749
08:15 AM	9	168	21	0	198	20	39	36	0	95	96	250	0	0	346	10	89	16	0	115	754
08:30 AM	12	171	20	1	204	33	42	29	0	104	92	208	0	0	300	17	75	24	0	116	724
Total Volume	42	675	87	1	805	87	171	122	0	380	385	938	1	0	1324	53	314	74	0	441	2950
% App. Total	5.2	83.9	10.8	0.1		22.9	45	32.1	0		29.1	70.8	0.1	0		12	71.2	16.8	0		
PHF	.875	.987	.837	.250	.987	.659	.929	.847	.000	.913	.944	.923	.250	.000	.930	.779	.882	.771	.000	.950	.978
Cars	32	626	81	1	740	80	163	104	0	347	361	874	1	0	1236	46	288	60	0	394	2717
% Cars	76.2	92.7	93.1	100	91.9	92.0	95.3	85.2	0	91.3	93.8	93.2	100	0	93.4	86.8	91.7	81.1	0	89.3	92.1
Heavy Vehicles	10	49	6	0	65	7	8	18	0	33	24	64	0	0	88	7	26	14	0	47	233
% Heavy Vehicles	23.8	7.3	6.9	0	8.1	8.0	4.7	14.8	0	8.7	6.2	6.8	0	0	6.6	13.2	8.3	18.9	0	10.7	7.9



N/S: Massachusetts Avenue
E/W: Albany Street
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Groups Printed- Cars - Heavy Vehicles

	Massachusetts Avenue From North				Albany Street From East				Massachusetts Avenue From South				Albany Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
03:30 PM	5	212	11	0	29	97	61	0	60	189	1	0	35	48	11	0	759
03:45 PM	6	218	9	0	24	111	33	0	54	163	0	0	21	33	22	0	694
Total	11	430	20	0	53	208	94	0	114	352	1	0	56	81	33	0	1453
04:00 PM	9	209	11	0	33	108	47	0	52	188	1	0	40	33	13	0	744
04:15 PM	12	233	7	0	26	97	41	0	47	146	0	0	38	51	17	0	715
04:30 PM	5	200	10	0	30	91	46	0	58	179	0	0	42	55	15	0	731
04:45 PM	6	176	18	0	26	91	45	0	58	167	0	0	35	45	18	0	685
Total	32	818	46	0	115	387	179	0	215	680	1	0	155	184	63	0	2875
05:00 PM	5	227	12	0	30	94	41	0	38	215	0	0	33	42	15	0	752
05:15 PM	7	207	16	0	24	101	39	0	36	137	0	0	41	32	24	0	664
Grand Total	55	1682	94	0	222	790	353	0	403	1384	2	0	285	339	135	0	5744
Apprch %	3	91.9	5.1	0	16.3	57.9	25.9	0	22.5	77.4	0.1	0	37.5	44.7	17.8	0	
Total %	1	29.3	1.6	0	3.9	13.8	6.1	0	7	24.1	0	0	5	5.9	2.4	0	
Cars	41	1616	86	0	209	756	322	0	368	1346	2	0	279	314	118	0	5457
% Cars	74.5	96.1	91.5	0	94.1	95.7	91.2	0	91.3	97.3	100	0	97.9	92.6	87.4	0	95
Heavy Vehicles	14	66	8	0	13	34	31	0	35	38	0	0	6	25	17	0	287
% Heavy Vehicles	25.5	3.9	8.5	0	5.9	4.3	8.8	0	8.7	2.7	0	0	2.1	7.4	12.6	0	5

Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 03:30 PM

	Massachusetts Avenue From North					Albany Street From East					Massachusetts Avenue From South					Albany Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
03:30 PM	5	212	11	0	228	29	97	61	0	187	60	189	1	0	250	35	48	11	0	94	759
03:45 PM	6	218	9	0	233	24	111	33	0	168	54	163	0	0	217	21	33	22	0	76	694
04:00 PM	9	209	11	0	229	33	108	47	0	188	52	188	1	0	241	40	33	13	0	86	744
04:15 PM	12	233	7	0	252	26	97	41	0	164	47	146	0	0	193	38	51	17	0	106	715
Total Volume	32	872	38	0	942	112	413	182	0	707	213	686	2	0	901	134	165	63	0	362	2912
% App. Total	3.4	92.6	4	0		15.8	58.4	25.7	0		23.6	76.1	0.2	0		37	45.6	17.4	0		
PHF	.667	.936	.864	.000	.935	.848	.930	.746	.000	.940	.888	.907	.500	.000	.901	.838	.809	.716	.000	.854	.959
Cars	26	835	34	0	895	105	388	163	0	656	196	660	2	0	858	132	154	55	0	341	2750
% Cars	81.3	95.8	89.5	0	95.0	93.8	93.9	89.6	0	92.8	92.0	96.2	100	0	95.2	98.5	93.3	87.3	0	94.2	94.4
Heavy Vehicles	6	37	4	0	47	7	25	19	0	51	17	26	0	0	43	2	11	8	0	21	162
% Heavy Vehicles	18.8	4.2	10.5	0	5.0	6.3	6.1	10.4	0	7.2	8.0	3.8	0	0	4.8	1.5	6.7	12.7	0	5.8	5.6

N/S: Massachusetts Avenue
E/W: Albany Street
City, State: Boston, MA
Client: HSH/ R. Burgess

PRECISION DATA INDUSTRIES, LLC
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File Name : 133243 AA
Site Code : 2012165.
Start Date : 3/5/2013

Groups Printed- Cars

	Massachusetts Avenue From North				Albany Street From East				Massachusetts Avenue From South				Albany Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
03:30 PM	4	204	11	0	27	89	53	0	56	182	1	0	35	46	10	0	718
03:45 PM	5	206	8	0	22	103	29	0	48	153	0	0	21	31	19	0	645
Total	9	410	19	0	49	192	82	0	104	335	1	0	56	77	29	0	1363
04:00 PM	8	202	10	0	32	102	45	0	49	181	1	0	39	29	11	0	709
04:15 PM	9	223	5	0	24	94	36	0	43	144	0	0	37	48	15	0	678
04:30 PM	2	189	10	0	27	86	44	0	54	177	0	0	41	53	12	0	695
04:45 PM	4	168	16	0	25	89	40	0	53	162	0	0	34	40	16	0	647
Total	23	782	41	0	108	371	165	0	199	664	1	0	151	170	54	0	2729
05:00 PM	4	221	12	0	29	92	38	0	34	211	0	0	32	37	13	0	723
05:15 PM	5	203	14	0	23	101	37	0	31	136	0	0	40	30	22	0	642
Grand Total	41	1616	86	0	209	756	322	0	368	1346	2	0	279	314	118	0	5457
Apprch %	2.4	92.7	4.9	0	16.2	58.7	25	0	21.4	78.4	0.1	0	39.2	44.2	16.6	0	
Total %	0.8	29.6	1.6	0	3.8	13.9	5.9	0	6.7	24.7	0	0	5.1	5.8	2.2	0	

	Massachusetts Avenue From North					Albany Street From East					Massachusetts Avenue From South					Albany Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:30 PM																					
03:30 PM	4	204	11	0	219	27	89	53	0	169	56	182	1	0	239	35	46	10	0	91	718
03:45 PM	5	206	8	0	219	22	103	29	0	154	48	153	0	0	201	21	31	19	0	71	645
04:00 PM	8	202	10	0	220	32	102	45	0	179	49	181	1	0	231	39	29	11	0	79	709
04:15 PM	9	223	5	0	237	24	94	36	0	154	43	144	0	0	187	37	48	15	0	100	678
Total Volume	26	835	34	0	895	105	388	163	0	656	196	660	2	0	858	132	154	55	0	341	2750
% App. Total	2.9	93.3	3.8	0		16	59.1	24.8	0		22.8	76.9	0.2	0		38.7	45.2	16.1	0		
PHF	.722	.936	.773	.000	.944	.820	.942	.769	.000	.916	.875	.907	.500	.000	.897	.846	.802	.724	.000	.853	.958

N/S: Massachusetts Avenue
E/W: Albany Street
City, State: Boston, MA
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File Name : 133243 AA
Site Code : 2012165.
Start Date : 3/5/2013
Page No : 1

Groups Printed- Heavy Vehicles

	Massachusetts Avenue From North				Albany Street From East				Massachusetts Avenue From South				Albany Street From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
03:30 PM	1	8	0	0	2	8	8	0	4	7	0	0	0	2	1	0	41
03:45 PM	1	12	1	0	2	8	4	0	6	10	0	0	0	2	3	0	49
Total	2	20	1	0	4	16	12	0	10	17	0	0	0	4	4	0	90
04:00 PM	1	7	1	0	1	6	2	0	3	7	0	0	1	4	2	0	35
04:15 PM	3	10	2	0	2	3	5	0	4	2	0	0	1	3	2	0	37
04:30 PM	3	11	0	0	3	5	2	0	4	2	0	0	1	2	3	0	36
04:45 PM	2	8	2	0	1	2	5	0	5	5	0	0	1	5	2	0	38
Total	9	36	5	0	7	16	14	0	16	16	0	0	4	14	9	0	146
05:00 PM	1	6	0	0	1	2	3	0	4	4	0	0	1	5	2	0	29
05:15 PM	2	4	2	0	1	0	2	0	5	1	0	0	1	2	2	0	22
Grand Total	14	66	8	0	13	34	31	0	35	38	0	0	6	25	17	0	287
Apprch %	15.9	75	9.1	0	16.7	43.6	39.7	0	47.9	52.1	0	0	12.5	52.1	35.4	0	
Total %	4.9	23	2.8	0	4.5	11.8	10.8	0	12.2	13.2	0	0	2.1	8.7	5.9	0	

	Massachusetts Avenue From North					Albany Street From East					Massachusetts Avenue From South					Albany Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:30 PM																					
03:30 PM	1	8	0	0	9	2	8	8	0	18	4	7	0	0	11	0	2	1	0	3	41
03:45 PM	1	12	1	0	14	2	8	4	0	14	6	10	0	0	16	0	2	3	0	5	49
04:00 PM	1	7	1	0	9	1	6	2	0	9	3	7	0	0	10	1	4	2	0	7	35
04:15 PM	3	10	2	0	15	2	3	5	0	10	4	2	0	0	6	1	3	2	0	6	37
Total Volume	6	37	4	0	47	7	25	19	0	51	17	26	0	0	43	2	11	8	0	21	162
% App. Total	12.8	78.7	8.5	0		13.7	49	37.3	0		39.5	60.5	0	0		9.5	52.4	38.1	0		
PHF	.500	.771	.500	.000	.783	.875	.781	.594	.000	.708	.708	.650	.000	.000	.672	.500	.688	.667	.000	.750	.827

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File Name : 133243 AA
Site Code : 2012165.
Start Date : 3/5/2013
Page No : 1

Groups Printed- Peds and Bicycles

	Massachusetts Avenue From North				Albany Street From East				Massachusetts Avenue From South				Albany Street From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
03:30 PM	1	0	0	37	0	0	1	45	0	0	0	41	0	0	1	36	162
03:45 PM	0	0	0	33	0	0	0	45	0	0	0	22	0	0	0	38	138
Total	1	0	0	70	0	0	1	90	0	0	0	63	0	0	1	74	300
04:00 PM	0	1	0	38	0	0	1	47	0	0	0	15	0	0	0	32	134
04:15 PM	0	0	0	44	0	0	2	54	0	2	0	24	0	0	0	32	158
04:30 PM	0	1	0	43	0	0	0	56	0	0	0	25	0	0	0	39	164
04:45 PM	0	2	0	54	1	0	0	34	0	0	0	45	0	0	0	56	192
Total	0	4	0	179	1	0	3	191	0	2	0	109	0	0	0	159	648
05:00 PM	0	2	0	50	0	1	0	39	0	3	0	33	0	0	0	49	177
05:15 PM	0	3	0	45	1	1	1	43	0	5	0	32	0	0	0	35	166
Grand Total	1	9	0	344	2	2	5	363	0	10	0	237	0	0	1	317	1291
Apprch %	0.3	2.5	0	97.2	0.5	0.5	1.3	97.6	0	4	0	96	0	0	0.3	99.7	
Total %	0.1	0.7	0	26.6	0.2	0.2	0.4	28.1	0	0.8	0	18.4	0	0	0.1	24.6	

	Massachusetts Avenue From North					Albany Street From East					Massachusetts Avenue From South					Albany Street 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
Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	0	1	0	43	44	0	0	0	56	56	0	0	0	25	25	0	0	0	39	39	164
04:45 PM	0	2	0	54	56	1	0	0	34	35	0	0	0	45	45	0	0	0	56	56	192
05:00 PM	0	2	0	50	52	0	1	0	39	40	0	3	0	33	36	0	0	0	49	49	177
05:15 PM	0	3	0	45	48	1	1	1	43	46	0	5	0	32	37	0	0	0	35	35	166
Total Volume	0	8	0	192	200	2	2	1	172	177	0	8	0	135	143	0	0	0	179	179	699
% App. Total	0	4	0	96		1.1	1.1	0.6	97.2		0	5.6	0	94.4		0	0	0	100		
PHF	.000	.667	.000	.889	.893	.500	.500	.250	.768	.790	.000	.400	.000	.750	.794	.000	.000	.000	.799	.799	.910

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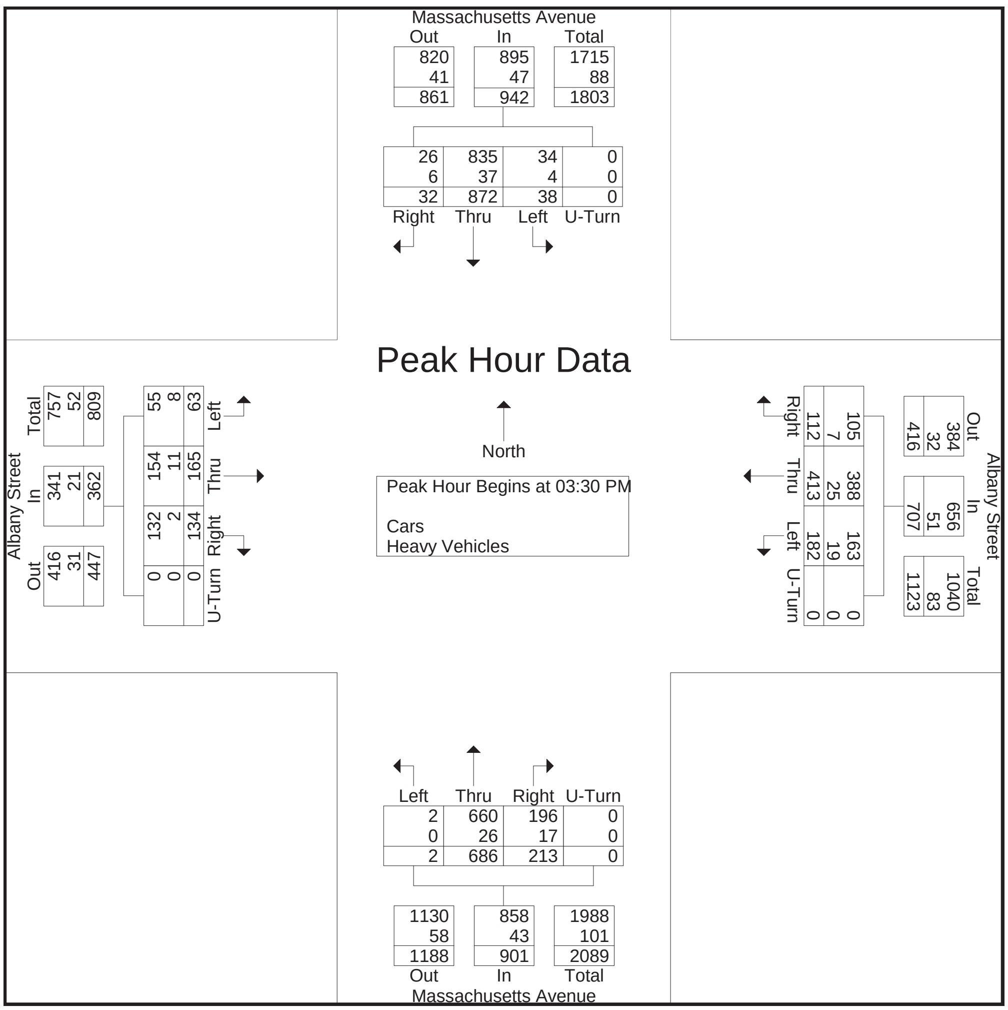
N/S: Massachusetts Avenue
E/W: Albany Street
City, State: Boston, MA
Client: HSH/ R. Burgess

File Name : 133243 AA
Site Code : 2012165.
Start Date : 3/5/2013
Page No : 1

	Massachusetts Avenue From North					Albany Street From East					Massachusetts Avenue From South					Albany Street From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:30 PM																					
03:30 PM	5	212	11	0	228	29	97	61	0	187	60	189	1	0	250	35	48	11	0	94	759
03:45 PM	6	218	9	0	233	24	111	33	0	168	54	163	0	0	217	21	33	22	0	76	694
04:00 PM	9	209	11	0	229	33	108	47	0	188	52	188	1	0	241	40	33	13	0	86	744
04:15 PM	12	233	7	0	252	26	97	41	0	164	47	146	0	0	193	38	51	17	0	106	715
Total Volume	32	872	38	0	942	112	413	182	0	707	213	686	2	0	901	134	165	63	0	362	2912
% App. Total	3.4	92.6	4	0		15.8	58.4	25.7	0		23.6	76.1	0.2	0		37	45.6	17.4	0		
PHF	.667	.936	.864	.000	.935	.848	.930	.746	.000	.940	.888	.907	.500	.000	.901	.838	.809	.716	.000	.854	.959
Cars	26	835	34	0	895	105	388	163	0	656	196	660	2	0	858	132	154	55	0	341	2750
% Cars	81.3	95.8	89.5	0	95.0	93.8	93.9	89.6	0	92.8	92.0	96.2	100	0	95.2	98.5	93.3	87.3	0	94.2	94.4
Heavy Vehicles	6	37	4	0	47	7	25	19	0	51	17	26	0	0	43	2	11	8	0	21	162
% Heavy Vehicles	18.8	4.2	10.5	0	5.0	6.3	6.1	10.4	0	7.2	8.0	3.8	0	0	4.8	1.5	6.7	12.7	0	5.8	5.6



N/S: Massachusetts Avenue
E/W: Harrison Avenue
City, State: Boston, MA
Client: HSH/ R. Burgess

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File Name : 133243 D
Site Code : 2012165
Start Date : 3/5/2013

Groups Printed- Cars - Heavy Vehicles

	Massachusetts Avenue From North				Harrison Avenue From East				Massachusetts Avenue From South				Harrison Avenue From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	17	131	11	0	4	38	11	0	21	213	30	0	10	37	6	0	529
07:15 AM	28	168	23	0	4	25	5	0	40	213	20	1	7	56	7	0	597
07:30 AM	21	171	33	0	19	49	15	0	34	217	17	0	8	65	13	0	662
07:45 AM	27	173	21	0	18	28	15	0	36	223	7	0	11	63	10	0	632
Total	93	643	88	0	45	140	46	0	131	866	74	1	36	221	36	0	2420
08:00 AM	32	186	23	0	10	41	14	0	46	215	15	0	6	73	9	0	670
08:15 AM	26	175	24	0	12	43	13	0	63	209	10	0	7	64	15	0	661
08:30 AM	30	165	22	0	6	38	19	0	55	199	17	0	13	60	10	0	634
08:45 AM	27	157	27	0	12	30	20	0	40	224	19	0	7	60	11	0	634
Total	115	683	96	0	40	152	66	0	204	847	61	0	33	257	45	0	2599
Grand Total	208	1326	184	0	85	292	112	0	335	1713	135	1	69	478	81	0	5019
Apprch %	12.1	77.2	10.7	0	17.4	59.7	22.9	0	15.3	78.4	6.2	0	11	76.1	12.9	0	
Total %	4.1	26.4	3.7	0	1.7	5.8	2.2	0	6.7	34.1	2.7	0	1.4	9.5	1.6	0	
Cars	199	1211	179	0	82	251	104	0	321	1522	131	1	61	459	75	0	4596
% Cars	95.7	91.3	97.3	0	96.5	86	92.9	0	95.8	88.8	97	100	88.4	96	92.6	0	91.6
Heavy Vehicles	9	115	5	0	3	41	8	0	14	191	4	0	8	19	6	0	423
% Heavy Vehicles	4.3	8.7	2.7	0	3.5	14	7.1	0	4.2	11.2	3	0	11.6	4	7.4	0	8.4

	Massachusetts Avenue From North					Harrison Avenue From East					Massachusetts Avenue From South					Harrison Avenue From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	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	21	171	33	0	225	19	49	15	0	83	34	217	17	0	268	8	65	13	0	86	662
07:45 AM	27	173	21	0	221	18	28	15	0	61	36	223	7	0	266	11	63	10	0	84	632
08:00 AM	32	186	23	0	241	10	41	14	0	65	46	215	15	0	276	6	73	9	0	88	670
08:15 AM	26	175	24	0	225	12	43	13	0	68	63	209	10	0	282	7	64	15	0	86	661
Total Volume	106	705	101	0	912	59	161	57	0	277	179	864	49	0	1092	32	265	47	0	344	2625
% App. Total	11.6	77.3	11.1	0		21.3	58.1	20.6	0		16.4	79.1	4.5	0		9.3	77	13.7	0		
PHF	.828	.948	.765	.000	.946	.776	.821	.950	.000	.834	.710	.969	.721	.000	.968	.727	.908	.783	.000	.977	.979
Cars	101	656	100	0	857	57	140	55	0	252	172	776	47	0	995	28	257	43	0	328	2432
% Cars	95.3	93.0	99.0	0	94.0	96.6	87.0	96.5	0	91.0	96.1	89.8	95.9	0	91.1	87.5	97.0	91.5	0	95.3	92.6
Heavy Vehicles	5	49	1	0	55	2	21	2	0	25	7	88	2	0	97	4	8	4	0	16	193
% Heavy Vehicles	4.7	7.0	1.0	0	6.0	3.4	13.0	3.5	0	9.0	3.9	10.2	4.1	0	8.9	12.5	3.0	8.5	0	4.7	7.4

N/S: Massachusetts Avenue
E/W: Harrison Avenue
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File Name : 133243 D
Site Code : 2012165
Start Date : 3/5/2013
Page No : 1

Groups Printed- Cars

	Massachusetts Avenue From North				Harrison Avenue From East				Massachusetts Avenue From South				Harrison Avenue From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	17	114	10	0	4	32	11	0	21	186	28	0	8	37	6	0	474
07:15 AM	25	154	23	0	3	20	4	0	37	182	20	1	7	54	7	0	537
07:30 AM	21	161	33	0	18	44	14	0	32	194	16	0	6	63	13	0	615
07:45 AM	24	165	20	0	18	23	14	0	33	199	7	0	10	62	9	0	584
Total	87	594	86	0	43	119	43	0	123	761	71	1	31	216	35	0	2210
08:00 AM	31	170	23	0	9	36	14	0	46	194	14	0	6	69	7	0	619
08:15 AM	25	160	24	0	12	37	13	0	61	189	10	0	6	63	14	0	614
08:30 AM	30	149	20	0	6	34	16	0	53	176	17	0	13	55	9	0	578
08:45 AM	26	138	26	0	12	25	18	0	38	202	19	0	5	56	10	0	575
Total	112	617	93	0	39	132	61	0	198	761	60	0	30	243	40	0	2386
Grand Total	199	1211	179	0	82	251	104	0	321	1522	131	1	61	459	75	0	4596
Apprch %	12.5	76.2	11.3	0	18.8	57.4	23.8	0	16.3	77.1	6.6	0.1	10.3	77.1	12.6	0	
Total %	4.3	26.3	3.9	0	1.8	5.5	2.3	0	7	33.1	2.9	0	1.3	10	1.6	0	

	Massachusetts Avenue From North					Harrison Avenue From East					Massachusetts Avenue From South					Harrison Avenue From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	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	21	161	33	0	215	18	44	14	0	76	32	194	16	0	242	6	63	13	0	82	615
07:45 AM	24	165	20	0	209	18	23	14	0	55	33	199	7	0	239	10	62	9	0	81	584
08:00 AM	31	170	23	0	224	9	36	14	0	59	46	194	14	0	254	6	69	7	0	82	619
08:15 AM	25	160	24	0	209	12	37	13	0	62	61	189	10	0	260	6	63	14	0	83	614
Total Volume	101	656	100	0	857	57	140	55	0	252	172	776	47	0	995	28	257	43	0	328	2432
% App. Total	11.8	76.5	11.7	0		22.6	55.6	21.8	0		17.3	78	4.7	0		8.5	78.4	13.1	0		
PHF	.815	.965	.758	.000	.956	.792	.795	.982	.000	.829	.705	.975	.734	.000	.957	.700	.931	.768	.000	.988	.982

N/S: Massachusetts Avenue
E/W: Harrison Avenue
City, State: Boston, MA
Client: HSH/ R. Burgess

PRECISION DATA INDUSTRIES, LLC
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Office: 508.481.3999 Fax: 508.545.1234
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File Name : 133243 D
Site Code : 2012165
Start Date : 3/5/2013

Groups Printed- Heavy Vehicles

	Massachusetts Avenue From North				Harrison Avenue From East				Massachusetts Avenue From South				Harrison Avenue From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
07:00 AM	0	17	1	0	0	6	0	0	0	27	2	0	2	0	0	0	55
07:15 AM	3	14	0	0	1	5	1	0	3	31	0	0	0	2	0	0	60
07:30 AM	0	10	0	0	1	5	1	0	2	23	1	0	2	2	0	0	47
07:45 AM	3	8	1	0	0	5	1	0	3	24	0	0	1	1	1	0	48
Total	6	49	2	0	2	21	3	0	8	105	3	0	5	5	1	0	210
08:00 AM	1	16	0	0	1	5	0	0	0	21	1	0	0	4	2	0	51
08:15 AM	1	15	0	0	0	6	0	0	2	20	0	0	1	1	1	0	47
08:30 AM	0	16	2	0	0	4	3	0	2	23	0	0	0	5	1	0	56
08:45 AM	1	19	1	0	0	5	2	0	2	22	0	0	2	4	1	0	59
Total	3	66	3	0	1	20	5	0	6	86	1	0	3	14	5	0	213
Grand Total	9	115	5	0	3	41	8	0	14	191	4	0	8	19	6	0	423
Apprch %	7	89.1	3.9	0	5.8	78.8	15.4	0	6.7	91.4	1.9	0	24.2	57.6	18.2	0	
Total %	2.1	27.2	1.2	0	0.7	9.7	1.9	0	3.3	45.2	0.9	0	1.9	4.5	1.4	0	

	Massachusetts Avenue From North					Harrison Avenue From East					Massachusetts Avenue From South					Harrison Avenue From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	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	1	16	0	0	17	1	5	0	0	6	0	21	1	0	22	0	4	2	0	6	51
08:15 AM	1	15	0	0	16	0	6	0	0	6	2	20	0	0	22	1	1	1	0	3	47
08:30 AM	0	16	2	0	18	0	4	3	0	7	2	23	0	0	25	0	5	1	0	6	56
08:45 AM	1	19	1	0	21	0	5	2	0	7	2	22	0	0	24	2	4	1	0	7	59
Total Volume	3	66	3	0	72	1	20	5	0	26	6	86	1	0	93	3	14	5	0	22	213
% App. Total	4.2	91.7	4.2	0		3.8	76.9	19.2	0		6.5	92.5	1.1	0		13.6	63.6	22.7	0		
PHF	.750	.868	.375	.000	.857	.250	.833	.417	.000	.929	.750	.935	.250	.000	.930	.375	.700	.625	.000	.786	.903

N/S: Massachusetts Avenue
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File Name : 133243 D
Site Code : 2012165
Start Date : 3/5/2013
Page No : 1

Groups Printed- Peds and Bicycles

	Massachusetts Avenue From North				Harrison Avenue From East				Massachusetts Avenue From South				Harrison Avenue From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
07:00 AM	0	2	1	9	0	0	0	22	0	1	0	28	0	0	0	10	73
07:15 AM	0	0	0	14	0	0	0	25	0	5	0	25	0	2	1	10	82
07:30 AM	0	0	0	16	0	1	0	28	0	3	0	32	0	2	0	21	103
07:45 AM	0	2	3	21	0	2	0	32	0	1	0	47	0	1	1	26	136
Total	0	4	4	60	0	3	0	107	0	10	0	132	0	5	2	67	394
08:00 AM	0	0	1	14	1	0	0	38	0	3	0	59	0	2	0	24	142
08:15 AM	0	0	1	23	0	0	0	32	0	3	0	37	0	0	0	37	133
08:30 AM	0	2	5	17	0	0	0	37	0	0	0	59	0	2	0	32	154
08:45 AM	0	0	0	19	0	0	0	32	2	0	0	46	0	0	0	36	135
Total	0	2	7	73	1	0	0	139	2	6	0	201	0	4	0	129	564
Grand Total	0	6	11	133	1	3	0	246	2	16	0	333	0	9	2	196	958
Apprch %	0	4	7.3	88.7	0.4	1.2	0	98.4	0.6	4.6	0	94.9	0	4.3	1	94.7	
Total %	0	0.6	1.1	13.9	0.1	0.3	0	25.7	0.2	1.7	0	34.8	0	0.9	0.2	20.5	

	Massachusetts Avenue From North					Harrison Avenue From East					Massachusetts Avenue From South					Harrison Avenue 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
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	0	2	3	21	26	0	2	0	32	34	0	1	0	47	48	0	1	1	26	28	136
08:00 AM	0	0	1	14	15	1	0	0	38	39	0	3	0	59	62	0	2	0	24	26	142
08:15 AM	0	0	1	23	24	0	0	0	32	32	0	3	0	37	40	0	0	0	37	37	133
08:30 AM	0	2	5	17	24	0	0	0	37	37	0	0	0	59	59	0	2	0	32	34	154
Total Volume	0	4	10	75	89	1	2	0	139	142	0	7	0	202	209	0	5	1	119	125	565
% App. Total	0	4.5	11.2	84.3		0.7	1.4	0	97.9		0	3.3	0	96.7		0	4	0.8	95.2		
PHF	.000	.500	.500	.815	.856	.250	.250	.000	.914	.910	.000	.583	.000	.856	.843	.000	.625	.250	.804	.845	.917

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N/S: Massachusetts Avenue
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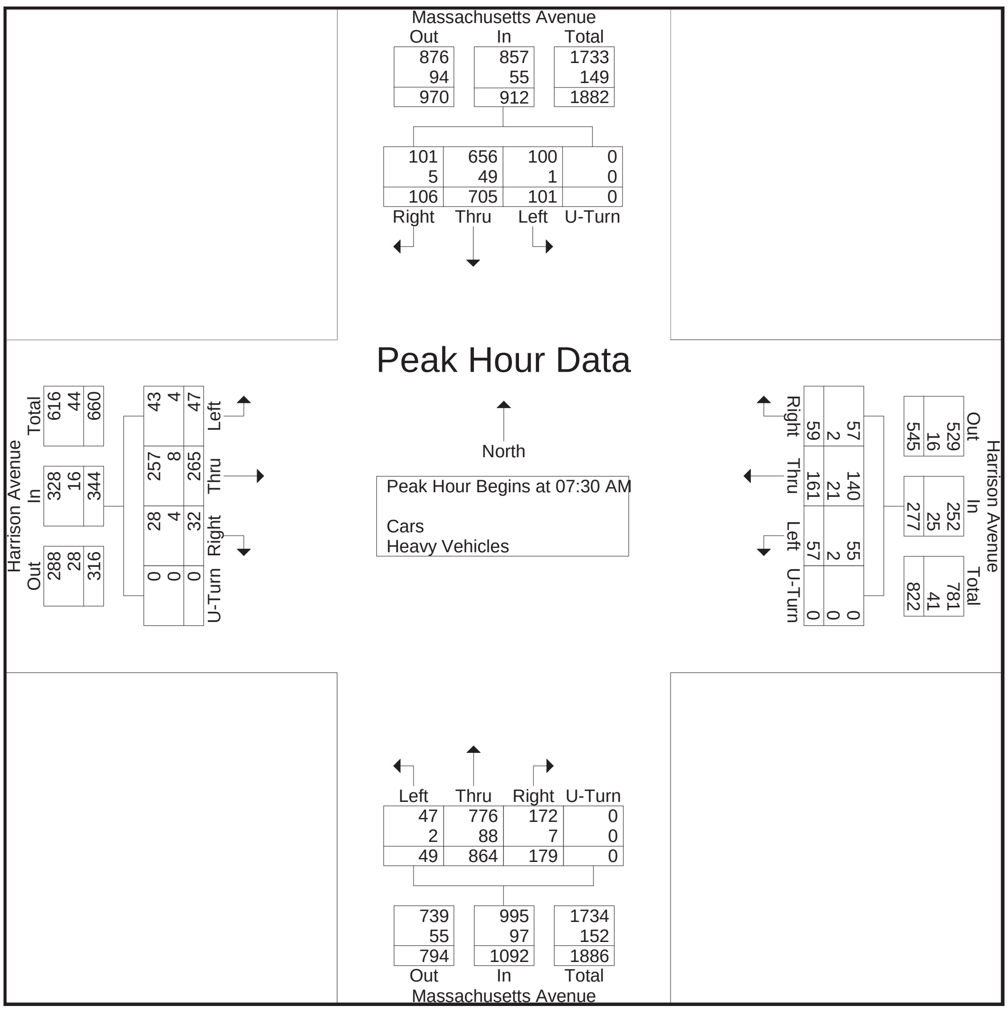
File Name : 133243 D
Site Code : 2012165
Start Date : 3/5/2013
Page No : 1

	Massachusetts Avenue From North					Harrison Avenue From East					Massachusetts Avenue From South					Harrison Avenue From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	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	21	171	33	0	225	19	49	15	0	83	34	217	17	0	268	8	65	13	0	86	662
07:45 AM	27	173	21	0	221	18	28	15	0	61	36	223	7	0	266	11	63	10	0	84	632
08:00 AM	32	186	23	0	241	10	41	14	0	65	46	215	15	0	276	6	73	9	0	88	670
08:15 AM	26	175	24	0	225	12	43	13	0	68	63	209	10	0	282	7	64	15	0	86	661
Total Volume	106	705	101	0	912	59	161	57	0	277	179	864	49	0	1092	32	265	47	0	344	2625
% App. Total	11.6	77.3	11.1	0		21.3	58.1	20.6	0		16.4	79.1	4.5	0		9.3	77	13.7	0		
PHF	.828	.948	.765	.000	.946	.776	.821	.950	.000	.834	.710	.969	.721	.000	.968	.727	.908	.783	.000	.977	.979
Cars	101	656	100	0	857	57	140	55	0	252	172	776	47	0	995	28	257	43	0	328	2432
% Cars	95.3	93.0	99.0	0	94.0	96.6	87.0	96.5	0	91.0	96.1	89.8	95.9	0	91.1	87.5	97.0	91.5	0	95.3	92.6
Heavy Vehicles	5	49	1	0	55	2	21	2	0	25	7	88	2	0	97	4	8	4	0	16	193
% Heavy Vehicles	4.7	7.0	1.0	0	6.0	3.4	13.0	3.5	0	9.0	3.9	10.2	4.1	0	8.9	12.5	3.0	8.5	0	4.7	7.4



N/S: Massachusetts Avenue
E/W: Albany Street
City, State: Boston, MA
Client: HSH/ R. Burgess

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File Name : 133243 DD
Site Code : 2012165
Start Date : 3/5/2013

Groups Printed- Cars - Heavy Vehicles

	Massachusetts Avenue From North				Harrison Avenue From East				Massachusetts Avenue From South				Harrison Avenue From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
03:30 PM	34	186	13	0	16	60	32	0	39	167	21	0	8	48	8	0	632
03:45 PM	29	198	16	0	7	62	21	0	36	156	24	0	9	52	8	0	618
Total	63	384	29	0	23	122	53	0	75	323	45	0	17	100	16	0	1250
04:00 PM	38	179	12	0	13	59	20	0	31	171	22	0	14	51	10	0	620
04:15 PM	30	213	13	1	18	66	30	0	29	155	12	0	11	43	13	0	634
04:30 PM	31	182	14	0	22	58	16	0	31	159	21	0	13	54	14	0	615
04:45 PM	25	176	9	0	15	57	25	0	34	166	27	0	10	39	13	0	596
Total	124	750	48	1	68	240	91	0	125	651	82	0	48	187	50	0	2465
05:00 PM	39	205	10	0	5	73	15	0	45	182	23	0	14	58	12	0	681
05:15 PM	29	214	9	0	10	72	21	0	35	144	10	0	10	49	11	0	614
Grand Total	255	1553	96	1	106	507	180	0	280	1300	160	0	89	394	89	0	5010
Apprch %	13.4	81.5	5	0.1	13.4	63.9	22.7	0	16.1	74.7	9.2	0	15.6	68.9	15.6	0	
Total %	5.1	31	1.9	0	2.1	10.1	3.6	0	5.6	25.9	3.2	0	1.8	7.9	1.8	0	
Cars	242	1480	91	1	101	475	174	0	272	1246	153	0	85	374	87	0	4781
% Cars	94.9	95.3	94.8	100	95.3	93.7	96.7	0	97.1	95.8	95.6	0	95.5	94.9	97.8	0	95.4
Heavy Vehicles	13	73	5	0	5	32	6	0	8	54	7	0	4	20	2	0	229
% Heavy Vehicles	5.1	4.7	5.2	0	4.7	6.3	3.3	0	2.9	4.2	4.4	0	4.5	5.1	2.2	0	4.6

Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 04:15 PM

	Massachusetts Avenue From North					Harrison Avenue From East					Massachusetts Avenue From South					Harrison Avenue From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
04:15 PM	30	213	13	1	257	18	66	30	0	114	29	155	12	0	196	11	43	13	0	67	634
04:30 PM	31	182	14	0	227	22	58	16	0	96	31	159	21	0	211	13	54	14	0	81	615
04:45 PM	25	176	9	0	210	15	57	25	0	97	34	166	27	0	227	10	39	13	0	62	596
05:00 PM	39	205	10	0	254	5	73	15	0	93	45	182	23	0	250	14	58	12	0	84	681
Total Volume	125	776	46	1	948	60	254	86	0	400	139	662	83	0	884	48	194	52	0	294	2526
% App. Total	13.2	81.9	4.9	0.1		15	63.5	21.5	0		15.7	74.9	9.4	0		16.3	66	17.7	0		
PHF	.801	.911	.821	.250	.922	.682	.870	.717	.000	.877	.772	.909	.769	.000	.884	.857	.836	.929	.000	.875	.927
Cars	118	737	44	1	900	57	235	84	0	376	136	639	81	0	856	45	184	51	0	280	2412
% Cars	94.4	95.0	95.7	100	94.9	95.0	92.5	97.7	0	94.0	97.8	96.5	97.6	0	96.8	93.8	94.8	98.1	0	95.2	95.5
Heavy Vehicles	7	39	2	0	48	3	19	2	0	24	3	23	2	0	28	3	10	1	0	14	114
% Heavy Vehicles	5.6	5.0	4.3	0	5.1	5.0	7.5	2.3	0	6.0	2.2	3.5	2.4	0	3.2	6.3	5.2	1.9	0	4.8	4.5

N/S: Massachusetts Avenue
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File Name : 133243 DD
Site Code : 2012165
Start Date : 3/5/2013
Page No : 1

Groups Printed- Cars

	Massachusetts Avenue From North				Harrison Avenue From East				Massachusetts Avenue From South				Harrison Avenue From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
03:30 PM	31	178	13	0	16	58	31	0	38	156	21	0	8	44	8	0	602
03:45 PM	28	186	14	0	7	56	21	0	33	146	22	0	8	49	7	0	577
Total	59	364	27	0	23	114	52	0	71	302	43	0	16	93	15	0	1179
04:00 PM	36	172	12	0	11	57	18	0	31	164	19	0	14	51	10	0	595
04:15 PM	29	204	13	1	17	60	29	0	28	149	12	0	9	39	13	0	603
04:30 PM	27	169	14	0	20	53	15	0	31	152	20	0	13	49	14	0	577
04:45 PM	25	163	9	0	15	51	25	0	32	162	26	0	10	38	12	0	568
Total	117	708	48	1	63	221	87	0	122	627	77	0	46	177	49	0	2343
05:00 PM	37	201	8	0	5	71	15	0	45	176	23	0	13	58	12	0	664
05:15 PM	29	207	8	0	10	69	20	0	34	141	10	0	10	46	11	0	595
Grand Total	242	1480	91	1	101	475	174	0	272	1246	153	0	85	374	87	0	4781
Apprch %	13.3	81.6	5	0.1	13.5	63.3	23.2	0	16.3	74.6	9.2	0	15.6	68.5	15.9	0	
Total %	5.1	31	1.9	0	2.1	9.9	3.6	0	5.7	26.1	3.2	0	1.8	7.8	1.8	0	

	Massachusetts Avenue From North					Harrison Avenue From East					Massachusetts Avenue From South					Harrison Avenue From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:15 PM																					
04:15 PM	29	204	13	1	247	17	60	29	0	106	28	149	12	0	189	9	39	13	0	61	603
04:30 PM	27	169	14	0	210	20	53	15	0	88	31	152	20	0	203	13	49	14	0	76	577
04:45 PM	25	163	9	0	197	15	51	25	0	91	32	162	26	0	220	10	38	12	0	60	568
05:00 PM	37	201	8	0	246	5	71	15	0	91	45	176	23	0	244	13	58	12	0	83	664
Total Volume	118	737	44	1	900	57	235	84	0	376	136	639	81	0	856	45	184	51	0	280	2412
% App. Total	13.1	81.9	4.9	0.1		15.2	62.5	22.3	0		15.9	74.6	9.5	0		16.1	65.7	18.2	0		
PHF	.797	.903	.786	.250	.911	.713	.827	.724	.000	.887	.756	.908	.779	.000	.877	.865	.793	.911	.000	.843	.908

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File Name : 133243 DD
Site Code : 2012165
Start Date : 3/5/2013

Groups Printed- Heavy Vehicles

	Massachusetts Avenue From North				Harrison Avenue From East				Massachusetts Avenue From South				Harrison Avenue From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
03:30 PM	3	8	0	0	0	2	1	0	1	11	0	0	0	4	0	0	30
03:45 PM	1	12	2	0	0	6	0	0	3	10	2	0	1	3	1	0	41
Total	4	20	2	0	0	8	1	0	4	21	2	0	1	7	1	0	71
04:00 PM	2	7	0	0	2	2	2	0	0	7	3	0	0	0	0	0	25
04:15 PM	1	9	0	0	1	6	1	0	1	6	0	0	2	4	0	0	31
04:30 PM	4	13	0	0	2	5	1	0	0	7	1	0	0	5	0	0	38
04:45 PM	0	13	0	0	0	6	0	0	2	4	1	0	0	1	1	0	28
Total	7	42	0	0	5	19	4	0	3	24	5	0	2	10	1	0	122
05:00 PM	2	4	2	0	0	2	0	0	0	6	0	0	1	0	0	0	17
05:15 PM	0	7	1	0	0	3	1	0	1	3	0	0	0	3	0	0	19
Grand Total	13	73	5	0	5	32	6	0	8	54	7	0	4	20	2	0	229
Apprch %	14.3	80.2	5.5	0	11.6	74.4	14	0	11.6	78.3	10.1	0	15.4	76.9	7.7	0	
Total %	5.7	31.9	2.2	0	2.2	14	2.6	0	3.5	23.6	3.1	0	1.7	8.7	0.9	0	

	Massachusetts Avenue From North					Harrison Avenue From East					Massachusetts Avenue From South					Harrison Avenue From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:45 PM																					
03:45 PM	1	12	2	0	15	0	6	0	0	6	3	10	2	0	15	1	3	1	0	5	41
04:00 PM	2	7	0	0	9	2	2	2	0	6	0	7	3	0	10	0	0	0	0	0	25
04:15 PM	1	9	0	0	10	1	6	1	0	8	1	6	0	0	7	2	4	0	0	6	31
04:30 PM	4	13	0	0	17	2	5	1	0	8	0	7	1	0	8	0	5	0	0	5	38
Total Volume	8	41	2	0	51	5	19	4	0	28	4	30	6	0	40	3	12	1	0	16	135
% App. Total	15.7	80.4	3.9	0		17.9	67.9	14.3	0		10	75	15	0		18.8	75	6.2	0		
PHF	.500	.788	.250	.000	.750	.625	.792	.500	.000	.875	.333	.750	.500	.000	.667	.375	.600	.250	.000	.667	.823

N/S: Massachusetts Avenue
E/W: Albany Street
City, State: Boston, MA
Client: HSH/ R. Burgess

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

File Name : 133243 DD
Site Code : 2012165
Start Date : 3/5/2013
Page No : 1

Groups Printed- Peds and Bicycles

	Massachusetts Avenue From North				Harrison Avenue From East				Massachusetts Avenue From South				Harrison Avenue From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
03:30 PM	0	0	0	19	1	1	0	42	0	0	0	47	0	0	0	25	135
03:45 PM	0	0	0	28	0	1	0	32	0	4	0	69	0	0	0	26	160
Total	0	0	0	47	1	2	0	74	0	4	0	116	0	0	0	51	295
04:00 PM	0	1	0	10	1	0	0	33	0	0	0	32	0	0	0	29	106
04:15 PM	1	0	0	24	3	2	0	35	0	3	0	43	0	0	0	23	134
04:30 PM	0	1	0	21	0	1	0	49	0	0	0	48	0	0	0	34	154
04:45 PM	0	1	0	27	2	3	0	28	0	3	0	43	0	0	0	23	130
Total	1	3	0	82	6	6	0	145	0	6	0	166	0	0	0	109	524
05:00 PM	0	3	0	14	2	0	0	30	0	5	0	55	0	0	0	29	138
05:15 PM	0	0	0	24	0	1	0	35	0	3	0	32	0	1	0	31	127
Grand Total	1	6	0	167	9	9	0	284	0	18	0	369	0	1	0	220	1084
Apprch %	0.6	3.4	0	96	3	3	0	94	0	4.7	0	95.3	0	0.5	0	99.5	
Total %	0.1	0.6	0	15.4	0.8	0.8	0	26.2	0	1.7	0	34	0	0.1	0	20.3	

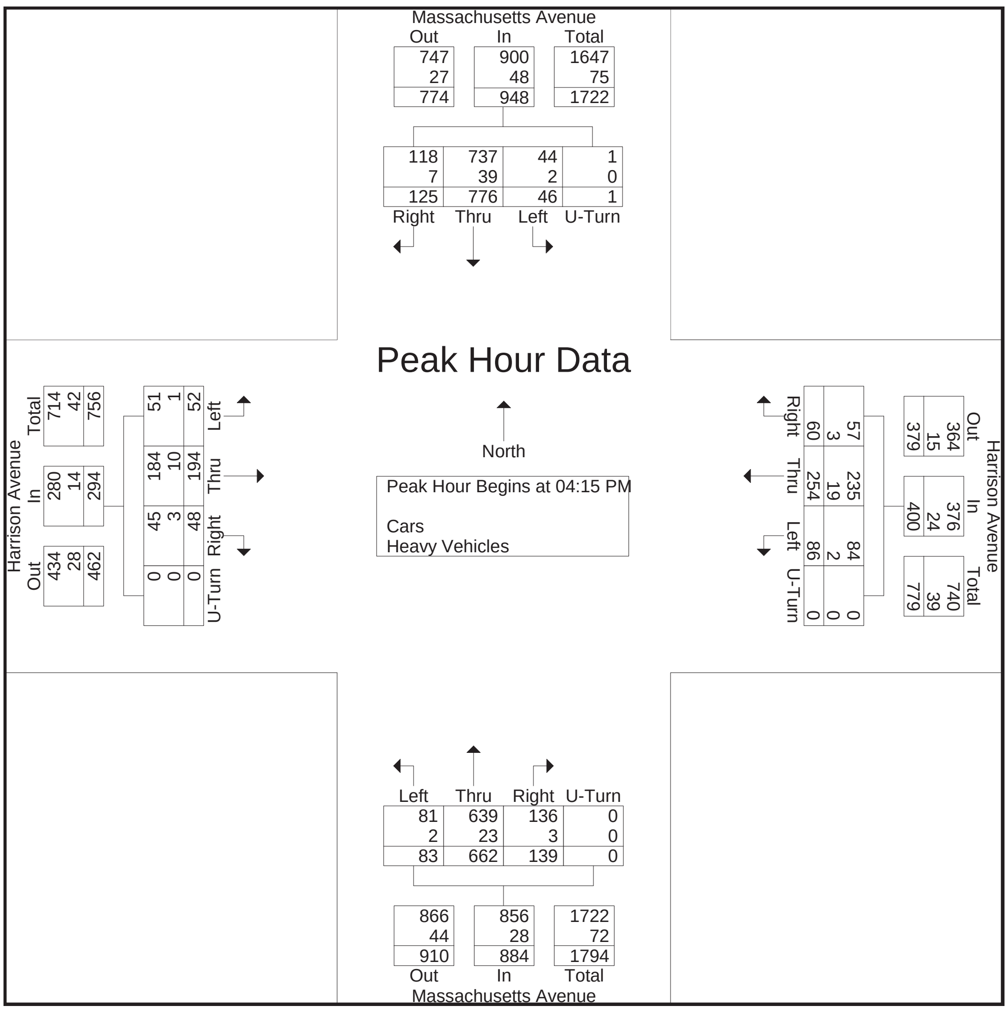
	Massachusetts Avenue From North					Harrison Avenue From East					Massachusetts Avenue From South					Harrison Avenue From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:15 PM																					
04:15 PM	1	0	0	24	25	3	2	0	35	40	0	3	0	43	46	0	0	0	23	23	134
04:30 PM	0	1	0	21	22	0	1	0	49	50	0	0	0	48	48	0	0	0	34	34	154
04:45 PM	0	1	0	27	28	2	3	0	28	33	0	3	0	43	46	0	0	0	23	23	130
05:00 PM	0	3	0	14	17	2	0	0	30	32	0	5	0	55	60	0	0	0	29	29	138
Total Volume	1	5	0	86	92	7	6	0	142	155	0	11	0	189	200	0	0	0	109	109	556
% App. Total	1.1	5.4	0	93.5		4.5	3.9	0	91.6		0	5.5	0	94.5		0	0	0	100		
PHF	.250	.417	.000	.796	.821	.583	.500	.000	.724	.775	.000	.550	.000	.859	.833	.000	.000	.000	.801	.801	.903

N/S: Massachusetts Avenue
E/W: Albany Street
City, State: Boston, MA
Client: HSH/ R. Burgess

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

File Name : 133243 DD
Site Code : 2012165
Start Date : 3/5/2013
Page No : 1

	Massachusetts Avenue From North					Harrison Avenue From East					Massachusetts Avenue From South					Harrison Avenue From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:15 PM																					
04:15 PM	30	213	13	1	257	18	66	30	0	114	29	155	12	0	196	11	43	13	0	67	634
04:30 PM	31	182	14	0	227	22	58	16	0	96	31	159	21	0	211	13	54	14	0	81	615
04:45 PM	25	176	9	0	210	15	57	25	0	97	34	166	27	0	227	10	39	13	0	62	596
05:00 PM	39	205	10	0	254	5	73	15	0	93	45	182	23	0	250	14	58	12	0	84	681
Total Volume	125	776	46	1	948	60	254	86	0	400	139	662	83	0	884	48	194	52	0	294	2526
% App. Total	13.2	81.9	4.9	0.1		15	63.5	21.5	0		15.7	74.9	9.4	0		16.3	66	17.7	0		
PHF	.801	.911	.821	.250	.922	.682	.870	.717	.000	.877	.772	.909	.769	.000	.884	.857	.836	.929	.000	.875	.927
Cars	118	737	44	1	900	57	235	84	0	376	136	639	81	0	856	45	184	51	0	280	2412
% Cars	94.4	95.0	95.7	100	94.9	95.0	92.5	97.7	0	94.0	97.8	96.5	97.6	0	96.8	93.8	94.8	98.1	0	95.2	95.5
Heavy Vehicles	7	39	2	0	48	3	19	2	0	24	3	23	2	0	28	3	10	1	0	14	114
% Heavy Vehicles	5.6	5.0	4.3	0	5.1	5.0	7.5	2.3	0	6.0	2.2	3.5	2.4	0	3.2	6.3	5.2	1.9	0	4.8	4.5



Accurate Counts
978-664-2565

N/S Street : Northampton St/Crosstown Dr
E/W Street: Albany Street
City/State : Boston, MA
Weather : Cloudy

File Name : 11032001
Site Code : 11032001
Start Date : 8/8/2013
Page No : 1

Groups Printed- Cars - Trucks

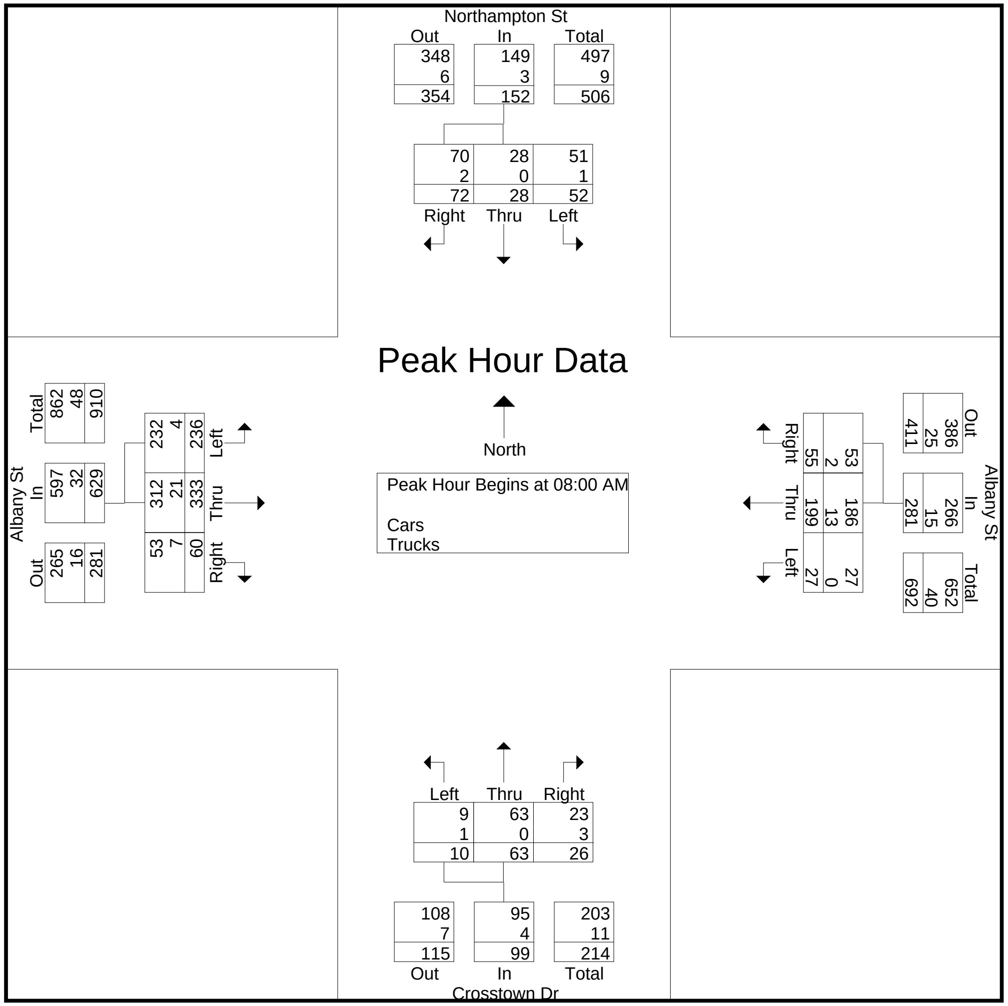
	Northampton St From North			Albany St From East			Crosstown Dr From South			Albany St From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	12	5	8	2	39	6	2	14	4	39	46	11	188
07:15 AM	13	2	12	4	39	8	3	14	4	38	43	10	190
07:30 AM	7	8	16	11	49	5	3	13	8	44	83	12	259
07:45 AM	12	13	20	4	35	13	1	20	2	41	85	17	263
Total	44	28	56	21	162	32	9	61	18	162	257	50	900
08:00 AM	7	10	11	7	48	13	2	26	10	61	82	18	295
08:15 AM	14	2	18	9	48	17	7	15	2	56	94	16	298
08:30 AM	18	7	15	6	54	12	1	17	8	61	70	13	282
08:45 AM	13	9	28	5	49	13	0	5	6	58	87	13	286
Total	52	28	72	27	199	55	10	63	26	236	333	60	1161
Grand Total	96	56	128	48	361	87	19	124	44	398	590	110	2061
Apprch %	34.3	20	45.7	9.7	72.8	17.5	10.2	66.3	23.5	36.2	53.7	10	
Total %	4.7	2.7	6.2	2.3	17.5	4.2	0.9	6	2.1	19.3	28.6	5.3	
Cars	91	56	125	47	334	84	18	124	41	390	551	99	1960
% Cars	94.8	100	97.7	97.9	92.5	96.6	94.7	100	93.2	98	93.4	90	95.1
Trucks	5	0	3	1	27	3	1	0	3	8	39	11	101
% Trucks	5.2	0	2.3	2.1	7.5	3.4	5.3	0	6.8	2	6.6	10	4.9

	Northampton St From North				Albany St From East				Crosstown Dr From South				Albany St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	7	**10**	11	28	7	48	13	68	2	**26**	**10**	**38**	**61**	82	**18**	161	295
08:15 AM	14	2	18	34	**9**	48	**17**	**74**	**7**	15	2	24	56	**94**	16	**166**	**298**
08:30 AM	**18**	7	15	40	6	**54**	12	72	1	17	8	26	61	70	13	144	282
08:45 AM	13	9	**28**	**50**	5	49	13	67	0	5	6	11	58	87	13	158	286
Total Volume	52	28	72	152	27	199	55	281	10	63	26	99	236	333	60	629	1161
% App. Total	34.2	18.4	47.4		9.6	70.8	19.6		10.1	63.6	26.3		37.5	52.9	9.5		
PHF	.722	.700	.643	.760	.750	.921	.809	.949	.357	.606	.650	.651	.967	.886	.833	.947	.974
Cars	51	28	70	149	27	186	53	266	9	63	23	95	232	312	53	597	1107
% Cars	98.1	100	97.2	98.0	100	93.5	96.4	94.7	90.0	100	88.5	96.0	98.3	93.7	88.3	94.9	95.3
Trucks	1	0	2	3	0	13	2	15	1	0	3	4	4	21	7	32	54
% Trucks	1.9	0	2.8	2.0	0	6.5	3.6	5.3	10.0	0	11.5	4.0	1.7	6.3	11.7	5.1	4.7

Accurate Counts
978-664-2565

N/S Street : Northampton St/Crosstown Dr
E/W Street: Albany Street
City/State : Boston, MA
Weather : Cloudy

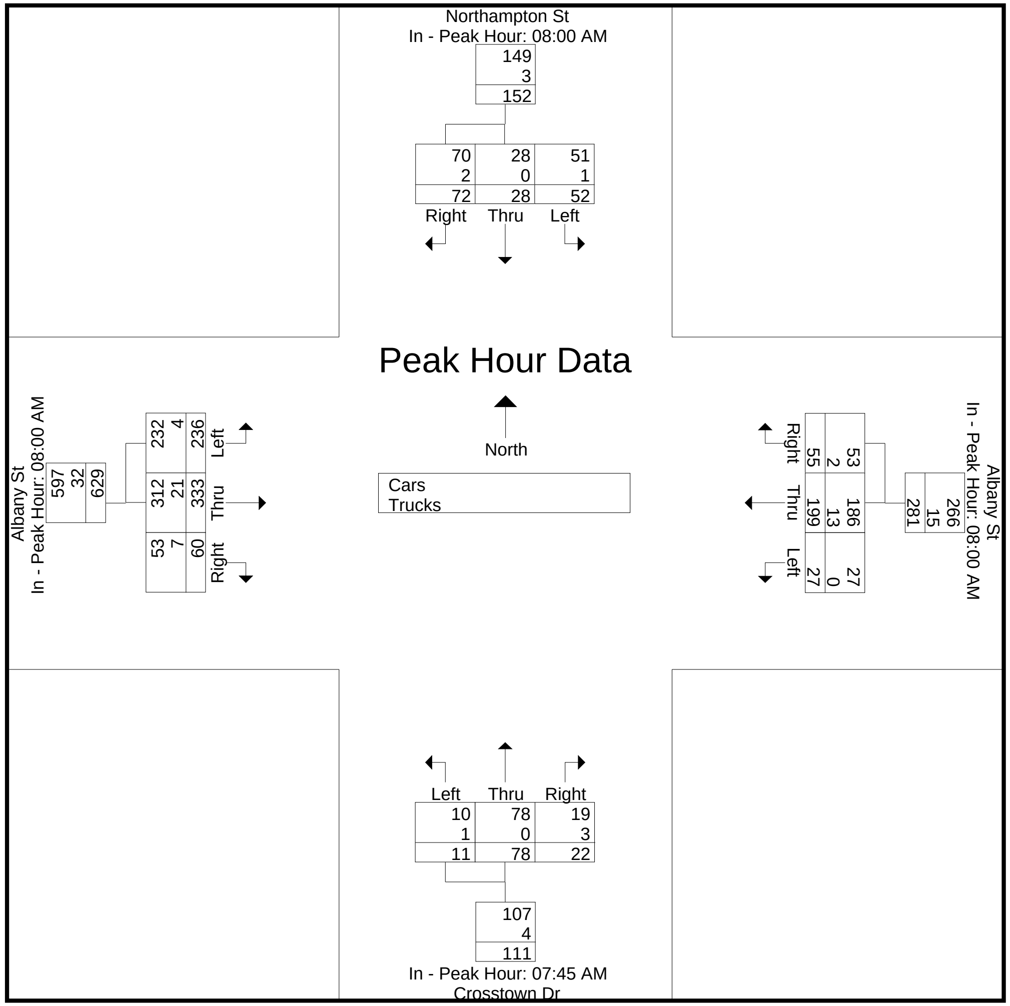
File Name : 11032001
Site Code : 11032001
Start Date : 8/8/2013
Page No : 2



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

	08:00 AM				08:00 AM				07:45 AM				08:00 AM			
+0 mins.	7	**10**	11	28	7	48	13	68	1	20	2	23	**61**	82	**18**	161
+15 mins.	14	2	18	34	**9**	48	**17**	**74**	2	**26**	**10**	**38**	56	**94**	16	**166**
+30 mins.	**18**	7	15	40	6	**54**	12	72	**7**	15	2	24	61	70	13	144
+45 mins.	13	9	**28**	**50**	5	49	13	67	1	17	8	26	58	87	13	158
Total Volume	52	28	72	152	27	199	55	281	11	78	22	111	236	333	60	629
% App. Total	34.2	18.4	47.4		9.6	70.8	19.6		9.9	70.3	19.8		37.5	52.9	9.5	
PHF	.722	.700	.643	.760	.750	.921	.809	.949	.393	.750	.550	.730	.967	.886	.833	.947
Cars	51	28	70	149	27	186	53	266	10	78	19	107	232	312	53	597
% Cars	98.1	100	97.2	98	100	93.5	96.4	94.7	90.9	100	86.4	96.4	98.3	93.7	88.3	94.9
Trucks	1	0	2	3	0	13	2	15	1	0	3	4	4	21	7	32

Accurate Counts
978-664-2565



Accurate Counts
978-664-2565

N/S Street : Northampton St/Crosstown Dr
E/W Street: Albany Street
City/State : Boston, MA
Weather : Cloudy

File Name : 11032001
Site Code : 11032001
Start Date : 8/8/2013
Page No : 1

Groups Printed- Cars

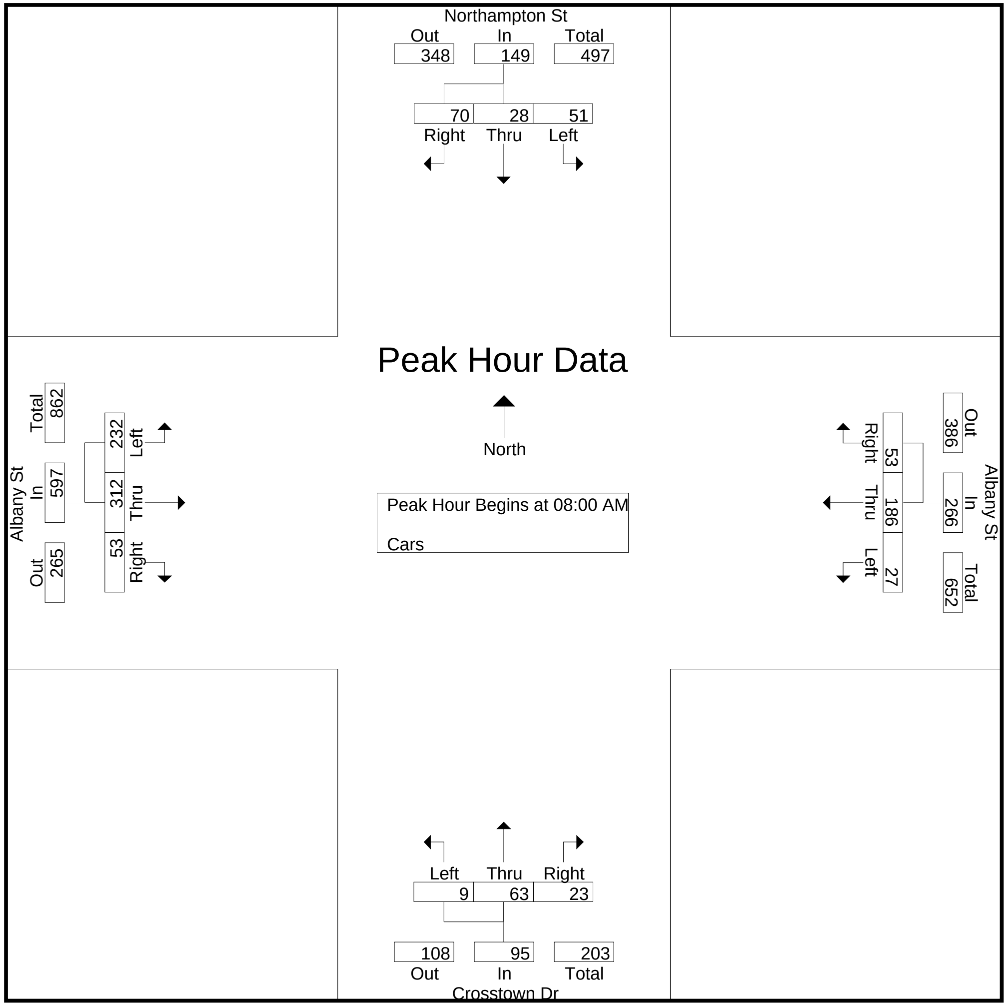
	Northampton St From North			Albany St From East			Crosstown Dr From South			Albany St From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	11	5	8	2	34	6	2	14	4	38	43	9	176
07:15 AM	12	2	12	4	38	8	3	14	4	37	39	10	183
07:30 AM	6	8	16	10	44	4	3	13	8	43	80	11	246
07:45 AM	11	13	19	4	32	13	1	20	2	40	77	16	248
Total	40	28	55	20	148	31	9	61	18	158	239	46	853
08:00 AM	7	10	11	7	44	13	1	26	8	59	75	16	277
08:15 AM	13	2	17	9	45	17	7	15	2	55	87	15	284
08:30 AM	18	7	14	6	49	11	1	17	7	60	68	9	267
08:45 AM	13	9	28	5	48	12	0	5	6	58	82	13	279
Total	51	28	70	27	186	53	9	63	23	232	312	53	1107
Grand Total	91	56	125	47	334	84	18	124	41	390	551	99	1960
Apprch %	33.5	20.6	46	10.1	71.8	18.1	9.8	67.8	22.4	37.5	53	9.5	
Total %	4.6	2.9	6.4	2.4	17	4.3	0.9	6.3	2.1	19.9	28.1	5.1	

	Northampton St From North				Albany St From East				Crosstown Dr From South				Albany St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	7	**10**	11	28	7	44	13	64	1	**26**	**8**	**35**	59	75	**16**	150	277
08:15 AM	13	2	17	32	**9**	45	**17**	**71**	**7**	15	2	24	55	**87**	15	**157**	**284**
08:30 AM	**18**	7	14	39	6	**49**	11	66	1	17	7	25	**60**	68	9	137	267
08:45 AM	13	9	**28**	**50**	5	48	12	65	0	5	6	11	58	82	13	153	279
Total Volume	51	28	70	149	27	186	53	266	9	63	23	95	232	312	53	597	1107
% App. Total	34.2	18.8	47		10.2	69.9	19.9		9.5	66.3	24.2		38.9	52.3	8.9		
PHF	.708	.700	.625	.745	.750	.949	.779	.937	.321	.606	.719	.679	.967	.897	.828	.951	.974

Accurate Counts
978-664-2565

N/S Street : Northampton St/Crosstown Dr
E/W Street: Albany Street
City/State : Boston, MA
Weather : Cloudy

File Name : 11032001
Site Code : 11032001
Start Date : 8/8/2013
Page No : 2



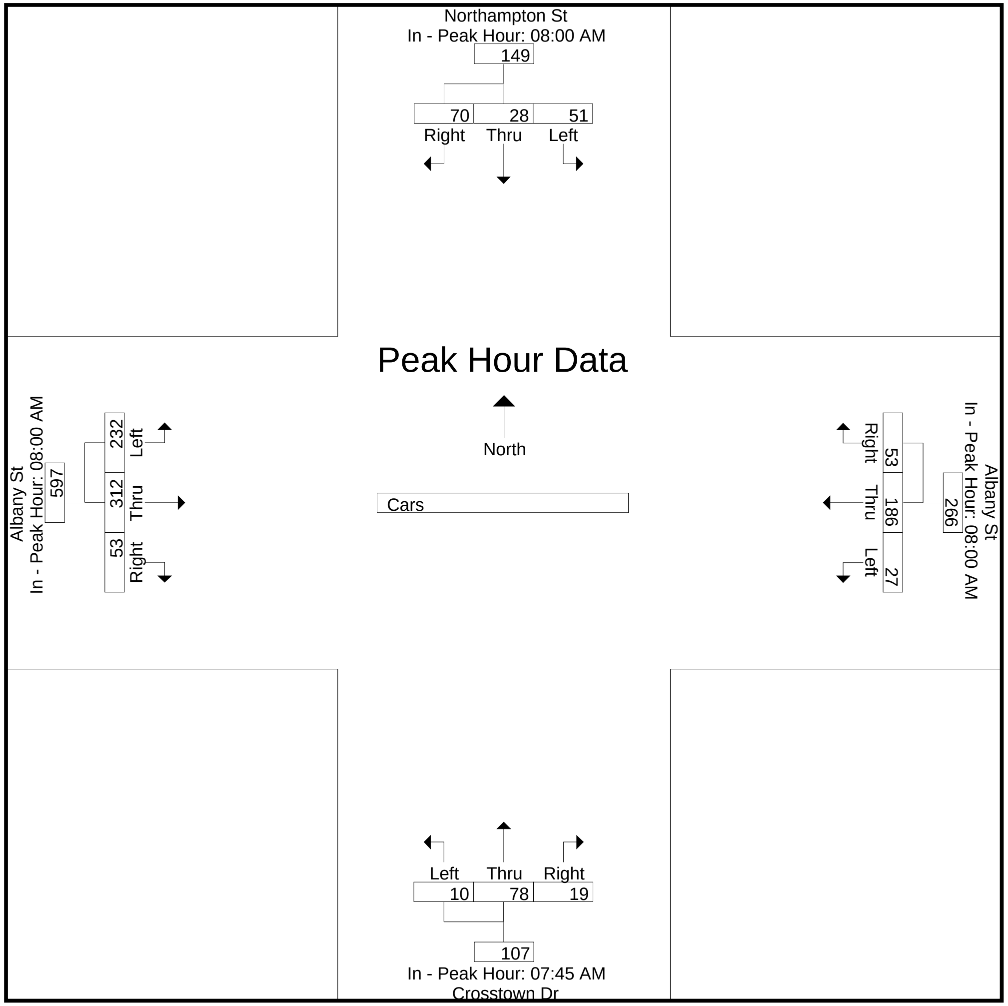
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	08:00 AM				08:00 AM				07:45 AM				08:00 AM			
+0 mins.	7	**10**	11	28	7	44	13	64	1	20	2	23	59	75	**16**	150
+15 mins.	13	2	17	32	**9**	45	**17**	**71**	1	**26**	**8**	**35**	55	**87**	15	**157**
+30 mins.	**18**	7	14	39	6	**49**	11	66	**7**	15	2	24	**60**	68	9	137
+45 mins.	13	9	**28**	**50**	5	48	12	65	1	17	7	25	58	82	13	153
Total Volume	51	28	70	149	27	186	53	266	10	78	19	107	232	312	53	597
% App. Total	34.2	18.8	47		10.2	69.9	19.9		9.3	72.9	17.8		38.9	52.3	8.9	
PHF	.708	.700	.625	.745	.750	.949	.779	.937	.357	.750	.594	.764	.967	.897	.828	.951

Accurate Counts
978-664-2565

N/S Street : Northampton St/Crosstown Dr
E/W Street: Albany Street
City/State : Boston, MA
Weather : Cloudy

File Name : 11032001
Site Code : 11032001
Start Date : 8/8/2013
Page No : 3



Accurate Counts
978-664-2565

N/S Street : Northampton St/Crosstown Dr
E/W Street: Albany Street
City/State : Boston, MA
Weather : Cloudy

File Name : 11032001
Site Code : 11032001
Start Date : 8/8/2013
Page No : 1

Groups Printed- Trucks

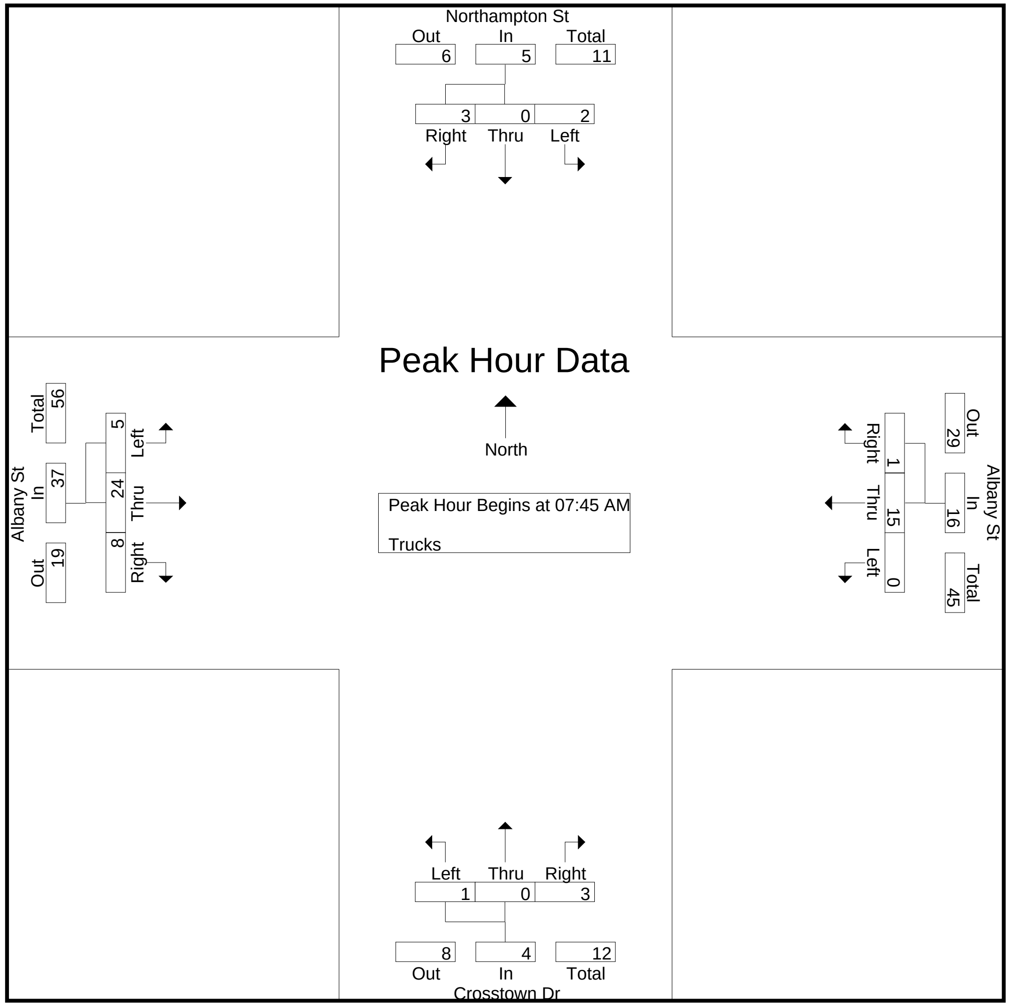
	Northampton St From North			Albany St From East			Crosstown Dr From South			Albany St From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	1	0	0	0	5	0	0	0	0	1	3	2	12
07:15 AM	1	0	0	0	1	0	0	0	0	1	4	0	7
07:30 AM	1	0	0	1	5	1	0	0	0	1	3	1	13
07:45 AM	1	0	1	0	3	0	0	0	0	1	8	1	15
Total	4	0	1	1	14	1	0	0	0	4	18	4	47
08:00 AM	0	0	0	0	4	0	1	0	2	2	7	2	18
08:15 AM	1	0	1	0	3	0	0	0	0	1	7	1	14
08:30 AM	0	0	1	0	5	1	0	0	1	1	2	4	15
08:45 AM	0	0	0	0	1	1	0	0	0	0	5	0	7
Total	1	0	2	0	13	2	1	0	3	4	21	7	54
Grand Total	5	0	3	1	27	3	1	0	3	8	39	11	101
Apprch %	62.5	0	37.5	3.2	87.1	9.7	25	0	75	13.8	67.2	19	
Total %	5	0	3	1	26.7	3	1	0	3	7.9	38.6	10.9	

	Northampton St From North				Albany St From East				Crosstown Dr From South				Albany St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	**1**	0	**1**	**2**	0	3	0	3	0	0	0	0	1	**8**	1	10	15
08:00 AM	0	0	0	0	0	4	0	4	**1**	0	**2**	**3**	**2**	7	2	**11**	**18**
08:15 AM	1	0	1	2	0	3	0	3	0	0	0	0	1	7	1	9	14
08:30 AM	0	0	1	1	0	**5**	**1**	**6**	0	0	1	1	1	2	**4**	7	15
Total Volume	2	0	3	5	0	15	1	16	1	0	3	4	5	24	8	37	62
% App. Total	40	0	60		0	93.8	6.2		25	0	75		13.5	64.9	21.6		
PHF	.500	.000	.750	.625	.000	.750	.250	.667	.250	.000	.375	.333	.625	.750	.500	.841	.861

Accurate Counts
978-664-2565

N/S Street : Northampton St/Crosstown Dr
E/W Street: Albany Street
City/State : Boston, MA
Weather : Cloudy

File Name : 11032001
Site Code : 11032001
Start Date : 8/8/2013
Page No : 2



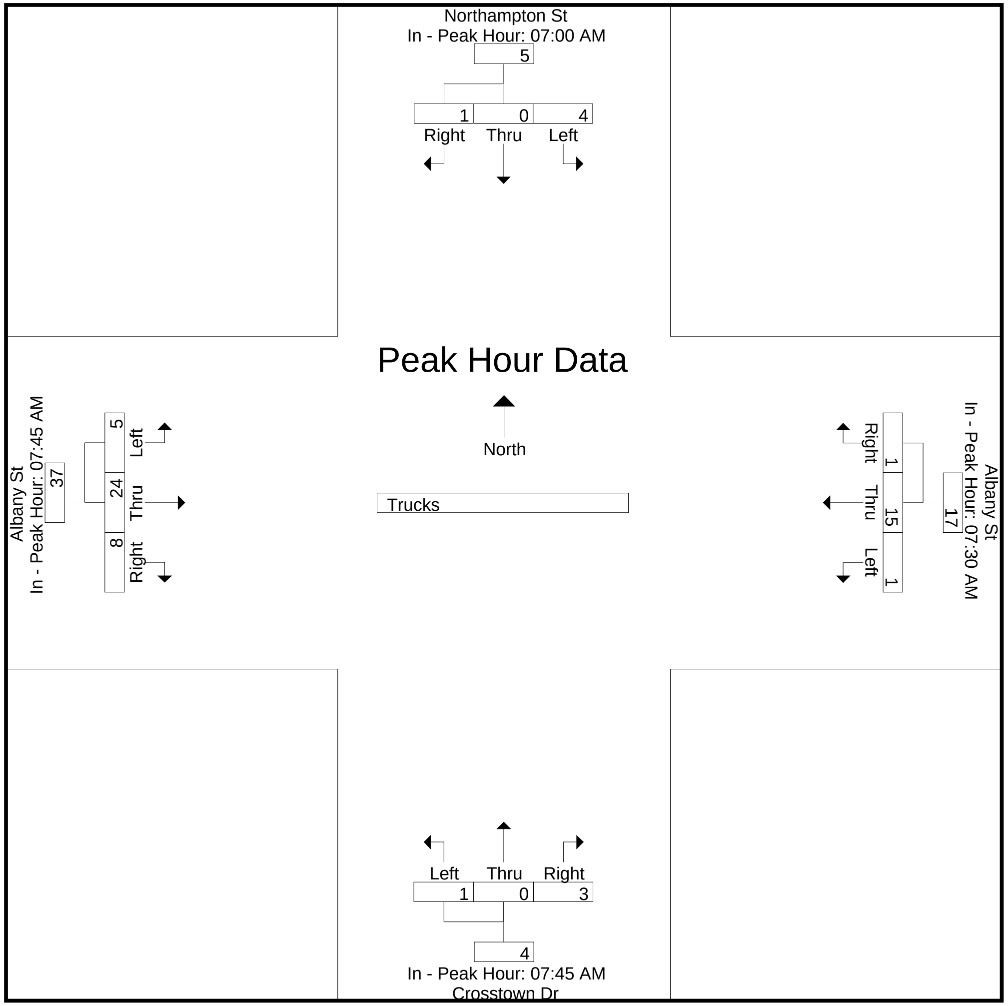
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:00 AM				07:30 AM				07:45 AM				07:45 AM			
+0 mins.	**1**	0	0	1	**1**	**5**	**1**	**7**	0	0	0	0	1	**8**	1	10
+15 mins.	1	0	0	1	0	3	0	3	**1**	0	**2**	**3**	**2**	7	2	**11**
+30 mins.	1	0	0	1	0	4	0	4	0	0	0	0	1	7	1	9
+45 mins.	1	0	**1**	**2**	0	3	0	3	0	0	1	1	1	2	**4**	7
Total Volume	4	0	1	5	1	15	1	17	1	0	3	4	5	24	8	37
% App. Total	80	0	20		5.9	88.2	5.9		25	0	75		13.5	64.9	21.6	
PHF	1.000	.000	.250	.625	.250	.750	.250	.607	.250	.000	.375	.333	.625	.750	.500	.841

Accurate Counts
978-664-2565

N/S Street : Northampton St/Crosstown Dr
E/W Street: Albany Street
City/State : Boston, MA
Weather : Cloudy

File Name : 11032001
Site Code : 11032001
Start Date : 8/8/2013
Page No : 3



Accurate Counts
978-664-2565

N/S Street : Northampton St/Crosstown Dr
E/W Street: Albany Street
City/State : Boston, MA
Weather : Cloudy

File Name : 11032001
Site Code : 11032001
Start Date : 8/8/2013
Page No : 1

Groups Printed- Bikes Peds

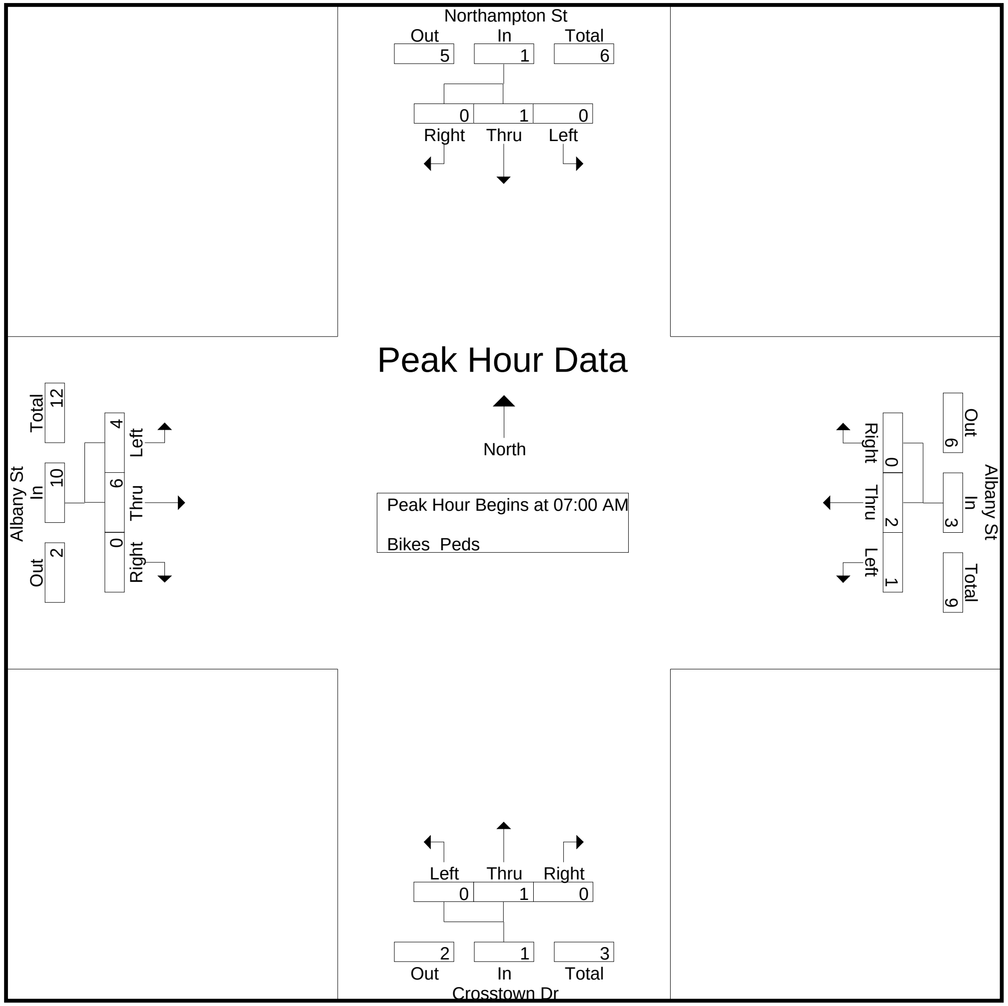
	Northampton St From North				Albany St From East				Crosstown Dr From South				Albany St From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	0	0	6	1	0	0	5	0	0	0	2	2	0	0	4	17	3	20
07:15 AM	0	0	0	5	0	1	0	13	0	0	0	8	2	0	0	7	33	3	36
07:30 AM	0	1	0	11	0	0	0	6	0	0	0	3	0	2	0	9	29	3	32
07:45 AM	0	0	0	11	0	1	0	17	0	1	0	13	0	4	0	12	53	6	59
Total	0	1	0	33	1	2	0	41	0	1	0	26	4	6	0	32	132	15	147
08:00 AM	0	1	0	28	0	0	0	15	0	0	0	4	0	0	0	15	62	1	63
08:15 AM	0	2	0	85	0	0	0	10	0	0	0	7	0	2	0	16	118	4	122
08:30 AM	0	1	0	15	1	1	0	13	0	0	0	2	0	0	0	13	43	3	46
08:45 AM	0	1	1	10	1	1	0	10	0	1	0	25	1	1	0	11	56	7	63
Total	0	5	1	138	2	2	0	48	0	1	0	38	1	3	0	55	279	15	294
Grand Total	0	6	1	171	3	4	0	89	0	2	0	64	5	9	0	87	411	30	441
Apprch %	0	85.7	14.3		42.9	57.1	0		0	100	0		35.7	64.3	0				
Total %	0	20	3.3		10	13.3	0		0	6.7	0		16.7	30	0		93.2	6.8	

	Northampton St From North				Albany St From East				Crosstown Dr From South				Albany St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	0	0	0	**1**	0	0	**1**	0	0	0	0	**2**	0	0	2	3
07:15 AM	0	0	0	0	0	**1**	0	1	0	0	0	0	2	0	0	2	3
07:30 AM	0	**1**	0	**1**	0	0	0	0	0	0	0	0	0	2	0	2	3
07:45 AM	0	0	0	0	0	1	0	1	0	**1**	0	**1**	0	**4**	0	**4**	**6**
Total Volume	0	1	0	1	1	2	0	3	0	1	0	1	4	6	0	10	15
% App. Total	0	100	0		33.3	66.7	0		0	100	0		40	60	0		
PHF	.000	.250	.000	.250	.250	.500	.000	.750	.000	.250	.000	.250	.500	.375	.000	.625	.625

Accurate Counts
978-664-2565

N/S Street : Northampton St/Crosstown Dr
E/W Street: Albany Street
City/State : Boston, MA
Weather : Cloudy

File Name : 11032001
Site Code : 11032001
Start Date : 8/8/2013



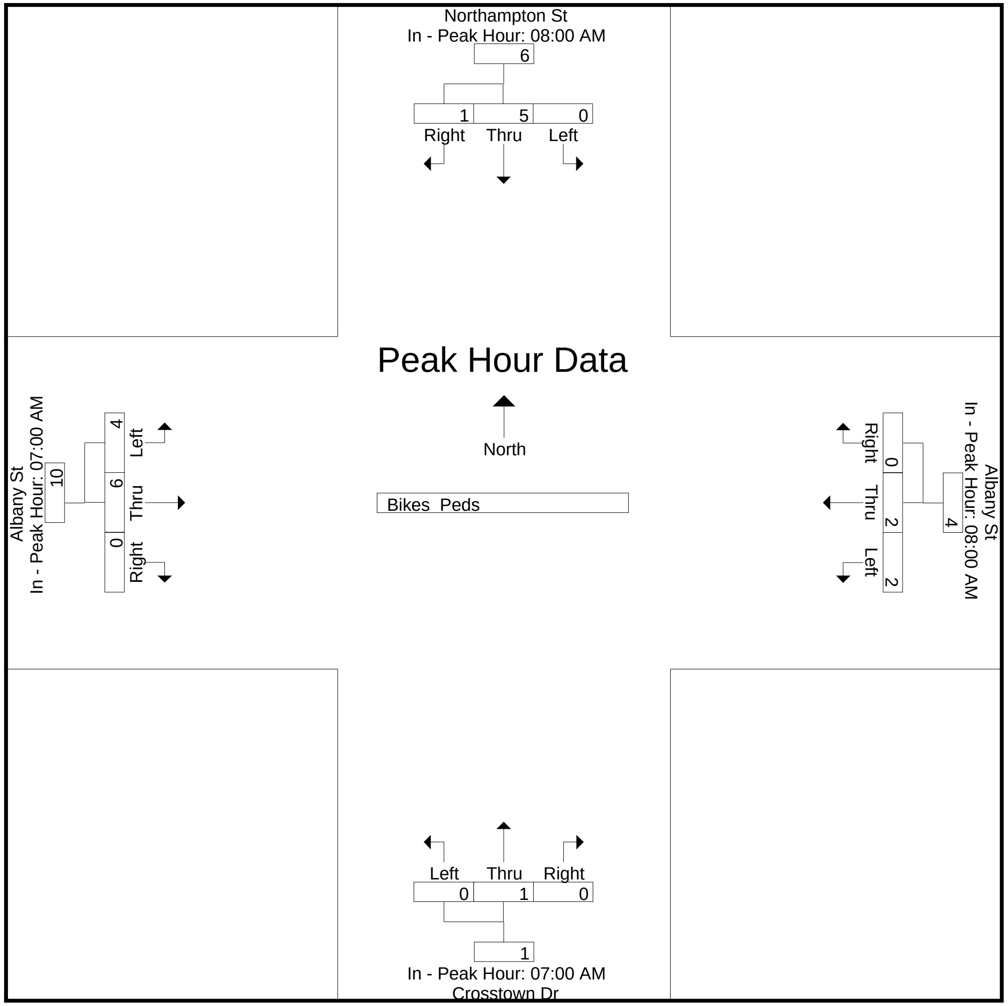
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	08:00 AM				08:00 AM				07:00 AM				07:00 AM			
+0 mins.	0	1	0	1	0	0	0	0	0	0	0	0	**2**	0	0	2
+15 mins.	0	**2**	0	**2**	0	0	0	0	0	0	0	0	2	0	0	2
+30 mins.	0	1	0	1	**1**	**1**	0	**2**	0	0	0	0	0	2	0	2
+45 mins.	0	1	**1**	2	1	1	0	2	0	**1**	0	**1**	0	**4**	0	**4**
Total Volume	0	5	1	6	2	2	0	4	0	1	0	1	4	6	0	10
% App. Total	0	83.3	16.7		50	50	0		0	100	0		40	60	0	
PHF	.000	.625	.250	.750	.500	.500	.000	.500	.000	.250	.000	.250	.500	.375	.000	.625

Accurate Counts
978-664-2565

N/S Street : Northampton St/Crosstown Dr
E/W Street: Albany Street
City/State : Boston, MA
Weather : Cloudy

File Name : 11032001
Site Code : 11032001
Start Date : 8/8/2013
Page No : 3



Accurate Counts
978-664-2565

N/S Street : Northampton St/Crosstown Dr
E/W Street: Albany Street
City/State : Boston, MA
Weather : Cloudy

File Name : 11032001
Site Code : 11032001
Start Date : 8/8/2013
Page No : 1

Groups Printed- Cars - Trucks

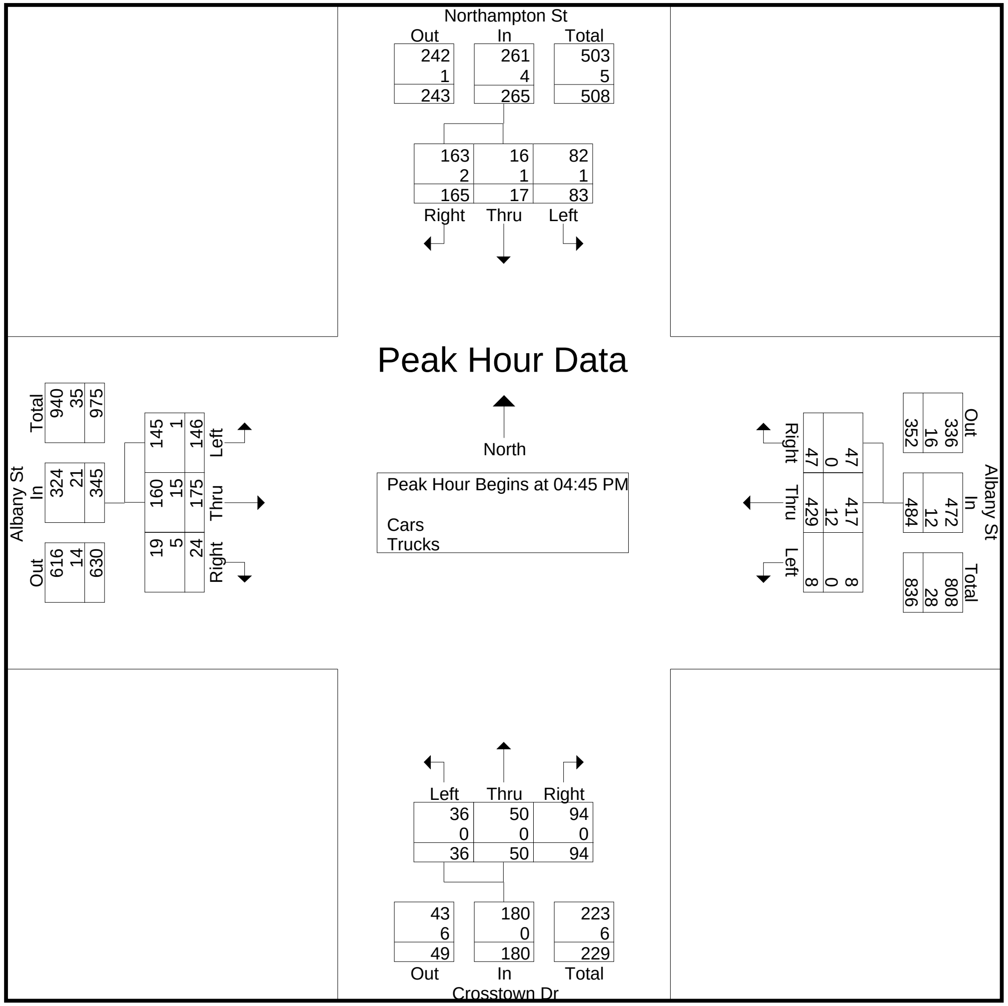
	Northampton St From North			Albany St From East			Crosstown Dr From South			Albany St From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
04:00 PM	12	2	47	4	95	14	16	7	33	25	46	6	307
04:15 PM	13	7	51	3	97	12	6	7	14	44	46	5	305
04:30 PM	19	6	40	3	85	13	12	4	19	31	39	7	278
04:45 PM	24	4	36	0	97	14	4	11	28	37	47	5	307
Total	68	19	174	10	374	53	38	29	94	137	178	23	1197
05:00 PM	24	0	41	3	134	17	14	13	27	32	41	6	352
05:15 PM	16	9	45	3	100	9	6	10	19	44	54	5	320
05:30 PM	19	4	43	2	98	7	12	16	20	33	33	8	295
05:45 PM	14	5	55	2	91	8	9	9	14	33	33	1	274
Total	73	18	184	10	423	41	41	48	80	142	161	20	1241
Grand Total	141	37	358	20	797	94	79	77	174	279	339	43	2438
Apprch %	26.3	6.9	66.8	2.2	87.5	10.3	23.9	23.3	52.7	42.2	51.3	6.5	
Total %	5.8	1.5	14.7	0.8	32.7	3.9	3.2	3.2	7.1	11.4	13.9	1.8	
Cars	139	36	355	20	771	93	79	77	174	276	309	34	2363
% Cars	98.6	97.3	99.2	100	96.7	98.9	100	100	100	98.9	91.2	79.1	96.9
Trucks	2	1	3	0	26	1	0	0	0	3	30	9	75
% Trucks	1.4	2.7	0.8	0	3.3	1.1	0	0	0	1.1	8.8	20.9	3.1

	Northampton St From North				Albany St From East				Crosstown Dr From South				Albany St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	**24**	4	36	64	0	97	14	111	4	11	**28**	43	37	47	5	89	307
05:00 PM	24	0	41	65	**3**	**134**	**17**	**154**	**14**	13	27	**54**	32	41	6	79	**352**
05:15 PM	16	**9**	**45**	**70**	3	100	9	112	6	10	19	35	**44**	**54**	5	**103**	320
05:30 PM	19	4	43	66	2	98	7	107	12	**16**	20	48	33	33	**8**	74	295
Total Volume	83	17	165	265	8	429	47	484	36	50	94	180	146	175	24	345	1274
% App. Total	31.3	6.4	62.3		1.7	88.6	9.7		20	27.8	52.2		42.3	50.7	7		
PHF	.865	.472	.917	.946	.667	.800	.691	.786	.643	.781	.839	.833	.830	.810	.750	.837	.905
Cars	82	16	163	261	8	417	47	472	36	50	94	180	145	160	19	324	1237
% Cars	98.8	94.1	98.8	98.5	100	97.2	100	97.5	100	100	100	100	99.3	91.4	79.2	93.9	97.1
Trucks	1	1	2	4	0	12	0	12	0	0	0	0	1	15	5	21	37
% Trucks	1.2	5.9	1.2	1.5	0	2.8	0	2.5	0	0	0	0	0.7	8.6	20.8	6.1	2.9

Accurate Counts
978-664-2565

N/S Street : Northampton St/Crosstown Dr
E/W Street: Albany Street
City/State : Boston, MA
Weather : Cloudy

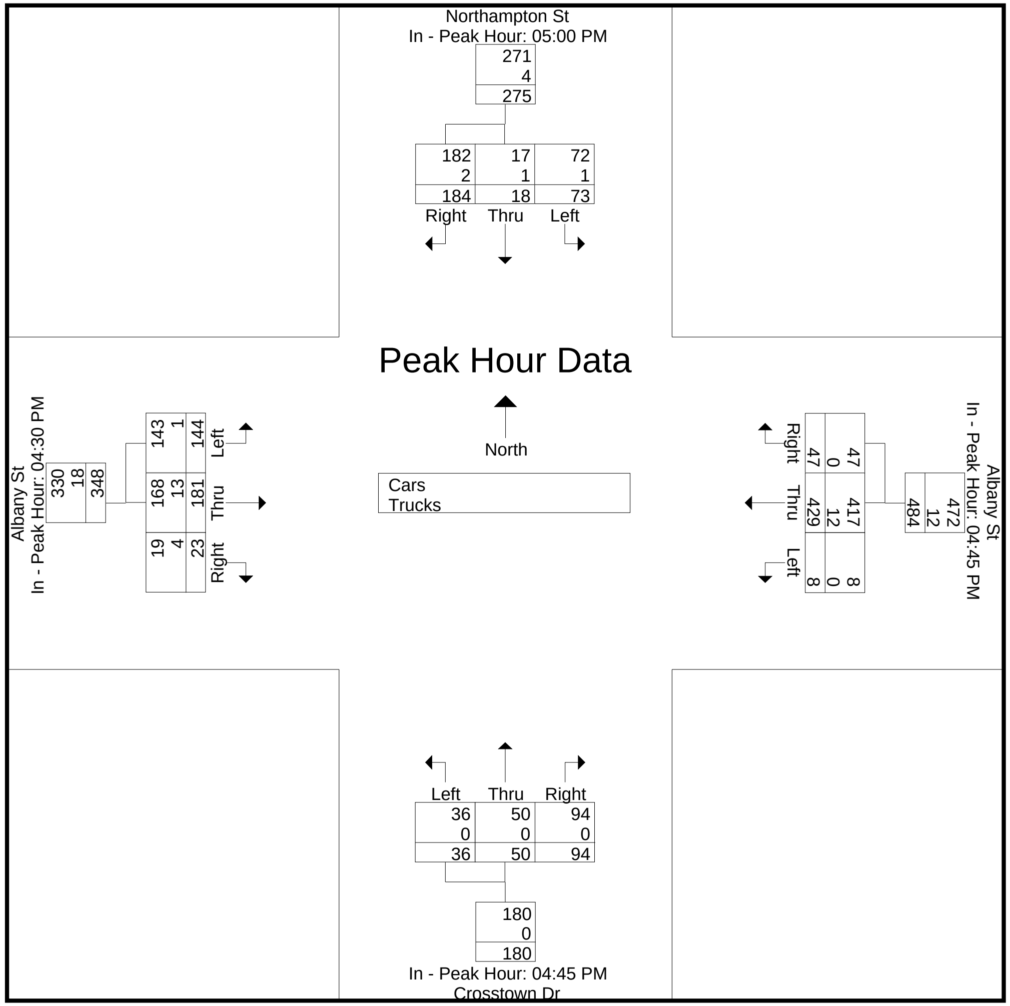
File Name : 11032001
Site Code : 11032001
Start Date : 8/8/2013
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	05:00 PM				04:45 PM				04:45 PM				04:30 PM			
+0 mins.	**24**	0	41	65	0	97	14	111	4	11	**28**	43	31	39	**7**	77
+15 mins.	16	**9**	45	70	**3**	**134**	**17**	**154**	**14**	13	27	**54**	37	47	5	89
+30 mins.	19	4	43	66	3	100	9	112	6	10	19	35	32	41	6	79
+45 mins.	14	5	**55**	**74**	2	98	7	107	12	**16**	20	48	**44**	**54**	5	**103**
Total Volume	73	18	184	275	8	429	47	484	36	50	94	180	144	181	23	348
% App. Total	26.5	6.5	66.9		1.7	88.6	9.7		20	27.8	52.2		41.4	52	6.6	
PHF	.760	.500	.836	.929	.667	.800	.691	.786	.643	.781	.839	.833	.818	.838	.821	.845
Cars	72	17	182	271	8	417	47	472	36	50	94	180	143	168	19	330
% Cars	98.6	94.4	98.9	98.5	100	97.2	100	97.5	100	100	100	100	99.3	92.8	82.6	94.8
Trucks	1	1	2	4	0	12	0	12	0	0	0	0	1	13	4	18

Accurate Counts
978-664-2565



Accurate Counts
978-664-2565

N/S Street : Northampton St/Crosstown Dr
E/W Street: Albany Street
City/State : Boston, MA
Weather : Cloudy

File Name : 11032001
Site Code : 11032001
Start Date : 8/8/2013
Page No : 1

Groups Printed- Cars

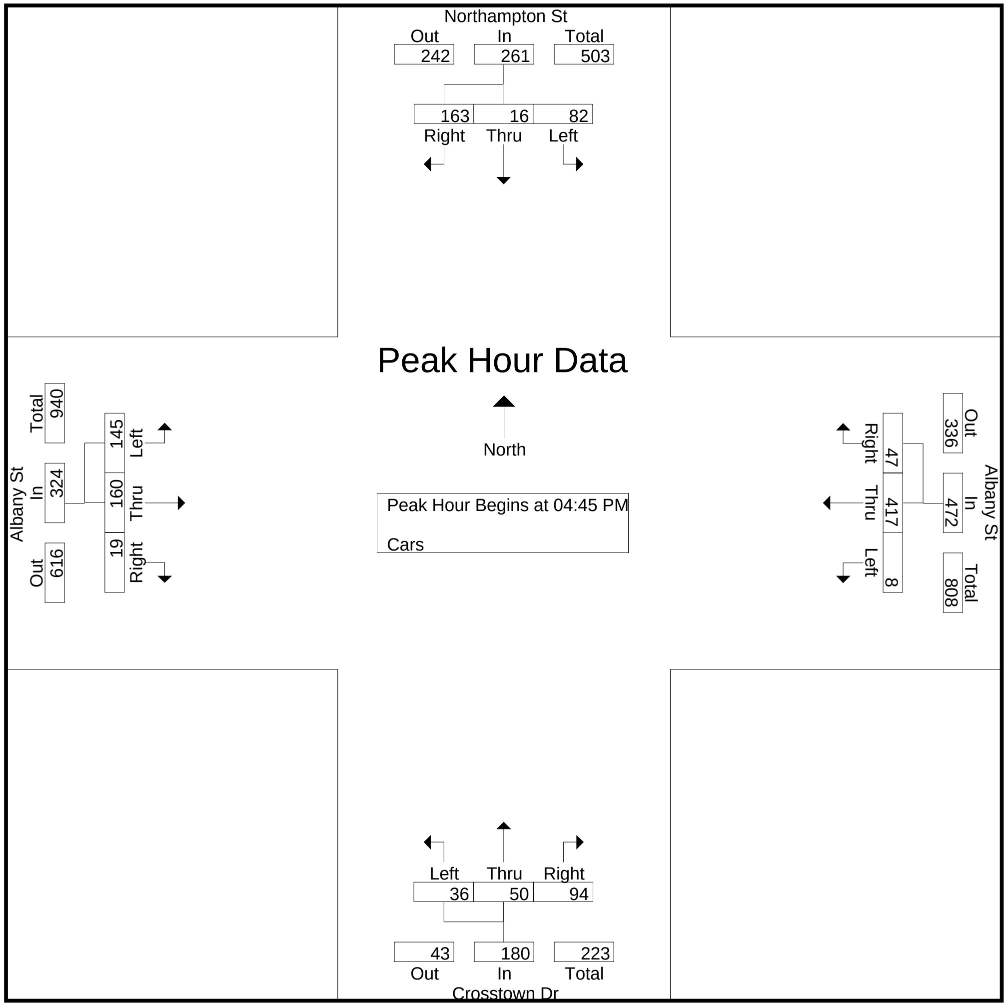
	Northampton St From North			**Albany St From East**			**Crosstown Dr From South**			**Albany St From West**			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
04:00 PM	12	2	47	4	92	14	16	7	33	24	41	4	296
04:15 PM	13	7	50	3	92	11	6	7	14	43	42	4	292
04:30 PM	18	6	40	3	83	13	12	4	19	31	37	6	272
04:45 PM	24	4	36	0	93	14	4	11	28	37	42	3	296
Total	67	19	173	10	360	52	38	29	94	135	162	17	1156
05:00 PM	23	0	39	3	130	17	14	13	27	31	38	6	341
05:15 PM	16	8	45	3	98	9	6	10	19	44	51	4	313
05:30 PM	19	4	43	2	96	7	12	16	20	33	29	6	287
05:45 PM	14	5	55	2	87	8	9	9	14	33	29	1	266
Total	72	17	182	10	411	41	41	48	80	141	147	17	1207
Grand Total	139	36	355	20	771	93	79	77	174	276	309	34	2363
Apprch %	26.2	6.8	67	2.3	87.2	10.5	23.9	23.3	52.7	44.6	49.9	5.5	
Total %	5.9	1.5	15	0.8	32.6	3.9	3.3	3.3	7.4	11.7	13.1	1.4	

	Northampton St From North				**Albany St From East**				**Crosstown Dr From South**				**Albany St From West**				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	**24**	4	36	64	0	93	14	107	4	11	**28**	43	37	42	3	82	296
05:00 PM	23	0	39	62	**3**	**130**	**17**	**150**	**14**	13	27	**54**	31	38	**6**	75	**341**
05:15 PM	16	**8**	**45**	**69**	3	98	9	110	6	10	19	35	**44**	**51**	4	**99**	313
05:30 PM	19	4	43	66	2	96	7	105	12	**16**	20	48	33	29	6	68	287
Total Volume	82	16	163	261	8	417	47	472	36	50	94	180	145	160	19	324	1237
% App. Total	31.4	6.1	62.5		1.7	88.3	10		20	27.8	52.2		44.8	49.4	5.9		
PHF	.854	.500	.906	.946	.667	.802	.691	.787	.643	.781	.839	.833	.824	.784	.792	.818	.907

Accurate Counts
978-664-2565

N/S Street : Northampton St/Crosstown Dr
E/W Street: Albany Street
City/State : Boston, MA
Weather : Cloudy

File Name : 11032001
Site Code : 11032001
Start Date : 8/8/2013
Page No : 2

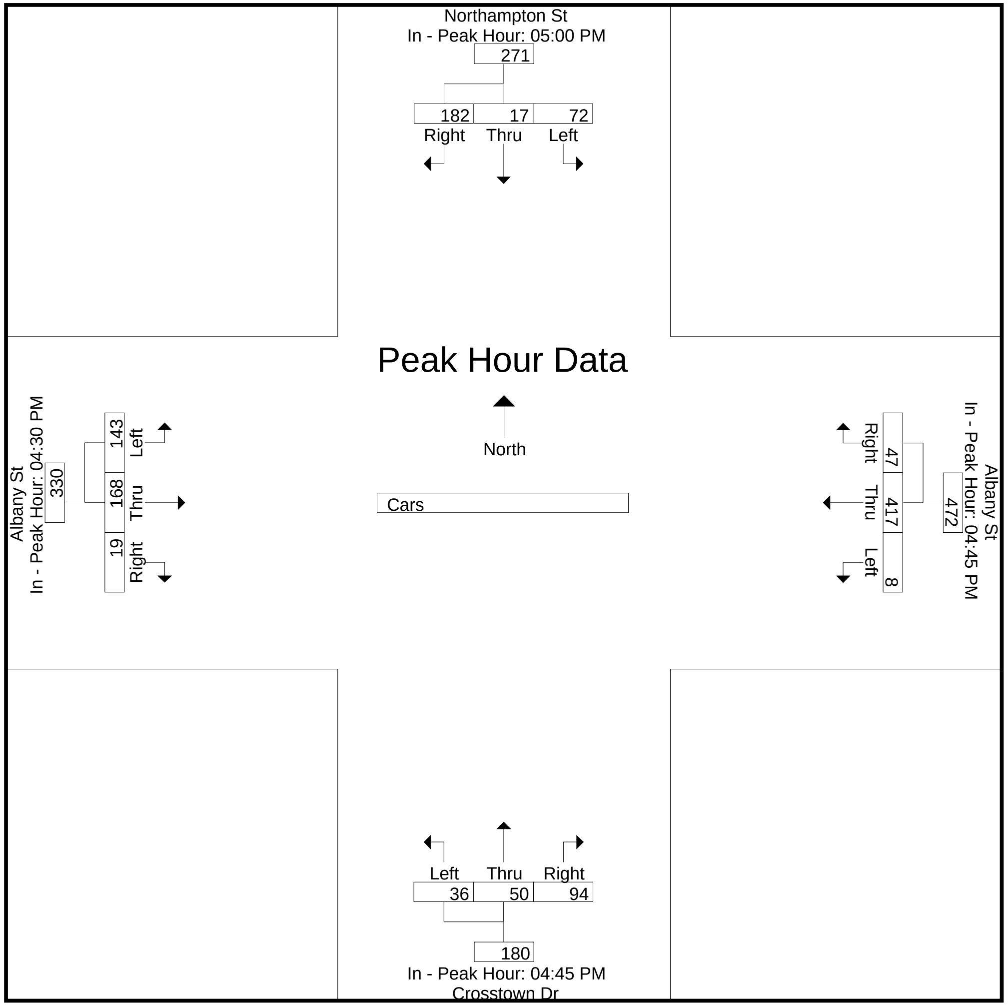


Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	05:00 PM				04:45 PM				04:45 PM				04:30 PM			
+0 mins.	**23**	0	39	62	0	93	14	107	4	11	**28**	43	31	37	**6**	74
+15 mins.	16	**8**	45	69	**3**	**130**	**17**	**150**	**14**	13	27	**54**	37	42	3	82
+30 mins.	19	4	43	66	3	98	9	110	6	10	19	35	31	38	6	75
+45 mins.	14	5	**55**	**74**	2	96	7	105	12	**16**	20	48	**44**	**51**	4	**99**
Total Volume	72	17	182	271	8	417	47	472	36	50	94	180	143	168	19	330
% App. Total	26.6	6.3	67.2		1.7	88.3	10		20	27.8	52.2		43.3	50.9	5.8	
PHF	.783	.531	.827	.916	.667	.802	.691	.787	.643	.781	.839	.833	.813	.824	.792	.833

Accurate Counts
978-664-2565

N/S Street : Northampton St/Crosstown Dr	File Name : 11032001
E/W Street: Albany Street	Site Code : 11032001
City/State : Boston, MA	Start Date : 8/8/2013
Weather : Cloudy	Page No : 3



Accurate Counts
978-664-2565

N/S Street : Northampton St/Crosstown Dr
E/W Street: Albany Street
City/State : Boston, MA
Weather : Cloudy

File Name : 11032001
Site Code : 11032001
Start Date : 8/8/2013
Page No : 1

Groups Printed- Trucks

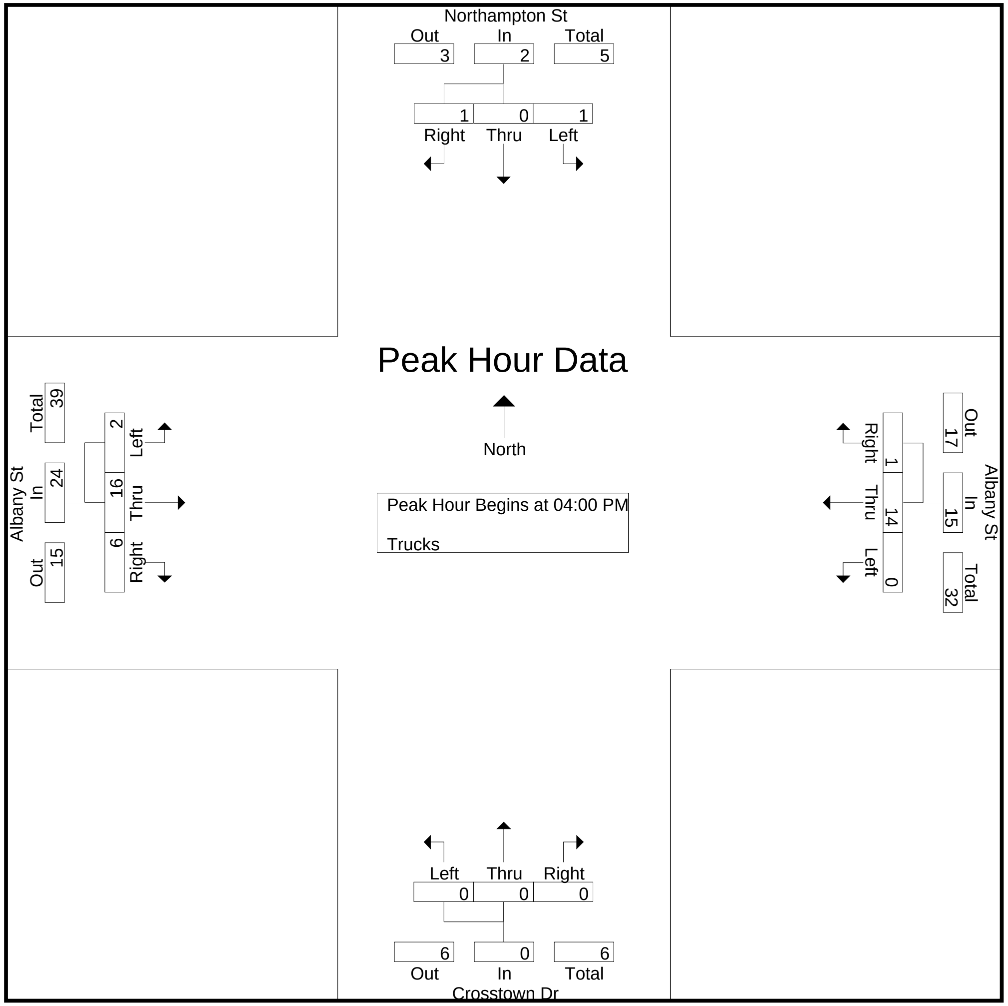
	Northampton St From North			Albany St From East			Crosstown Dr From South			Albany St From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
04:00 PM	0	0	0	0	3	0	0	0	0	1	5	2	11
04:15 PM	0	0	1	0	5	1	0	0	0	1	4	1	13
04:30 PM	1	0	0	0	2	0	0	0	0	0	2	1	6
04:45 PM	0	0	0	0	4	0	0	0	0	0	5	2	11
Total	1	0	1	0	14	1	0	0	0	2	16	6	41
05:00 PM	1	0	2	0	4	0	0	0	0	1	3	0	11
05:15 PM	0	1	0	0	2	0	0	0	0	0	3	1	7
05:30 PM	0	0	0	0	2	0	0	0	0	0	4	2	8
05:45 PM	0	0	0	0	4	0	0	0	0	0	4	0	8
Total	1	1	2	0	12	0	0	0	0	1	14	3	34
Grand Total	2	1	3	0	26	1	0	0	0	3	30	9	75
Apprch %	33.3	16.7	50	0	96.3	3.7	0	0	0	7.1	71.4	21.4	
Total %	2.7	1.3	4	0	34.7	1.3	0	0	0	4	40	12	

	Northampton St From North				Albany St From East				Crosstown Dr From South				Albany St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	0	0	0	0	0	3	0	3	0	0	0	0	**1**	**5**	**2**	**8**	11
04:15 PM	0	0	**1**	**1**	0	**5**	**1**	**6**	0	0	0	0	1	4	1	6	**13**
04:30 PM	**1**	0	0	1	0	2	0	2	0	0	0	0	0	2	1	3	6
04:45 PM	0	0	0	0	0	4	0	4	0	0	0	0	0	5	2	7	11
Total Volume	1	0	1	2	0	14	1	15	0	0	0	0	2	16	6	24	41
% App. Total	50	0	50		0	93.3	6.7		0	0	0		8.3	66.7	25		
PHF	.250	.000	.250	.500	.000	.700	.250	.625	.000	.000	.000	.000	.500	.800	.750	.750	.788

Accurate Counts
978-664-2565

N/S Street : Northampton St/Crosstown Dr
E/W Street: Albany Street
City/State : Boston, MA
Weather : Cloudy

File Name : 11032001
Site Code : 11032001
Start Date : 8/8/2013
Page No : 2



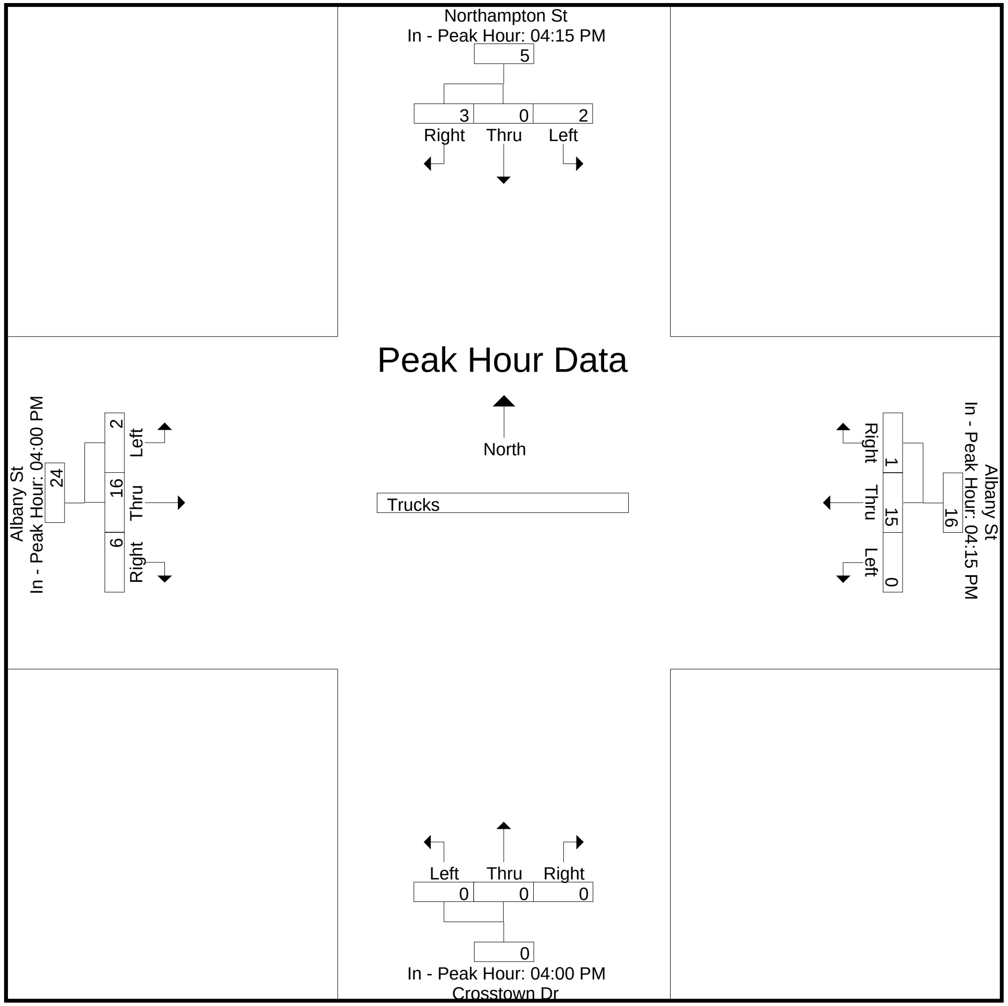
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:15 PM				04:15 PM				04:00 PM				04:00 PM			
+0 mins.	0	0	1	1	0	**5**	**1**	**6**	0	0	0	0	**1**	**5**	**2**	**8**
+15 mins.	**1**	0	0	1	0	2	0	2	0	0	0	0	1	4	1	6
+30 mins.	0	0	0	0	0	4	0	4	0	0	0	0	0	2	1	3
+45 mins.	1	0	**2**	**3**	0	4	0	4	0	0	0	0	0	5	2	7
Total Volume	2	0	3	5	0	15	1	16	0	0	0	0	2	16	6	24
% App. Total	40	0	60		0	93.8	6.2		0	0	0		8.3	66.7	25	
PHF	.500	.000	.375	.417	.000	.750	.250	.667	.000	.000	.000	.000	.500	.800	.750	.750

Accurate Counts
978-664-2565

N/S Street : Northampton St/Crosstown Dr
E/W Street: Albany Street
City/State : Boston, MA
Weather : Cloudy

File Name : 11032001
Site Code : 11032001
Start Date : 8/8/2013
Page No : 3



Accurate Counts
978-664-2565

N/S Street : Northampton St/Crosstown Dr
E/W Street: Albany Street
City/State : Boston, MA
Weather : Cloudy

File Name : 11032001
Site Code : 11032001
Start Date : 8/8/2013
Page No : 1

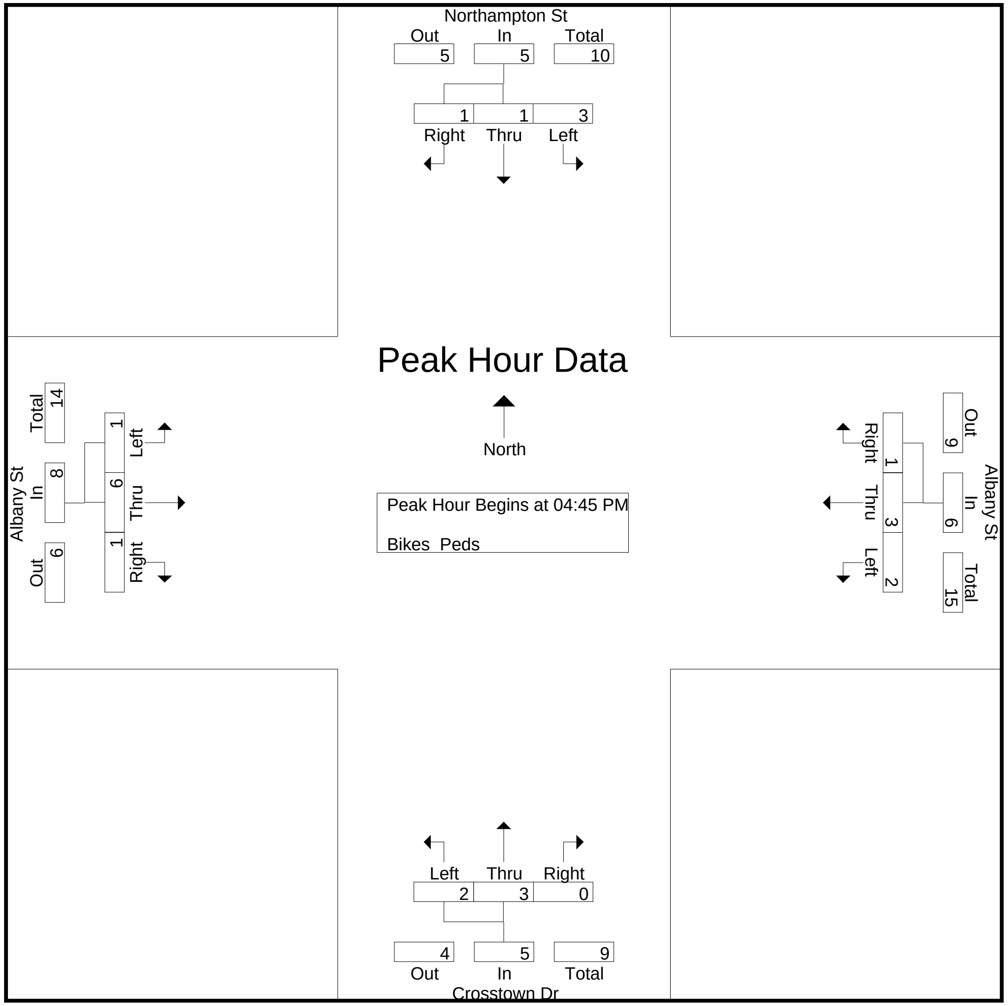
Groups Printed- Bikes Peds

	Northampton St From North				Albany St From East				Crosstown Dr From South				Albany St From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
04:00 PM	0	1	0	22	0	0	0	8	0	2	0	15	0	1	1	4	49	5	54
04:15 PM	0	1	0	9	0	1	0	8	0	0	1	1	1	1	0	3	21	5	26
04:30 PM	0	0	2	39	0	1	0	28	0	0	0	8	0	0	0	0	75	3	78
04:45 PM	2	0	1	29	0	0	1	9	0	0	0	16	0	1	1	6	60	6	66
Total	2	2	3	99	0	2	1	53	0	2	1	40	1	3	2	13	205	19	224
05:00 PM	0	0	0	28	0	0	0	15	2	1	0	12	1	1	0	7	62	5	67
05:15 PM	1	1	0	26	1	3	0	13	0	0	0	5	0	2	0	2	46	8	54
05:30 PM	0	0	0	46	1	0	0	10	0	2	0	5	0	2	0	3	64	5	69
05:45 PM	0	1	0	24	0	1	0	3	0	0	0	5	0	1	0	4	36	3	39
Total	1	2	0	124	2	4	0	41	2	3	0	27	1	6	0	16	208	21	229
Grand Total	3	4	3	223	2	6	1	94	2	5	1	67	2	9	2	29	413	40	453
Apprch %	30	40	30		22.2	66.7	11.1		25	62.5	12.5		15.4	69.2	15.4				
Total %	7.5	10	7.5		5	15	2.5		5	12.5	2.5		5	22.5	5		91.2	8.8	

	Northampton St From North				Albany St From East				Crosstown Dr From South				Albany St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	**2**	0	**1**	**3**	0	0	**1**	1	0	0	0	0	0	1	**1**	**2**	6
05:00 PM	0	0	0	0	0	0	0	0	**2**	1	0	**3**	**1**	1	0	2	5
05:15 PM	1	**1**	0	2	**1**	**3**	0	**4**	0	0	0	0	0	**2**	0	2	**8**
05:30 PM	0	0	0	0	1	0	0	1	0	**2**	0	2	0	2	0	2	5
Total Volume	3	1	1	5	2	3	1	6	2	3	0	5	1	6	1	8	24
% App. Total	60	20	20		33.3	50	16.7		40	60	0		12.5	75	12.5		
PHF	.375	.250	.250	.417	.500	.250	.250	.375	.250	.375	.000	.417	.250	.750	.250	1.00	.750

N/S Street : Northampton St/Crosstown Dr
E/W Street: Albany Street
City/State : Boston, MA
Weather : Cloudy

File Name : 11032001
Site Code : 11032001
Start Date : 8/8/2013
Page No : 2



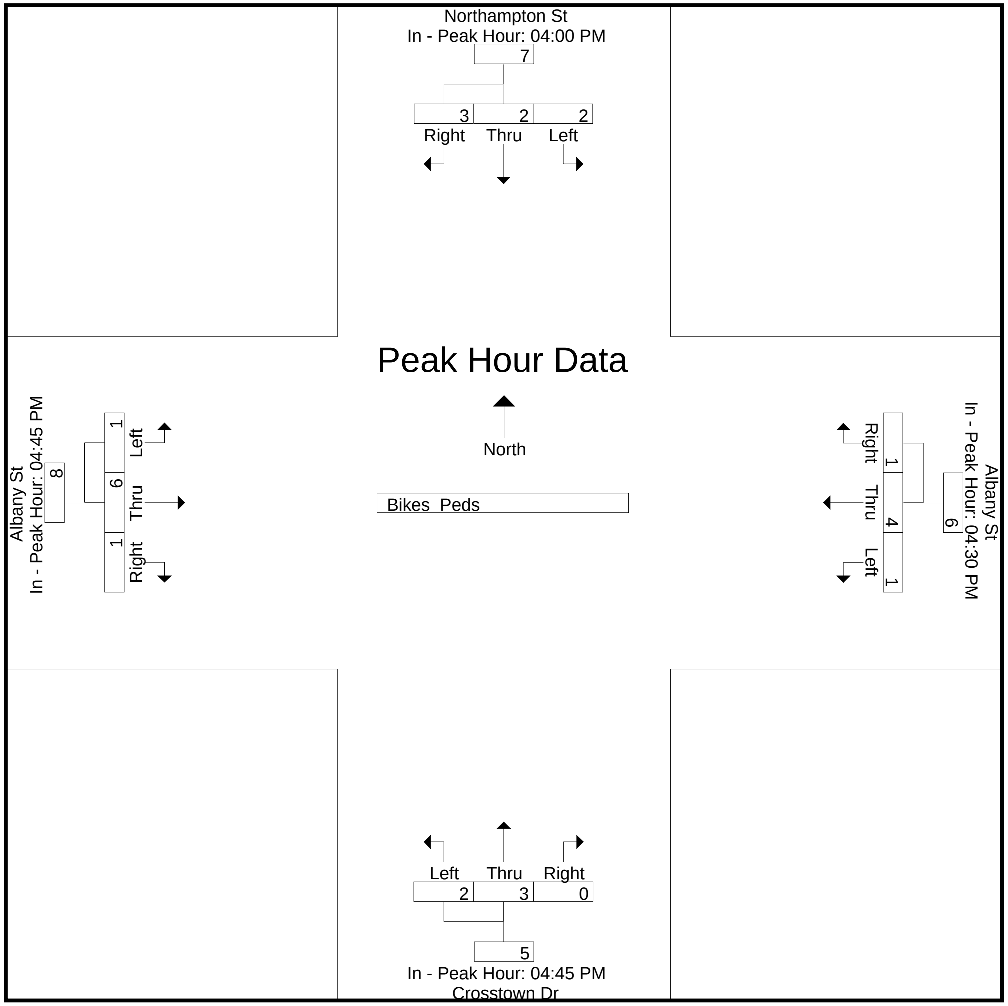
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:00 PM				04:30 PM				04:45 PM				04:45 PM			
+0 mins.	0	**1**	0	1	0	1	0	1	0	0	0	0	0	1	**1**	**2**
+15 mins.	0	1	0	1	0	0	**1**	1	**2**	1	0	**3**	**1**	1	0	2
+30 mins.	0	0	**2**	2	0	0	0	0	0	0	0	0	0	**2**	0	2
+45 mins.	**2**	0	1	**3**	**1**	**3**	0	**4**	0	**2**	0	2	0	2	0	2
Total Volume	2	2	3	7	1	4	1	6	2	3	0	5	1	6	1	8
% App. Total	28.6	28.6	42.9		16.7	66.7	16.7		40	60	0		12.5	75	12.5	
PHF	.250	.500	.375	.583	.250	.333	.250	.375	.250	.375	.000	.417	.250	.750	.250	1.000

Accurate Counts
978-664-2565

N/S Street : Northampton St/Crosstown Dr
E/W Street: Albany Street
City/State : Boston, MA
Weather : Cloudy

File Name : 11032001
Site Code : 11032001
Start Date : 8/8/2013
Page No : 3



Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Harrison Avenue
City/State : Boston, MA
Weather : Cloudy

File Name : 11032002
Site Code : 11032002
Start Date : 8/8/2013
Page No : 1

Groups Printed- Cars - Trucks

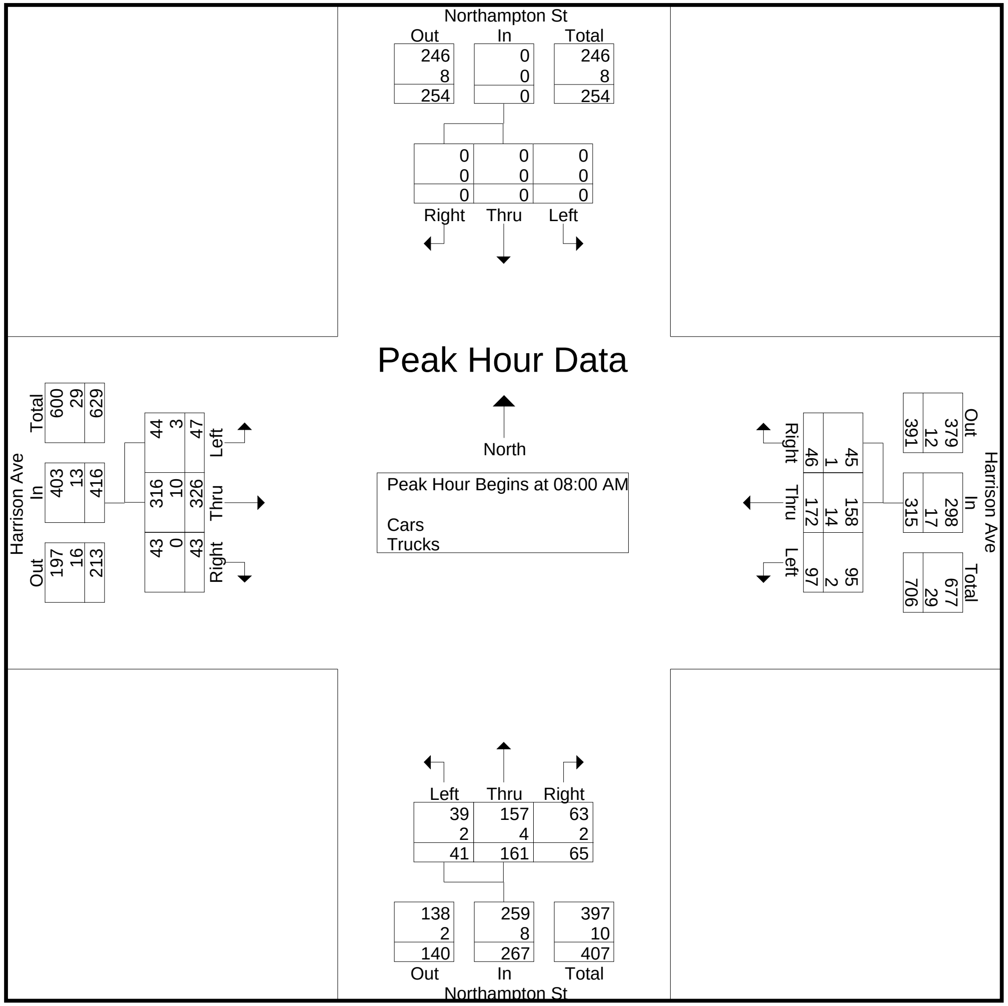
	Northampton St From North			Harrison Ave From East			Northampton St From South			Harrison Ave From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	0	0	0	21	27	10	9	28	14	7	37	9	162
07:15 AM	0	0	0	21	41	11	12	31	14	0	43	12	185
07:30 AM	0	0	0	27	41	8	13	27	4	7	80	14	221
07:45 AM	0	0	0	29	47	6	19	33	15	8	57	14	228
Total	0	0	0	98	156	35	53	119	47	22	217	49	796
08:00 AM	0	0	0	23	50	8	14	38	19	10	76	9	247
08:15 AM	0	0	0	24	33	16	6	39	17	10	94	10	249
08:30 AM	0	0	0	23	35	16	6	40	18	12	83	13	246
08:45 AM	0	0	0	27	54	6	15	44	11	15	73	11	256
Total	0	0	0	97	172	46	41	161	65	47	326	43	998
Grand Total	0	0	0	195	328	81	94	280	112	69	543	92	1794
Apprch %	0	0	0	32.3	54.3	13.4	19.3	57.6	23	9.8	77.1	13.1	
Total %	0	0	0	10.9	18.3	4.5	5.2	15.6	6.2	3.8	30.3	5.1	
Cars	0	0	0	191	298	78	92	269	109	65	523	91	1716
% Cars	0	0	0	97.9	90.9	96.3	97.9	96.1	97.3	94.2	96.3	98.9	95.7
Trucks	0	0	0	4	30	3	2	11	3	4	20	1	78
% Trucks	0	0	0	2.1	9.1	3.7	2.1	3.9	2.7	5.8	3.7	1.1	4.3

	Northampton St From North				Harrison Ave From East				Northampton St From South				Harrison Ave From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	0	0	0	0	23	50	8	81	14	38	**19**	**71**	10	76	9	95	247
08:15 AM	0	0	0	0	24	33	**16**	73	6	39	17	62	10	**94**	10	**114**	249
08:30 AM	0	0	0	0	23	35	16	74	6	40	18	64	12	83	**13**	108	246
08:45 AM	0	0	0	0	**27**	**54**	6	**87**	**15**	**44**	11	70	**15**	73	11	99	**256**
Total Volume	0	0	0	0	97	172	46	315	41	161	65	267	47	326	43	416	998
% App. Total	0	0	0		30.8	54.6	14.6		15.4	60.3	24.3		11.3	78.4	10.3		
PHF	.000	.000	.000	.000	.898	.796	.719	.905	.683	.915	.855	.940	.783	.867	.827	.912	.975
Cars	0	0	0	0	95	158	45	298	39	157	63	259	44	316	43	403	960
% Cars	0	0	0	0	97.9	91.9	97.8	94.6	95.1	97.5	96.9	97.0	93.6	96.9	100	96.9	96.2
Trucks	0	0	0	0	2	14	1	17	2	4	2	8	3	10	0	13	38
% Trucks	0	0	0	0	2.1	8.1	2.2	5.4	4.9	2.5	3.1	3.0	6.4	3.1	0	3.1	3.8

Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Harrison Avenue
City/State : Boston, MA
Weather : Cloudy

File Name : 11032002
Site Code : 11032002
Start Date : 8/8/2013



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

	07:00 AM				08:00 AM				08:00 AM				08:00 AM			
+0 mins.	0	0	0	0	23	50	8	81	14	38	**19**	**71**	10	76	9	95
+15 mins.	0	0	0	0	24	33	**16**	73	6	39	17	62	10	**94**	10	**114**
+30 mins.	0	0	0	0	23	35	16	74	6	40	18	64	12	83	**13**	108
+45 mins.	0	0	0	0	**27**	**54**	6	**87**	**15**	**44**	11	70	**15**	73	11	99
Total Volume	0	0	0	0	97	172	46	315	41	161	65	267	47	326	43	416
% App. Total	0	0	0		30.8	54.6	14.6		15.4	60.3	24.3		11.3	78.4	10.3	
PHF	.000	.000	.000	.000	.898	.796	.719	.905	.683	.915	.855	.940	.783	.867	.827	.912
Cars	0	0	0	0	95	158	45	298	39	157	63	259	44	316	43	403
% Cars	0	0	0	0	97.9	91.9	97.8	94.6	95.1	97.5	96.9	97	93.6	96.9	100	96.9
Trucks	0	0	0	0	2	14	1	17	2	4	2	8	3	10	0	13

Accurate Counts
978-664-2565

Peak Hour Data

North

Cars
Trucks

Northampton St — In - Peak Hour: 07:00 AM

	Right	Thru	Left	In
Cars	0	0	0	0
Trucks	0	0	0	0
Total	0	0	0	0

Harrison Ave — In - Peak Hour: 08:00 AM (West)

	Left	Thru	Right	In
Cars	44	316	43	403
Trucks	3	10	0	13
Total	47	326	43	416

Harrison Ave — In - Peak Hour: 08:00 AM (East)

	Right	Thru	Left	In
Cars	45	158	95	298
Trucks	1	14	2	17
Total	46	172	97	315

Northampton St — In - Peak Hour: 08:00 AM

	Left	Thru	Right	In
Cars	39	157	63	259
Trucks	2	4	2	8
Total	41	161	65	267

Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Harrison Avenue
City/State : Boston, MA
Weather : Cloudy

File Name : 11032002
Site Code : 11032002
Start Date : 8/8/2013
Page No : 1

Groups Printed- Cars

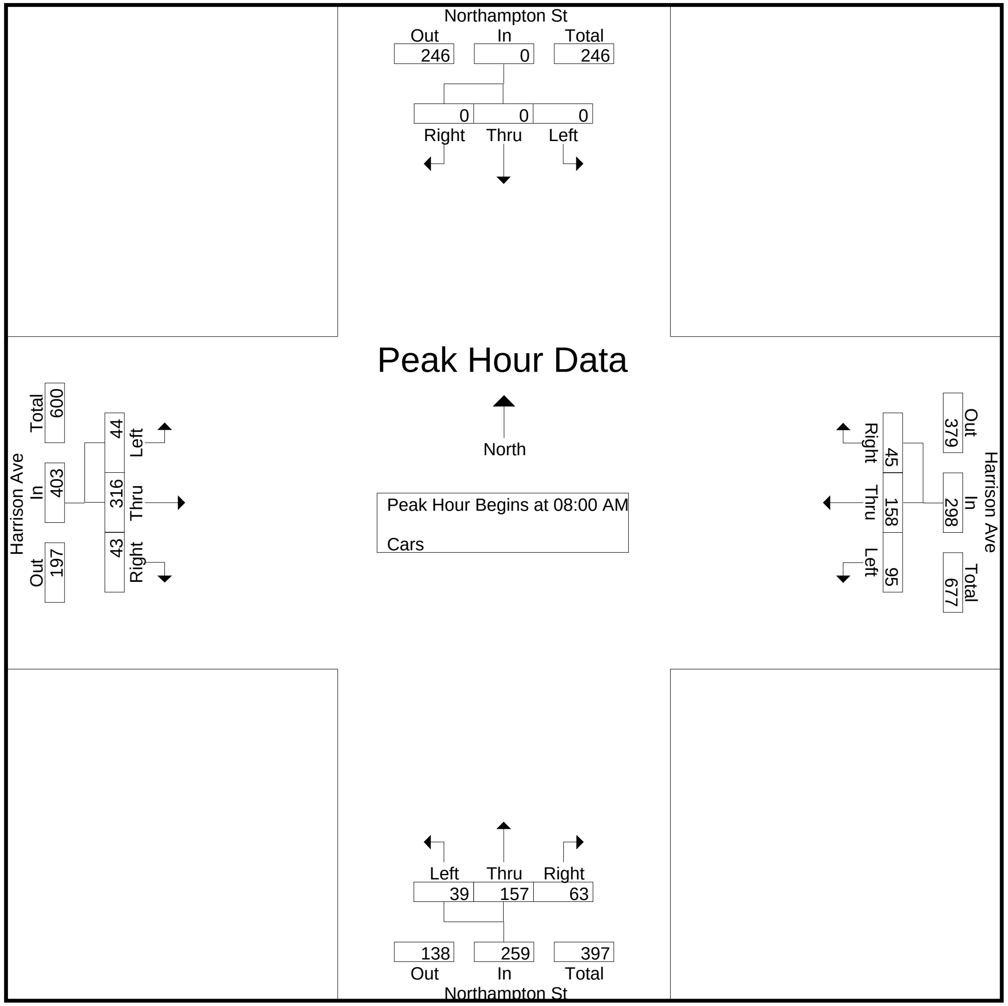
	Northampton St From North			Harrison Ave From East			Northampton St From South			Harrison Ave From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	0	0	0	21	23	9	9	27	14	7	34	9	153
07:15 AM	0	0	0	21	37	11	12	30	14	0	41	12	178
07:30 AM	0	0	0	26	36	8	13	26	4	7	77	13	210
07:45 AM	0	0	0	28	44	5	19	29	14	7	55	14	215
Total	0	0	0	96	140	33	53	112	46	21	207	48	756
08:00 AM	0	0	0	23	45	8	14	36	19	9	71	9	234
08:15 AM	0	0	0	23	32	16	6	38	15	9	91	10	240
08:30 AM	0	0	0	22	32	15	6	40	18	11	81	13	238
08:45 AM	0	0	0	27	49	6	13	43	11	15	73	11	248
Total	0	0	0	95	158	45	39	157	63	44	316	43	960
Grand Total	0	0	0	191	298	78	92	269	109	65	523	91	1716
Apprch %	0	0	0	33.7	52.6	13.8	19.6	57.2	23.2	9.6	77	13.4	
Total %	0	0	0	11.1	17.4	4.5	5.4	15.7	6.4	3.8	30.5	5.3	

	Northampton St From North				Harrison Ave From East				Northampton St From South				Harrison Ave From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	0	0	0	0	23	45	8	76	**14**	36	**19**	**69**	9	71	9	89	234
08:15 AM	0	0	0	0	23	32	**16**	71	6	38	15	59	9	**91**	10	**110**	240
08:30 AM	0	0	0	0	22	32	15	69	6	40	18	64	11	81	**13**	105	238
08:45 AM	0	0	0	0	**27**	**49**	6	**82**	13	**43**	11	67	**15**	73	11	99	**248**
Total Volume	0	0	0	0	95	158	45	298	39	157	63	259	44	316	43	403	960
% App. Total	0	0	0		31.9	53	15.1		15.1	60.6	24.3		10.9	78.4	10.7		
PHF	.000	.000	.000	.000	.880	.806	.703	.909	.696	.913	.829	.938	.733	.868	.827	.916	.968

Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Harrison Avenue
City/State : Boston, MA
Weather : Cloudy

File Name : 11032002
Site Code : 11032002
Start Date : 8/8/2013
Page No : 2



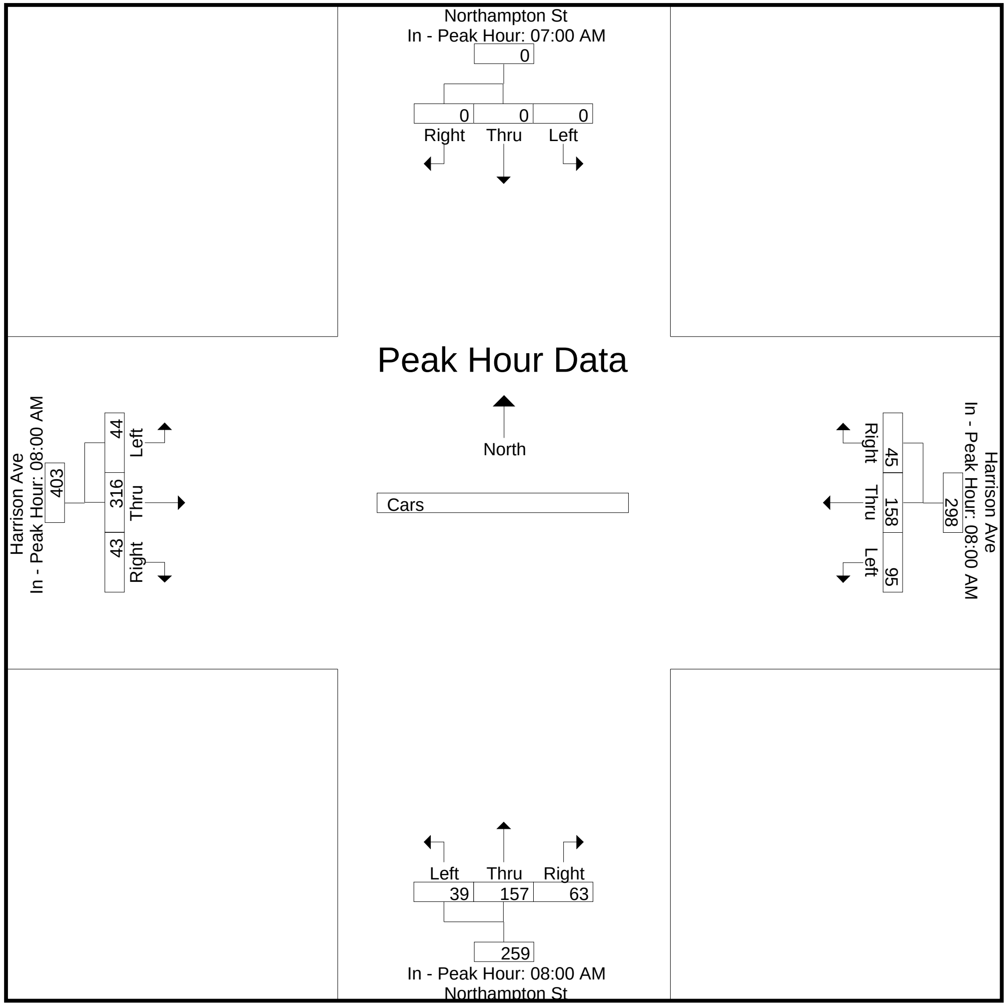
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:00 AM				08:00 AM				08:00 AM				08:00 AM			
+0 mins.	0	0	0	0	23	45	8	76	**14**	36	**19**	**69**	9	71	9	89
+15 mins.	0	0	0	0	23	32	**16**	71	6	38	15	59	9	**91**	10	**110**
+30 mins.	0	0	0	0	22	32	15	69	6	40	18	64	11	81	**13**	105
+45 mins.	0	0	0	0	**27**	**49**	6	**82**	13	**43**	11	67	**15**	73	11	99
Total Volume	0	0	0	0	95	158	45	298	39	157	63	259	44	316	43	403
% App. Total	0	0	0		31.9	53	15.1		15.1	60.6	24.3		10.9	78.4	10.7	
PHF	.000	.000	.000	.000	.880	.806	.703	.909	.696	.913	.829	.938	.733	.868	.827	.916

Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Harrison Avenue
City/State : Boston, MA
Weather : Cloudy

File Name : 11032002
Site Code : 11032002
Start Date : 8/8/2013
Page No : 3



Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Harrison Avenue
City/State : Boston, MA
Weather : Cloudy

File Name : 11032002
Site Code : 11032002
Start Date : 8/8/2013
Page No : 1

Groups Printed- Trucks

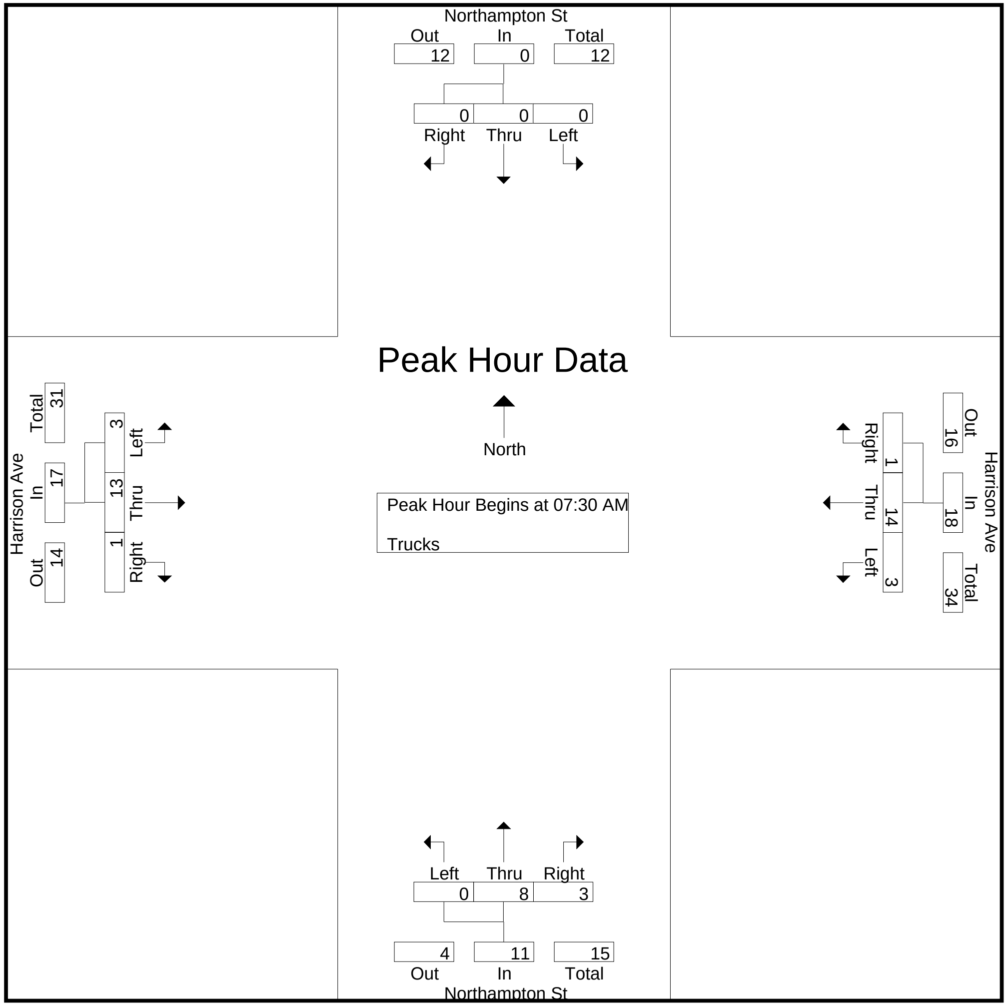
	Northampton St From North			Harrison Ave From East			Northampton St From South			Harrison Ave From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	0	0	0	0	4	1	0	1	0	0	3	0	9
07:15 AM	0	0	0	0	4	0	0	1	0	0	2	0	7
07:30 AM	0	0	0	1	5	0	0	1	0	0	3	1	11
07:45 AM	0	0	0	1	3	1	0	4	1	1	2	0	13
Total	0	0	0	2	16	2	0	7	1	1	10	1	40
08:00 AM	0	0	0	0	5	0	0	2	0	1	5	0	13
08:15 AM	0	0	0	1	1	0	0	1	2	1	3	0	9
08:30 AM	0	0	0	1	3	1	0	0	0	1	2	0	8
08:45 AM	0	0	0	0	5	0	2	1	0	0	0	0	8
Total	0	0	0	2	14	1	2	4	2	3	10	0	38
Grand Total	0	0	0	4	30	3	2	11	3	4	20	1	78
Apprch %	0	0	0	10.8	81.1	8.1	12.5	68.8	18.8	16	80	4	
Total %	0	0	0	5.1	38.5	3.8	2.6	14.1	3.8	5.1	25.6	1.3	

	Northampton St From North				Harrison Ave From East				Northampton St From South				Harrison Ave From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 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	**1**	**5**	0	**6**	0	1	0	1	0	3	**1**	4	11
07:45 AM	0	0	0	0	1	3	**1**	5	0	**4**	1	**5**	**1**	2	0	3	**13**
08:00 AM	0	0	0	0	0	5	0	5	0	2	0	2	1	**5**	0	**6**	13
08:15 AM	0	0	0	0	1	1	0	2	0	1	**2**	3	1	3	0	4	9
Total Volume	0	0	0	0	3	14	1	18	0	8	3	11	3	13	1	17	46
% App. Total	0	0	0		16.7	77.8	5.6		0	72.7	27.3		17.6	76.5	5.9		
PHF	.000	.000	.000	.000	.750	.700	.250	.750	.000	.500	.375	.550	.750	.650	.250	.708	.885

Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Harrison Avenue
City/State : Boston, MA
Weather : Cloudy

File Name : 11032002
Site Code : 11032002
Start Date : 8/8/2013



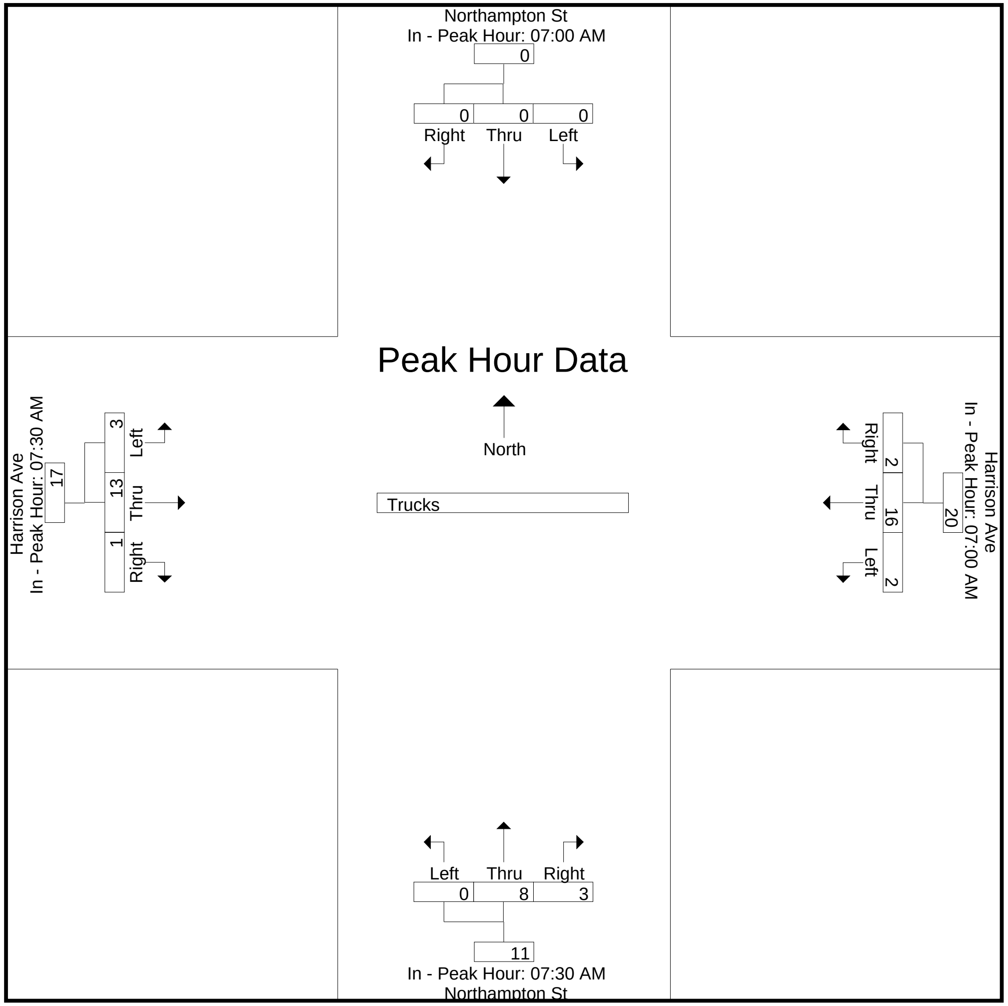
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:00 AM				07:00 AM				07:30 AM				07:30 AM			
+0 mins.	0	0	0	0	0	4	**1**	5	0	1	0	1	0	3	**1**	4
+15 mins.	0	0	0	0	0	4	0	4	0	**4**	1	**5**	**1**	2	0	3
+30 mins.	0	0	0	0	**1**	**5**	0	**6**	0	2	0	2	1	**5**	0	**6**
+45 mins.	0	0	0	0	1	3	1	5	0	1	**2**	3	1	3	0	4
Total Volume	0	0	0	0	2	16	2	20	0	8	3	11	3	13	1	17
% App. Total	0	0	0		10	80	10		0	72.7	27.3		17.6	76.5	5.9	
PHF	.000	.000	.000	.000	.500	.800	.500	.833	.000	.500	.375	.550	.750	.650	.250	.708

Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Harrison Avenue
City/State : Boston, MA
Weather : Cloudy

File Name : 11032002
Site Code : 11032002
Start Date : 8/8/2013
Page No : 3



Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Harrison Avenue
City/State : Boston, MA
Weather : Cloudy

File Name : 11032002
Site Code : 11032002
Start Date : 8/8/2013
Page No : 1

Groups Printed- Bikes Peds

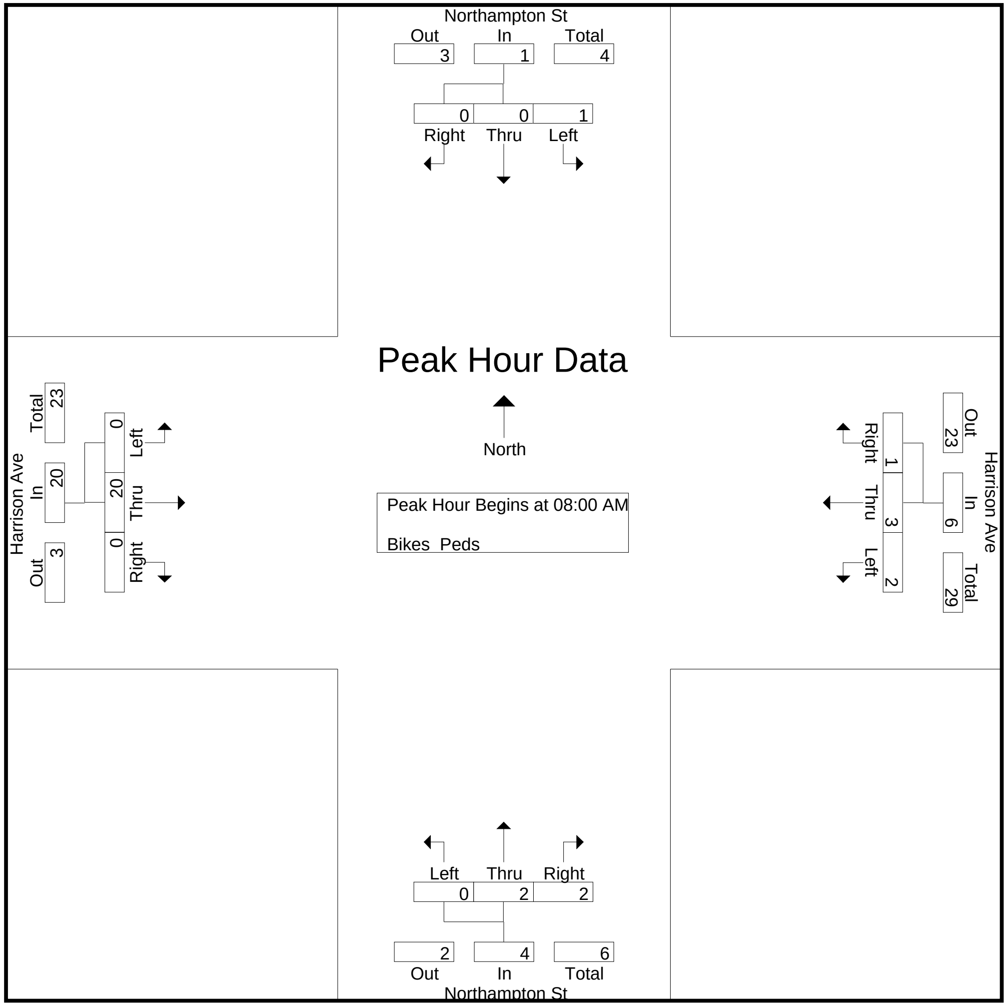
	Northampton St From North				Harrison Ave From East				Northampton St From South				Harrison Ave From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	0	0	14	0	1	0	10	0	0	1	17	0	1	0	4	45	3	48
07:15 AM	0	0	1	12	0	1	0	11	0	0	3	12	0	1	1	5	40	7	47
07:30 AM	0	0	0	24	0	0	0	12	0	0	0	14	0	2	1	5	55	3	58
07:45 AM	2	2	0	24	1	1	0	20	0	1	0	18	0	1	0	9	71	8	79
Total	2	2	1	74	1	3	0	53	0	1	4	61	0	5	2	23	211	21	232
08:00 AM	0	0	0	16	1	0	0	9	0	0	1	21	0	2	0	15	61	4	65
08:15 AM	1	0	0	26	1	2	0	13	0	0	0	24	0	5	0	18	81	9	90
08:30 AM	0	0	0	37	0	0	1	22	0	2	0	18	0	4	0	13	90	7	97
08:45 AM	0	0	0	36	0	1	0	26	0	0	1	23	0	9	0	17	102	11	113
Total	1	0	0	115	2	3	1	70	0	2	2	86	0	20	0	63	334	31	365
Grand Total	3	2	1	189	3	6	1	123	0	3	6	147	0	25	2	86	545	52	597
Apprch %	50	33.3	16.7		30	60	10		0	33.3	66.7		0	92.6	7.4				
Total %	5.8	3.8	1.9		5.8	11.5	1.9		0	5.8	11.5		0	48.1	3.8		91.3	8.7	

	Northampton St From North				Harrison Ave From East				Northampton St From South				Harrison Ave From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	0	0	0	0	**1**	0	0	1	0	0	**1**	1	0	2	0	2	4
08:15 AM	**1**	0	0	**1**	1	**2**	0	**3**	0	0	0	0	0	5	0	5	9
08:30 AM	0	0	0	0	0	0	**1**	1	0	**2**	0	**2**	0	4	0	4	7
08:45 AM	0	0	0	0	0	1	0	1	0	0	1	1	0	**9**	0	**9**	**11**
Total Volume	1	0	0	1	2	3	1	6	0	2	2	4	0	20	0	20	31
% App. Total	100	0	0		33.3	50	16.7		0	50	50		0	100	0		
PHF	.250	.000	.000	.250	.500	.375	.250	.500	.000	.250	.500	.500	.000	.556	.000	.556	.705

Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Harrison Avenue
City/State : Boston, MA
Weather : Cloudy

File Name : 11032002
Site Code : 11032002
Start Date : 8/8/2013
Page No : 2



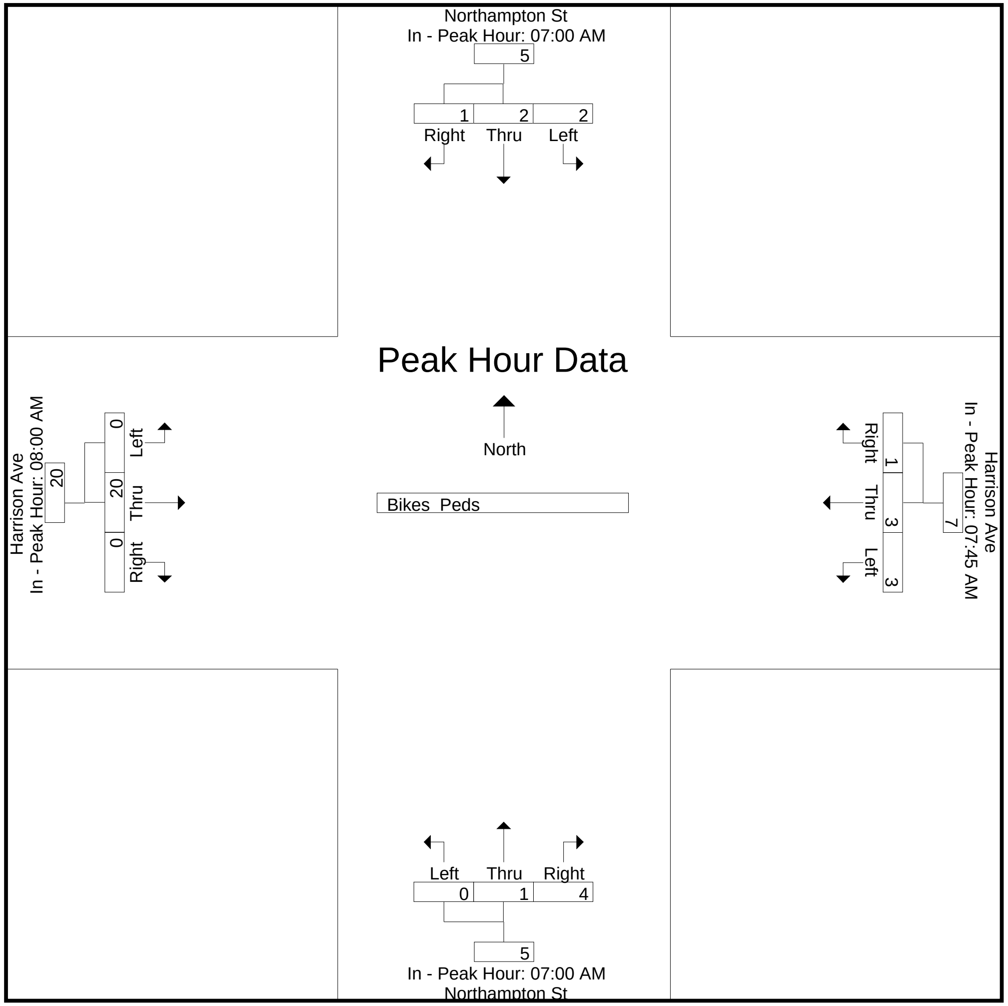
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:00 AM				07:45 AM				07:00 AM				08:00 AM			
+0 mins.	0	0	0	0	**1**	1	0	2	0	0	1	1	0	2	0	2
+15 mins.	0	0	**1**	1	1	0	0	1	0	0	**3**	**3**	0	5	0	5
+30 mins.	0	0	0	0	1	**2**	0	**3**	0	0	0	0	0	4	0	4
+45 mins.	**2**	**2**	0	**4**	0	0	**1**	1	0	**1**	0	1	0	**9**	0	**9**
Total Volume	2	2	1	5	3	3	1	7	0	1	4	5	0	20	0	20
% App. Total	40	40	20		42.9	42.9	14.3		0	20	80		0	100	0	
PHF	.250	.250	.250	.313	.750	.375	.250	.583	.000	.250	.333	.417	.000	.556	.000	.556

Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Harrison Avenue
City/State : Boston, MA
Weather : Cloudy

File Name : 11032002
Site Code : 11032002
Start Date : 8/8/2013
Page No : 3



Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Harrison Avenue
City/State : Boston, MA
Weather : Cloudy

File Name : 11032002
Site Code : 11032002
Start Date : 8/8/2013
Page No : 1

Groups Printed- Cars - Trucks

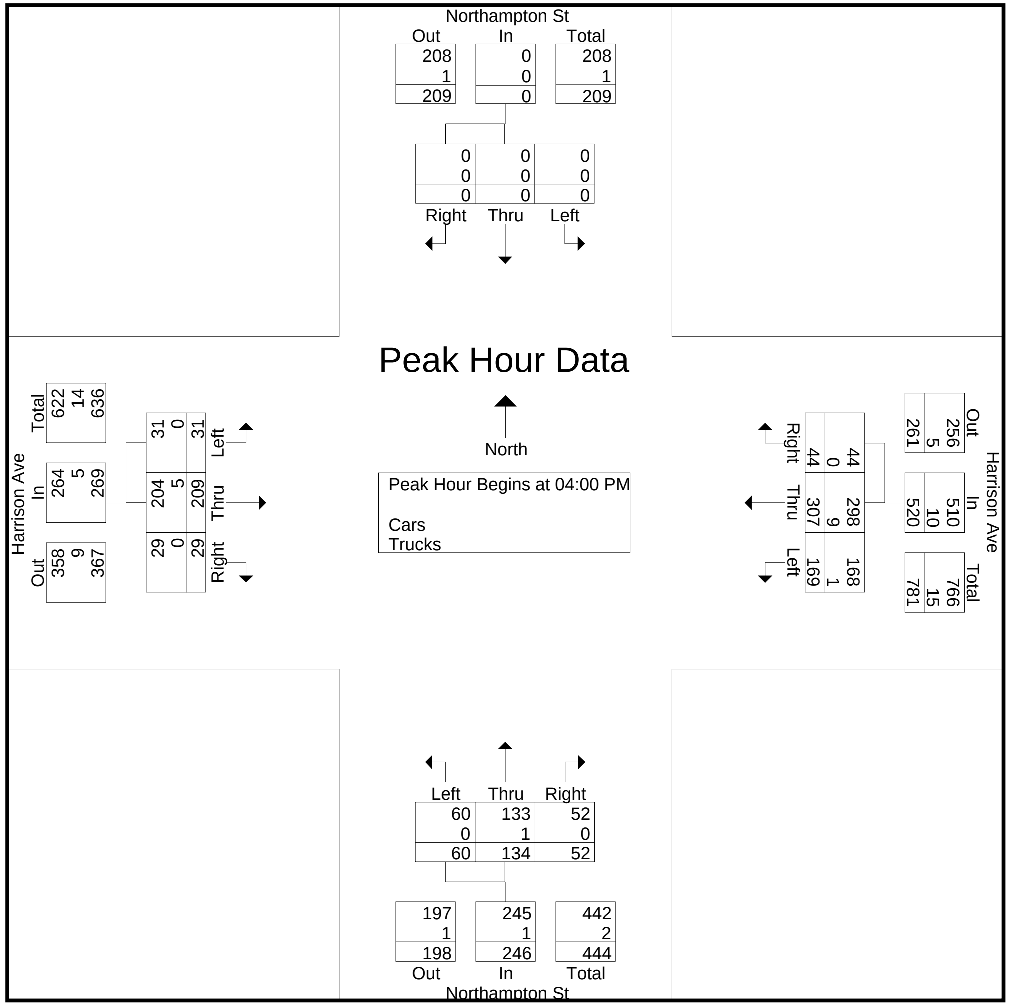
	Northampton St From North			Harrison Ave From East			Northampton St From South			Harrison Ave From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
04:00 PM	0	0	0	46	74	11	17	27	14	10	60	6	265
04:15 PM	0	0	0	42	83	8	11	30	17	6	48	6	251
04:30 PM	0	0	0	43	72	9	12	33	7	6	45	8	235
04:45 PM	0	0	0	38	78	16	20	44	14	9	56	9	284
Total	0	0	0	169	307	44	60	134	52	31	209	29	1035
05:00 PM	0	0	0	40	71	8	18	36	12	7	57	7	256
05:15 PM	0	0	0	37	71	10	5	41	11	9	55	5	244
05:30 PM	0	0	0	55	63	10	10	37	13	8	45	7	248
05:45 PM	0	0	0	42	51	6	9	33	6	6	33	5	191
Total	0	0	0	174	256	34	42	147	42	30	190	24	939
Grand Total	0	0	0	343	563	78	102	281	94	61	399	53	1974
Apprch %	0	0	0	34.9	57.2	7.9	21.4	58.9	19.7	11.9	77.8	10.3	
Total %	0	0	0	17.4	28.5	4	5.2	14.2	4.8	3.1	20.2	2.7	
Cars	0	0	0	341	542	78	102	279	94	61	392	53	1942
% Cars	0	0	0	99.4	96.3	100	100	99.3	100	100	98.2	100	98.4
Trucks	0	0	0	2	21	0	0	2	0	0	7	0	32
% Trucks	0	0	0	0.6	3.7	0	0	0.7	0	0	1.8	0	1.6

	Northampton St From North				Harrison Ave From East				Northampton St From South				Harrison Ave From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	0	0	0	0	**46**	74	11	131	17	27	14	58	**10**	**60**	6	**76**	265
04:15 PM	0	0	0	0	42	**83**	8	**133**	11	30	**17**	58	6	48	6	60	251
04:30 PM	0	0	0	0	43	72	9	124	12	33	7	52	6	45	8	59	235
04:45 PM	0	0	0	0	38	78	**16**	132	**20**	**44**	14	**78**	9	56	**9**	74	**284**
Total Volume	0	0	0	0	169	307	44	520	60	134	52	246	31	209	29	269	1035
% App. Total	0	0	0		32.5	59	8.5		24.4	54.5	21.1		11.5	77.7	10.8		
PHF	.000	.000	.000	.000	.918	.925	.688	.977	.750	.761	.765	.788	.775	.871	.806	.885	.911
Cars	0	0	0	0	168	298	44	510	60	133	52	245	31	204	29	264	1019
% Cars	0	0	0	0	99.4	97.1	100	98.1	100	99.3	100	99.6	100	97.6	100	98.1	98.5
Trucks	0	0	0	0	1	9	0	10	0	1	0	1	0	5	0	5	16
% Trucks	0	0	0	0	0.6	2.9	0	1.9	0	0.7	0	0.4	0	2.4	0	1.9	1.5

Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Harrison Avenue
City/State : Boston, MA
Weather : Cloudy

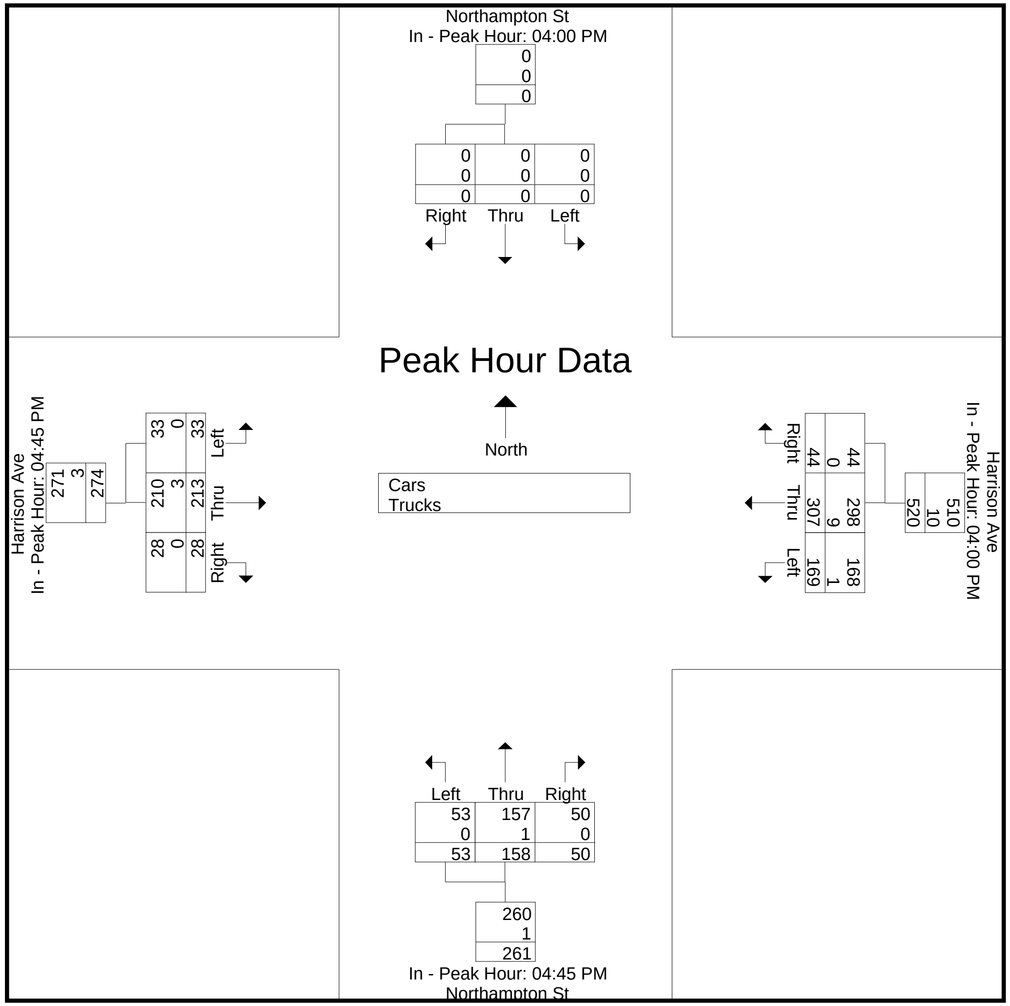
File Name : 11032002
Site Code : 11032002
Start Date : 8/8/2013
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:00 PM				04:00 PM				04:45 PM				04:45 PM			
+0 mins.	0	0	0	0	**46**	74	11	131	**20**	**44**	**14**	**78**	**9**	56	**9**	**74**
+15 mins.	0	0	0	0	42	**83**	8	**133**	18	36	12	66	7	**57**	7	71
+30 mins.	0	0	0	0	43	72	9	124	5	41	11	57	9	55	5	69
+45 mins.	0	0	0	0	38	78	**16**	132	10	37	13	60	8	45	7	60
Total Volume	0	0	0	0	169	307	44	520	53	158	50	261	33	213	28	274
% App. Total	0	0	0		32.5	59	8.5		20.3	60.5	19.2		12	77.7	10.2	
PHF	.000	.000	.000	.000	.918	.925	.688	.977	.663	.898	.893	.837	.917	.934	.778	.926
Cars	0	0	0	0	168	298	44	510	53	157	50	260	33	210	28	271
% Cars	0	0	0	0	99.4	97.1	100	98.1	100	99.4	100	99.6	100	98.6	100	98.9
Trucks	0	0	0	0	1	9	0	10	0	1	0	1	0	3	0	3

Accurate Counts
978-664-2565



Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Harrison Avenue
City/State : Boston, MA
Weather : Cloudy

File Name : 11032002
Site Code : 11032002
Start Date : 8/8/2013
Page No : 1

Groups Printed- Cars

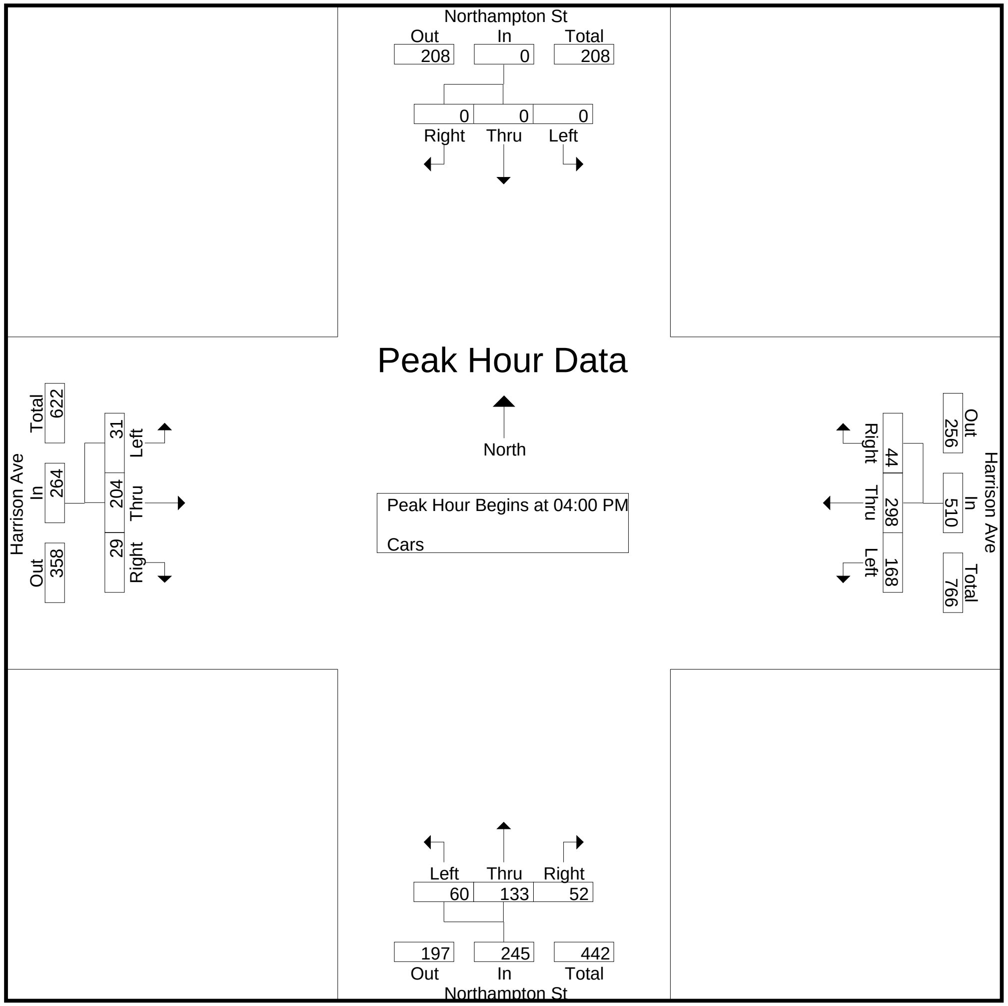
	Northampton St From North			**Harrison Ave From East**			**Northampton St From South**			**Harrison Ave From West**			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
04:00 PM	0	0	0	45	71	11	17	27	14	10	58	6	259
04:15 PM	0	0	0	42	82	8	11	29	17	6	46	6	247
04:30 PM	0	0	0	43	69	9	12	33	7	6	45	8	232
04:45 PM	0	0	0	38	76	16	20	44	14	9	55	9	281
Total	0	0	0	168	298	44	60	133	52	31	204	29	1019
05:00 PM	0	0	0	39	67	8	18	35	12	7	56	7	249
05:15 PM	0	0	0	37	68	10	5	41	11	9	55	5	241
05:30 PM	0	0	0	55	62	10	10	37	13	8	44	7	246
05:45 PM	0	0	0	42	47	6	9	33	6	6	33	5	187
Total	0	0	0	173	244	34	42	146	42	30	188	24	923
Grand Total	0	0	0	341	542	78	102	279	94	61	392	53	1942
Apprch %	0	0	0	35.5	56.4	8.1	21.5	58.7	19.8	12.1	77.5	10.5	
Total %	0	0	0	17.6	27.9	4	5.3	14.4	4.8	3.1	20.2	2.7	

	Northampton St From North				**Harrison Ave From East**				**Northampton St From South**				**Harrison Ave From West**				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	0	0	0	0	**45**	71	11	127	17	27	14	58	**10**	**58**	6	**74**	259
04:15 PM	0	0	0	0	42	**82**	8	**132**	11	29	**17**	57	6	46	6	58	247
04:30 PM	0	0	0	0	43	69	9	121	12	33	7	52	6	45	8	59	232
04:45 PM	0	0	0	0	38	76	**16**	130	**20**	**44**	14	**78**	9	55	**9**	73	**281**
Total Volume	0	0	0	0	168	298	44	510	60	133	52	245	31	204	29	264	1019
% App. Total	0	0	0		32.9	58.4	8.6		24.5	54.3	21.2		11.7	77.3	11		
PHF	.000	.000	.000	.000	.933	.909	.688	.966	.750	.756	.765	.785	.775	.879	.806	.892	.907

Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Harrison Avenue
City/State : Boston, MA
Weather : Cloudy

File Name : 11032002
Site Code : 11032002
Start Date : 8/8/2013
Page No : 2



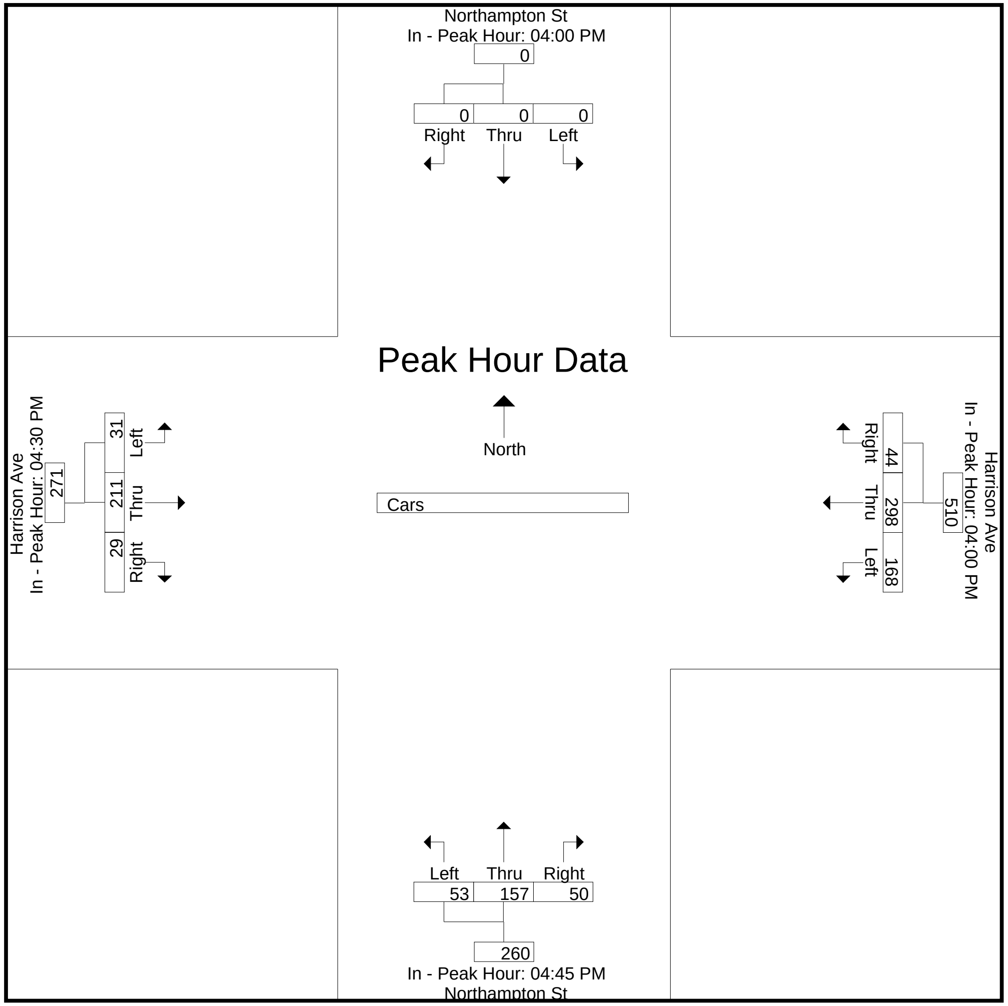
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:00 PM				04:00 PM				04:45 PM				04:30 PM			
+0 mins.	0	0	0	0	**45**	71	11	127	**20**	**44**	**14**	**78**	6	45	8	59
+15 mins.	0	0	0	0	42	**82**	8	**132**	18	35	12	65	**9**	55	**9**	**73**
+30 mins.	0	0	0	0	43	69	9	121	5	41	11	57	7	**56**	7	70
+45 mins.	0	0	0	0	38	76	**16**	130	10	37	13	60	9	55	5	69
Total Volume	0	0	0	0	168	298	44	510	53	157	50	260	31	211	29	271
% App. Total	0	0	0		32.9	58.4	8.6		20.4	60.4	19.2		11.4	77.9	10.7	
PHF	.000	.000	.000	.000	.933	.909	.688	.966	.663	.892	.893	.833	.861	.942	.806	.928

Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Harrison Avenue
City/State : Boston, MA
Weather : Cloudy

File Name : 11032002
Site Code : 11032002
Start Date : 8/8/2013
Page No : 3



Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Harrison Avenue
City/State : Boston, MA
Weather : Cloudy

File Name : 11032002
Site Code : 11032002
Start Date : 8/8/2013
Page No : 1

Groups Printed- Trucks

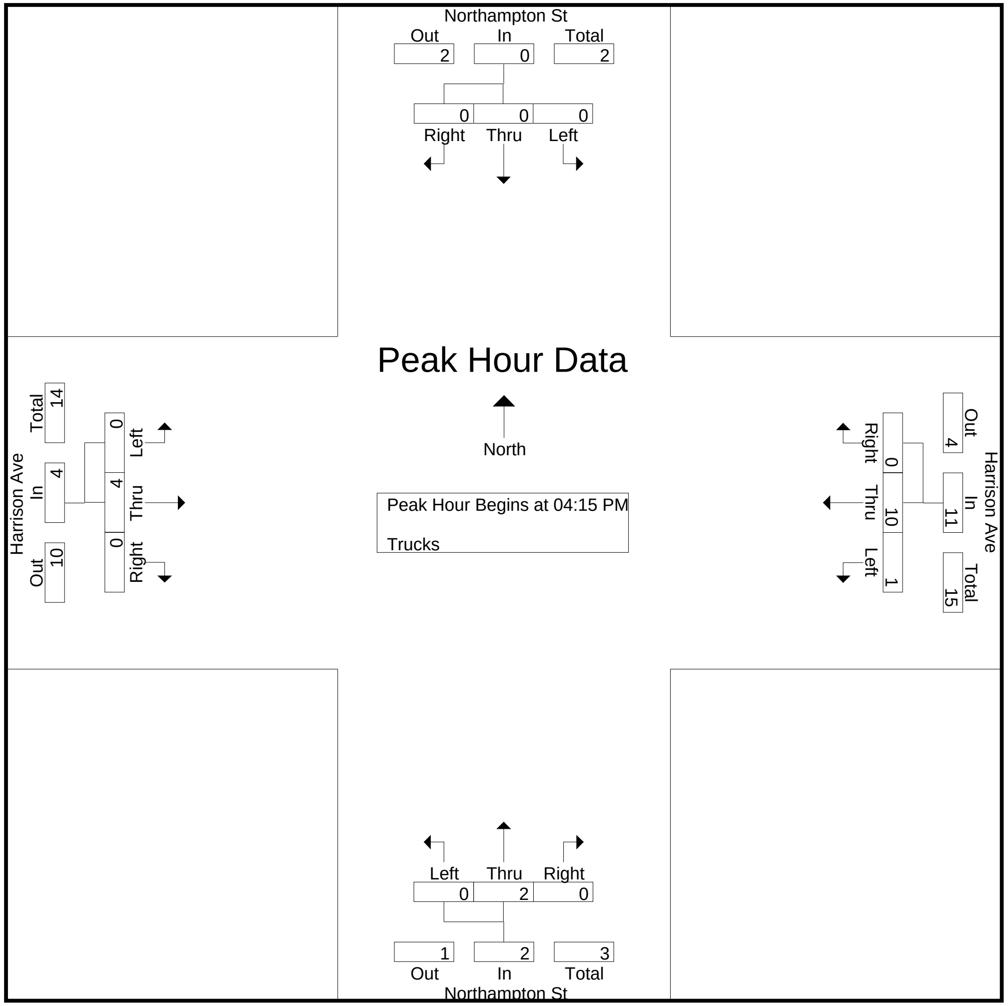
	Northampton St From North			**Harrison Ave From East**			**Northampton St From South**			**Harrison Ave From West**			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
04:00 PM	0	0	0	1	3	0	0	0	0	0	2	0	6
04:15 PM	0	0	0	0	1	0	0	1	0	0	2	0	4
04:30 PM	0	0	0	0	3	0	0	0	0	0	0	0	3
04:45 PM	0	0	0	0	2	0	0	0	0	0	1	0	3
Total	0	0	0	1	9	0	0	1	0	0	5	0	16
05:00 PM	0	0	0	1	4	0	0	1	0	0	1	0	7
05:15 PM	0	0	0	0	3	0	0	0	0	0	0	0	3
05:30 PM	0	0	0	0	1	0	0	0	0	0	1	0	2
05:45 PM	0	0	0	0	4	0	0	0	0	0	0	0	4
Total	0	0	0	1	12	0	0	1	0	0	2	0	16
Grand Total	0	0	0	2	21	0	0	2	0	0	7	0	32
Apprch %	0	0	0	8.7	91.3	0	0	100	0	0	100	0	
Total %	0	0	0	6.2	65.6	0	0	6.2	0	0	21.9	0	

	Northampton St From North				**Harrison Ave From East**				**Northampton St From South**				**Harrison Ave From West**				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:15 PM																	
04:15 PM	0	0	0	0	0	1	0	1	0	**1**	0	**1**	0	**2**	0	**2**	4
04:30 PM	0	0	0	0	0	3	0	3	0	0	0	0	0	0	0	0	3
04:45 PM	0	0	0	0	0	2	0	2	0	0	0	0	0	1	0	1	3
05:00 PM	0	0	0	0	**1**	**4**	0	**5**	0	1	0	1	0	1	0	1	**7**
Total Volume	0	0	0	0	1	10	0	11	0	2	0	2	0	4	0	4	17
% App. Total	0	0	0		9.1	90.9	0		0	100	0		0	100	0		
PHF	.000	.000	.000	.000	.250	.625	.000	.550	.000	.500	.000	.500	.000	.500	.000	.500	.607

Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Harrison Avenue
City/State : Boston, MA
Weather : Cloudy

File Name : 11032002
Site Code : 11032002
Start Date : 8/8/2013
Page No : 2



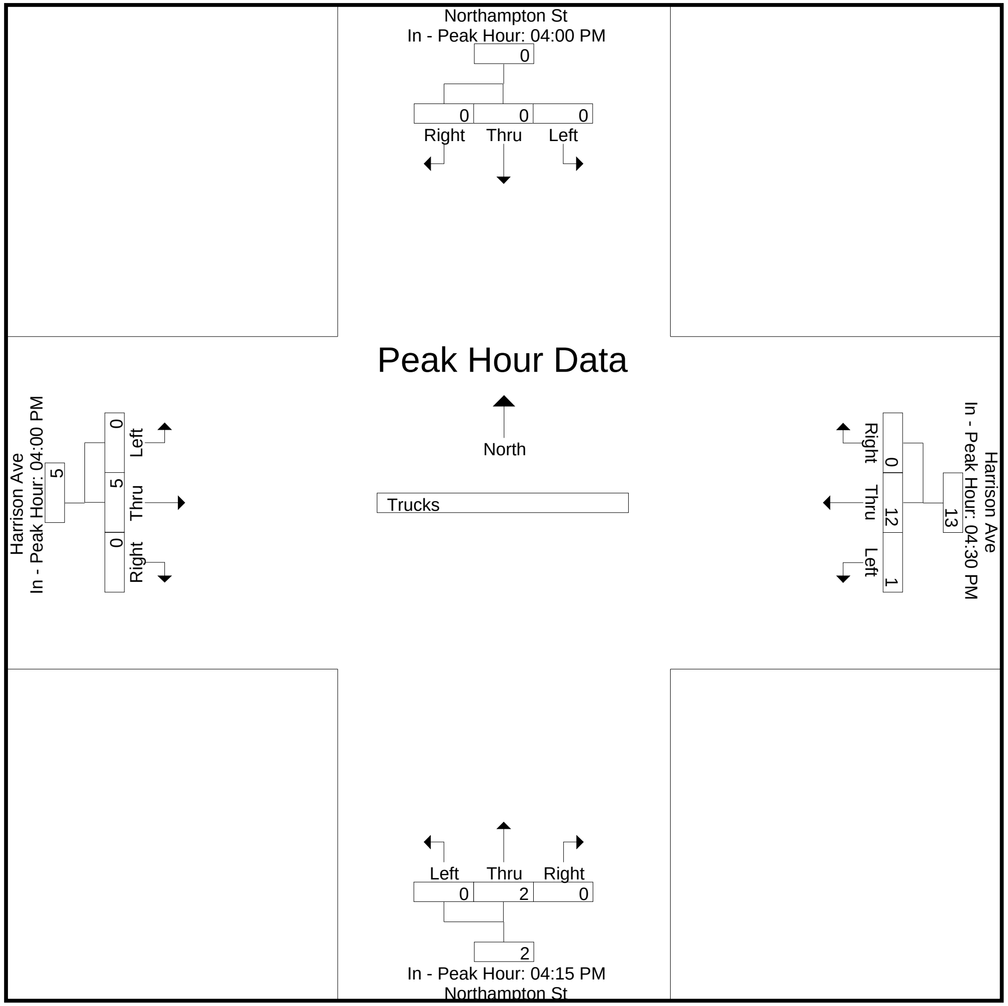
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:00 PM				04:30 PM				04:15 PM				04:00 PM			
+0 mins.	0	0	0	0	0	3	0	3	0	**1**	0	**1**	0	**2**	0	**2**
+15 mins.	0	0	0	0	0	2	0	2	0	0	0	0	0	2	0	2
+30 mins.	0	0	0	0	**1**	**4**	0	**5**	0	0	0	0	0	0	0	0
+45 mins.	0	0	0	0	0	3	0	3	0	1	0	1	0	1	0	1
Total Volume	0	0	0	0	1	12	0	13	0	2	0	2	0	5	0	5
% App. Total	0	0	0		7.7	92.3	0		0	100	0		0	100	0	
PHF	.000	.000	.000	.000	.250	.750	.000	.650	.000	.500	.000	.500	.000	.625	.000	.625

Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Harrison Avenue
City/State : Boston, MA
Weather : Cloudy

File Name : 11032002
Site Code : 11032002
Start Date : 8/8/2013
Page No : 3



Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Harrison Avenue
City/State : Boston, MA
Weather : Cloudy

File Name : 11032002
Site Code : 11032002
Start Date : 8/8/2013
Page No : 1

Groups Printed- Bikes Peds

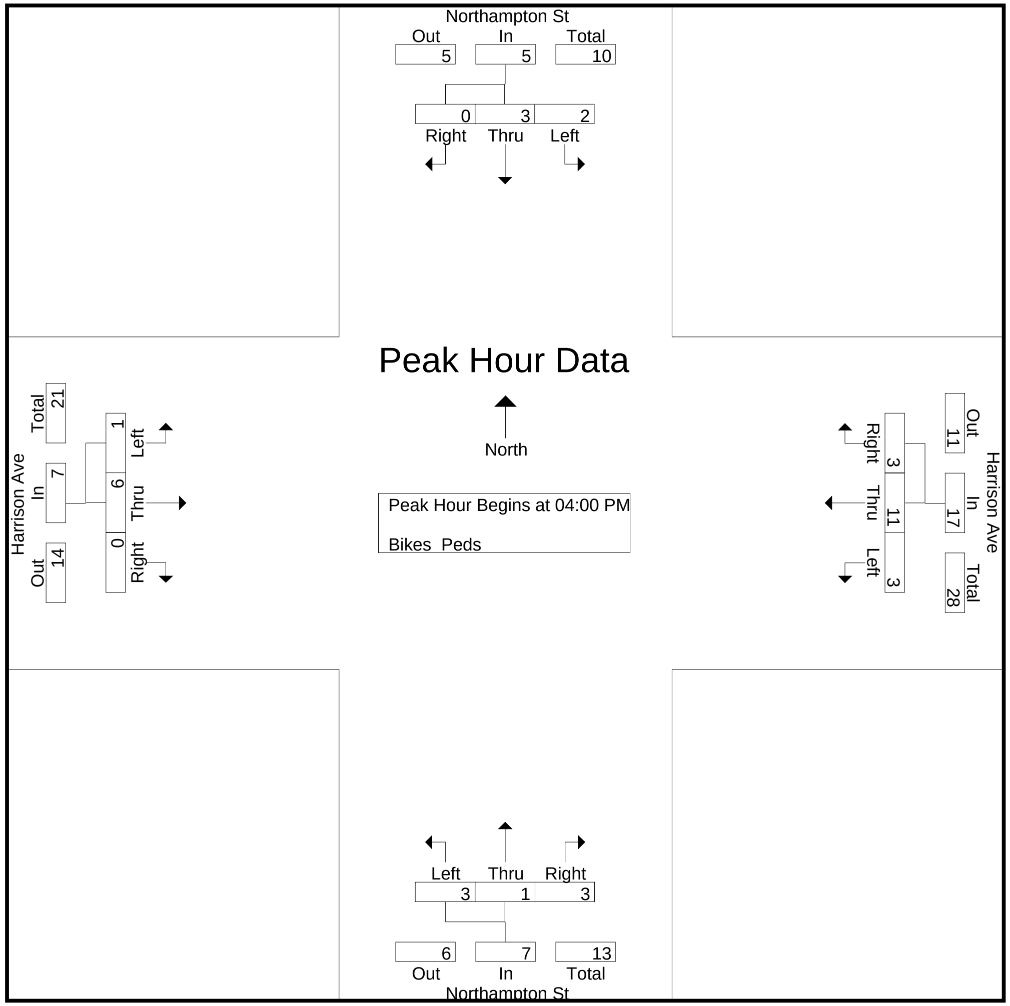
	Northampton St From North				Harrison Ave From East				Northampton St From South				Harrison Ave From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
04:00 PM	1	1	0	20	0	2	2	12	1	1	1	29	0	2	0	14	75	11	86
04:15 PM	1	0	0	36	0	4	0	11	0	0	2	27	1	3	0	8	82	11	93
04:30 PM	0	1	0	32	3	2	0	5	0	0	0	39	0	0	0	3	79	6	85
04:45 PM	0	1	0	17	0	3	1	8	2	0	0	32	0	1	0	13	70	8	78
Total	2	3	0	105	3	11	3	36	3	1	3	127	1	6	0	38	306	36	342
05:00 PM	0	0	1	21	1	1	0	5	1	1	0	45	0	4	0	12	83	9	92
05:15 PM	0	1	0	33	0	3	0	4	1	1	0	30	0	2	0	15	82	8	90
05:30 PM	0	0	0	27	0	4	0	9	0	2	0	14	1	3	0	12	62	10	72
05:45 PM	0	1	0	26	0	4	1	11	1	1	0	35	0	0	1	18	90	9	99
Total	0	2	1	107	1	12	1	29	3	5	0	124	1	9	1	57	317	36	353
Grand Total	2	5	1	212	4	23	4	65	6	6	3	251	2	15	1	95	623	72	695
Apprch %	25	62.5	12.5		12.9	74.2	12.9		40	40	20		11.1	83.3	5.6				
Total %	2.8	6.9	1.4		5.6	31.9	5.6		8.3	8.3	4.2		2.8	20.8	1.4		89.6	10.4	

	Northampton St From North				Harrison Ave From East				Northampton St From South				Harrison Ave From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	**1**	**1**	0	**2**	0	2	**2**	4	1	**1**	1	**3**	0	2	0	2	**11**
04:15 PM	1	0	0	1	0	**4**	0	4	0	0	**2**	2	**1**	**3**	0	**4**	11
04:30 PM	0	1	0	1	**3**	2	0	**5**	0	0	0	0	0	0	0	0	6
04:45 PM	0	1	0	1	0	3	1	4	**2**	0	0	2	0	1	0	1	8
Total Volume	2	3	0	5	3	11	3	17	3	1	3	7	1	6	0	7	36
% App. Total	40	60	0		17.6	64.7	17.6		42.9	14.3	42.9		14.3	85.7	0		
PHF	.500	.750	.000	.625	.250	.688	.375	.850	.375	.250	.375	.583	.250	.500	.000	.438	.818

Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Harrison Avenue
City/State : Boston, MA
Weather : Cloudy

File Name : 11032002
Site Code : 11032002
Start Date : 8/8/2013
Page No : 2



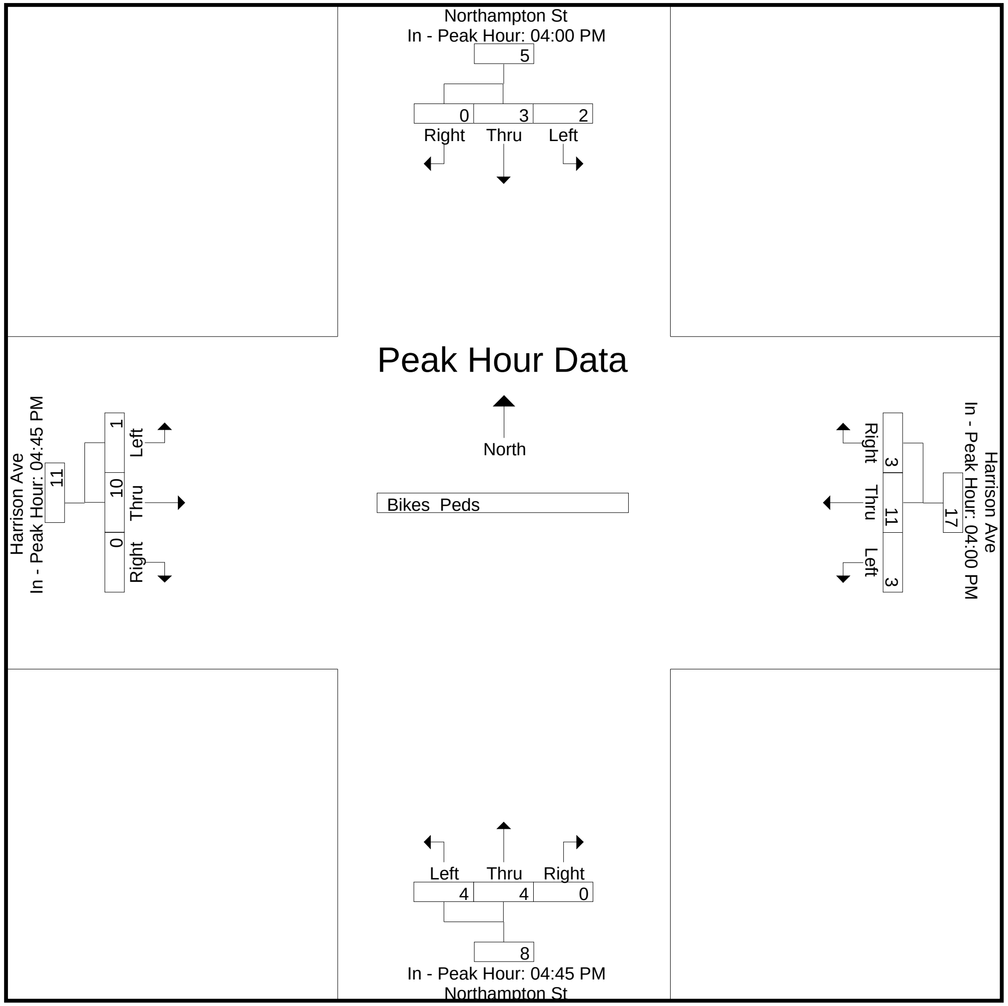
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:00 PM				04:00 PM				04:45 PM				04:45 PM			
+0 mins.	**1**	**1**	0	**2**	0	2	**2**	4	**2**	0	0	**2**	0	1	0	1
+15 mins.	1	0	0	1	0	**4**	0	4	1	1	0	2	0	**4**	0	**4**
+30 mins.	0	1	0	1	**3**	2	0	**5**	1	1	0	2	0	2	0	2
+45 mins.	0	1	0	1	0	3	1	4	0	**2**	0	2	**1**	3	0	4
Total Volume	2	3	0	5	3	11	3	17	4	4	0	8	1	10	0	11
% App. Total	40	60	0		17.6	64.7	17.6		50	50	0		9.1	90.9	0	
PHF	.500	.750	.000	.625	.250	.688	.375	.850	.500	.500	.000	1.000	.250	.625	.000	.688

Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Harrison Avenue
City/State : Boston, MA
Weather : Cloudy

File Name : 11032002
Site Code : 11032002
Start Date : 8/8/2013
Page No : 3



Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Garage Entrance
City/State : Boston, MA
Weather : Cloudy

File Name : 11032003
Site Code : 11032003
Start Date : 8/8/2013
Page No : 1

Groups Printed- Cars - Trucks

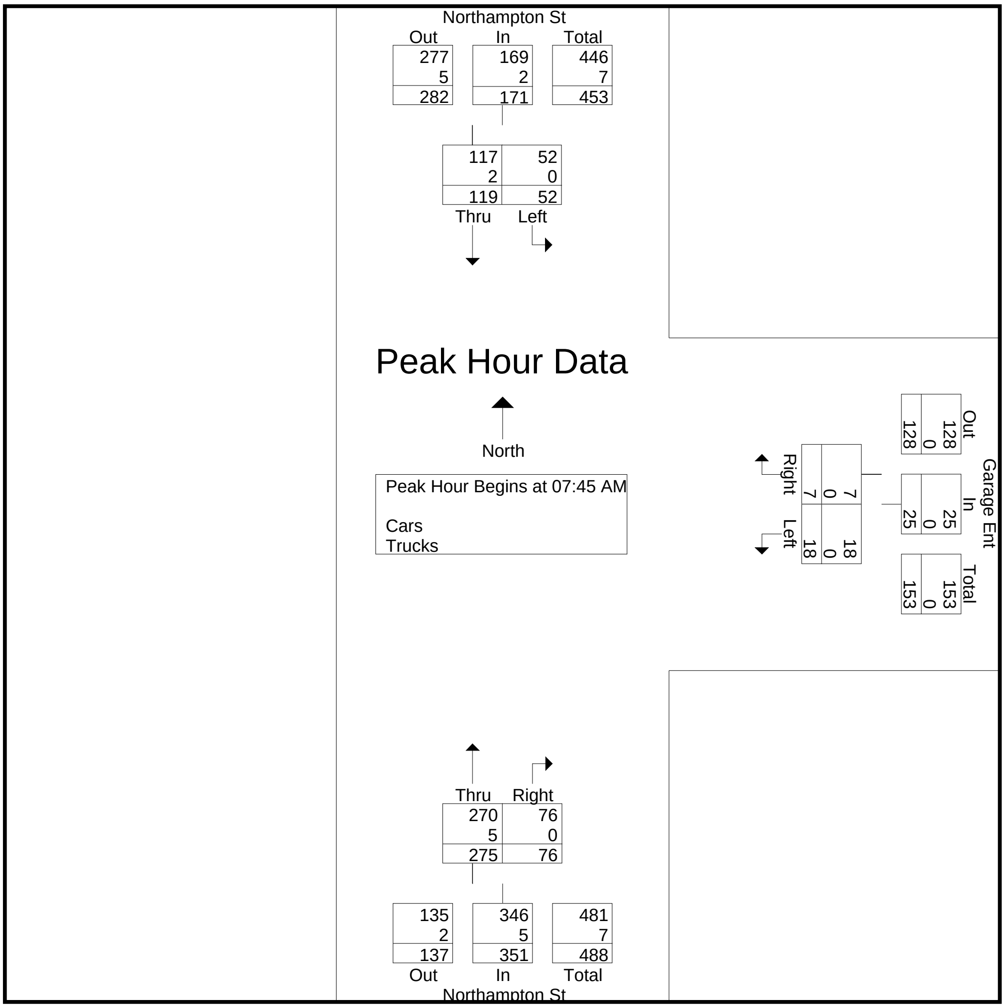
	Northampton St From North		**Garage Ent From East**		**Northampton St From South**		
Start Time	Left	Thru	Left	Right	Thru	Right	Int. Total
07:00 AM	11	21	4	1	50	12	99
07:15 AM	13	34	2	0	58	6	113
07:30 AM	21	34	0	2	60	11	128
07:45 AM	16	32	5	2	57	26	138
Total	61	121	11	5	225	55	478
08:00 AM	15	18	2	2	72	19	128
08:15 AM	10	37	4	1	70	17	139
08:30 AM	11	32	7	2	76	14	142
08:45 AM	5	37	3	0	61	10	116
Total	41	124	16	5	279	60	525
Grand Total	102	245	27	10	504	115	1003
Apprch %	29.4	70.6	73	27	81.4	18.6	
Total %	10.2	24.4	2.7	1	50.2	11.5	
Cars	102	242	27	10	494	115	990
% Cars	100	98.8	100	100	98	100	98.7
Trucks	0	3	0	0	10	0	13
% Trucks	0	1.2	0	0	2	0	1.3

	Northampton St From North			**Garage Ent From East**			**Northampton St From South**			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	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	**16**	32	**48**	5	**2**	7	57	**26**	83	138
08:00 AM	15	18	33	2	2	4	72	19	**91**	128
08:15 AM	10	**37**	47	4	1	5	70	17	87	139
08:30 AM	11	32	43	**7**	2	**9**	**76**	14	90	**142**
Total Volume	52	119	171	18	7	25	275	76	351	547
% App. Total	30.4	69.6		72	28		78.3	21.7		
PHF	.813	.804	.891	.643	.875	.694	.905	.731	.964	.963
Cars	52	117	169	18	7	25	270	76	346	540
% Cars	100	98.3	98.8	100	100	100	98.2	100	98.6	98.7
Trucks	0	2	2	0	0	0	5	0	5	7
% Trucks	0	1.7	1.2	0	0	0	1.8	0	1.4	1.3

Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Garage Entrance
City/State : Boston, MA
Weather : Cloudy

File Name : 11032003
Site Code : 11032003
Start Date : 8/8/2013
Page No : 2



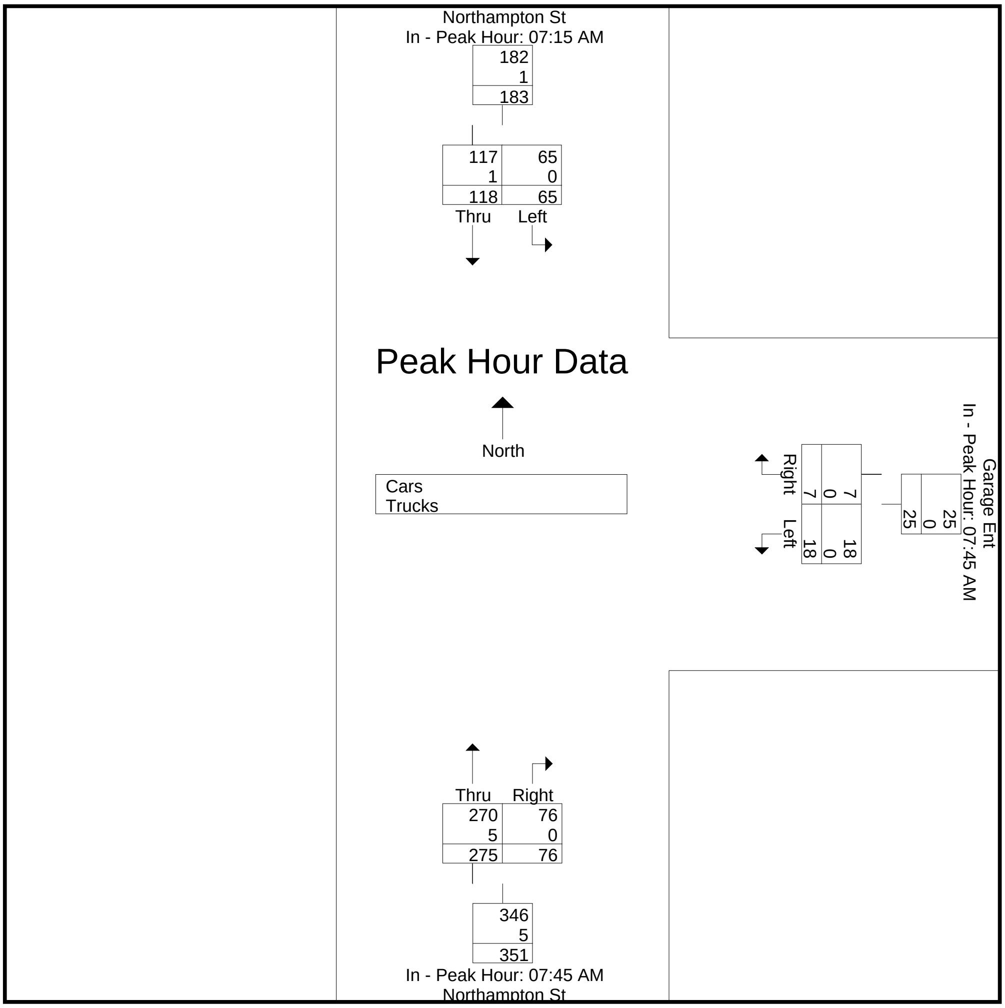
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:15 AM			07:45 AM			07:45 AM		
+0 mins.	13	**34**	47	5	**2**	7	57	**26**	83
+15 mins.	**21**	34	**55**	2	2	4	72	19	**91**
+30 mins.	16	32	48	4	1	5	70	17	87
+45 mins.	15	18	33	**7**	2	**9**	**76**	14	90
Total Volume	65	118	183	18	7	25	275	76	351
% App. Total	35.5	64.5		72	28		78.3	21.7	
PHF	.774	.868	.832	.643	.875	.694	.905	.731	.964
Cars	65	117	182	18	7	25	270	76	346
% Cars	100	99.2	99.5	100	100	100	98.2	100	98.6
Trucks	0	1	1	0	0	0	5	0	5
% Trucks	0	0.8	0.5	0	0	0	1.8	0	1.4

Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Garage Entrance
City/State : Boston, MA
Weather : Cloudy

File Name : 11032003
Site Code : 11032003
Start Date : 8/8/2013
Page No : 3



Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Garage Entrance
City/State : Boston, MA
Weather : Cloudy

File Name : 11032003
Site Code : 11032003
Start Date : 8/8/2013

Groups Printed- Cars

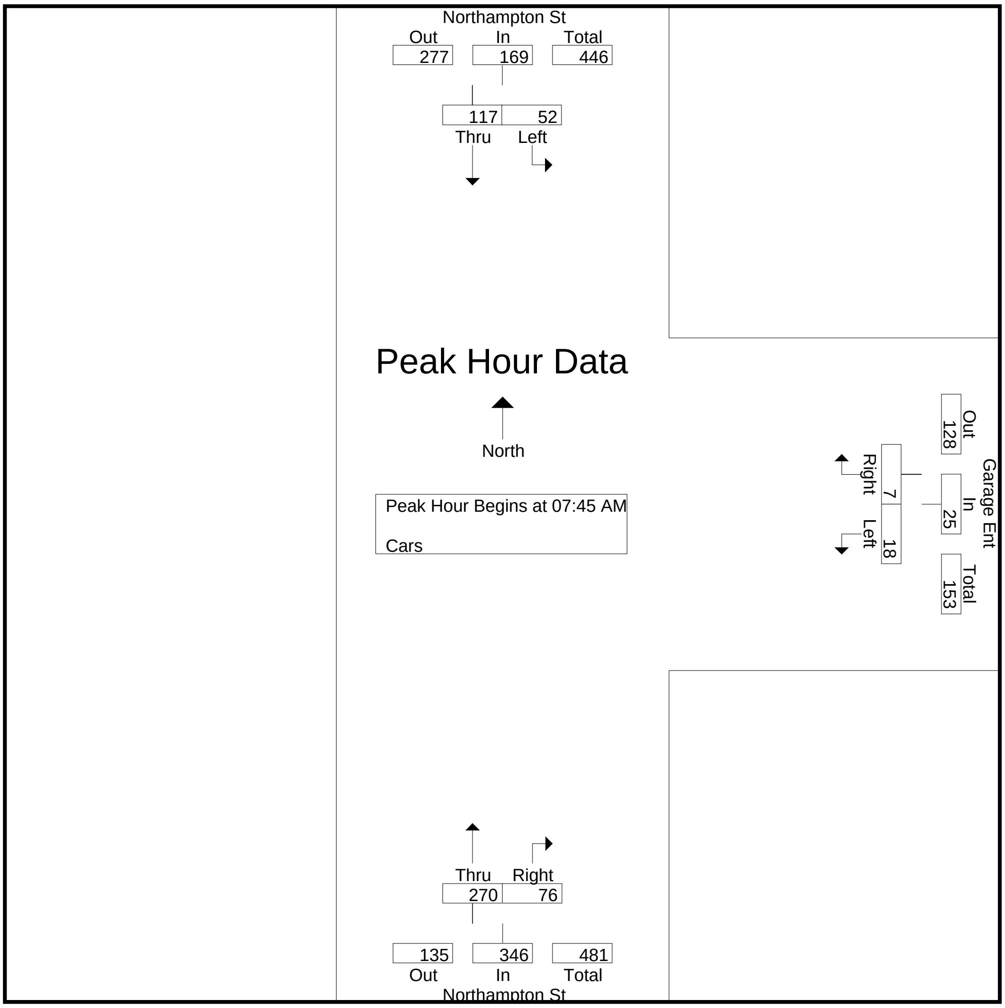
	Northampton St From North		Garage Ent From East		Northampton St From South		
Start Time	Left	Thru	Left	Right	Thru	Right	Int. Total
07:00 AM	11	21	4	1	49	12	98
07:15 AM	13	33	2	0	56	6	110
07:30 AM	21	34	0	2	59	11	127
07:45 AM	16	32	5	2	54	26	135
Total	61	120	11	5	218	55	470
08:00 AM	15	18	2	2	72	19	128
08:15 AM	10	36	4	1	69	17	137
08:30 AM	11	31	7	2	75	14	140
08:45 AM	5	37	3	0	60	10	115
Total	41	122	16	5	276	60	520
Grand Total	102	242	27	10	494	115	990
Apprch %	29.7	70.3	73	27	81.1	18.9	
Total %	10.3	24.4	2.7	1	49.9	11.6	

	Northampton St From North			Garage Ent From East			Northampton St From South			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	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	**16**	32	**48**	5	**2**	7	54	**26**	80	135
08:00 AM	15	18	33	2	2	4	72	19	**91**	128
08:15 AM	10	**36**	46	4	1	5	69	17	86	137
08:30 AM	11	31	42	**7**	2	**9**	**75**	14	89	**140**
Total Volume	52	117	169	18	7	25	270	76	346	540
% App. Total	30.8	69.2		72	28		78	22		
PHF	.813	.813	.880	.643	.875	.694	.900	.731	.951	.964

Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Garage Entrance
City/State : Boston, MA
Weather : Cloudy

File Name : 11032003
Site Code : 11032003
Start Date : 8/8/2013



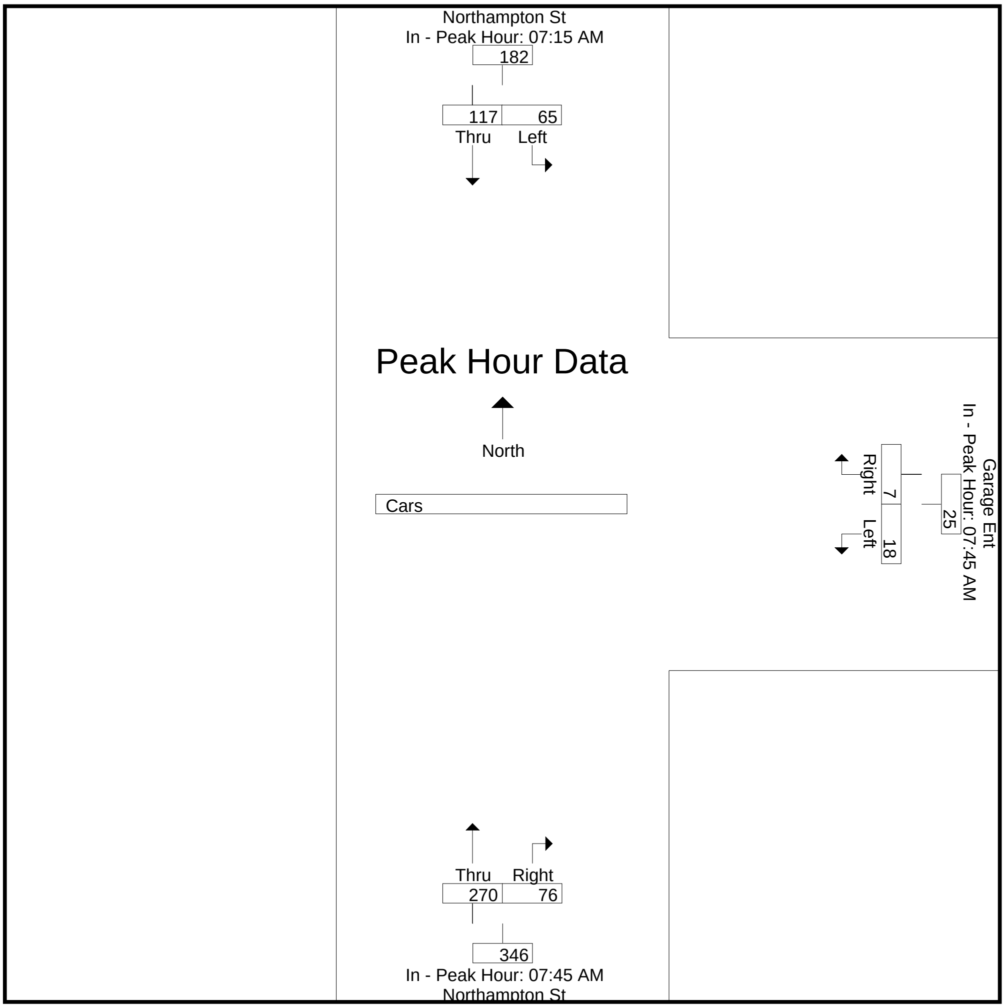
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:15 AM			07:45 AM			07:45 AM		
+0 mins.	13	33	46	5	**2**	7	54	**26**	80
+15 mins.	**21**	**34**	**55**	2	2	4	72	19	**91**
+30 mins.	16	32	48	4	1	5	69	17	86
+45 mins.	15	18	33	**7**	2	**9**	**75**	14	89
Total Volume	65	117	182	18	7	25	270	76	346
% App. Total	35.7	64.3		72	28		78	22	
PHF	.774	.860	.827	.643	.875	.694	.900	.731	.951

Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Garage Entrance
City/State : Boston, MA
Weather : Cloudy

File Name : 11032003
Site Code : 11032003
Start Date : 8/8/2013
Page No : 3



Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Garage Entrance
City/State : Boston, MA
Weather : Cloudy

File Name : 11032003
Site Code : 11032003
Start Date : 8/8/2013
Page No : 1

Groups Printed- Trucks

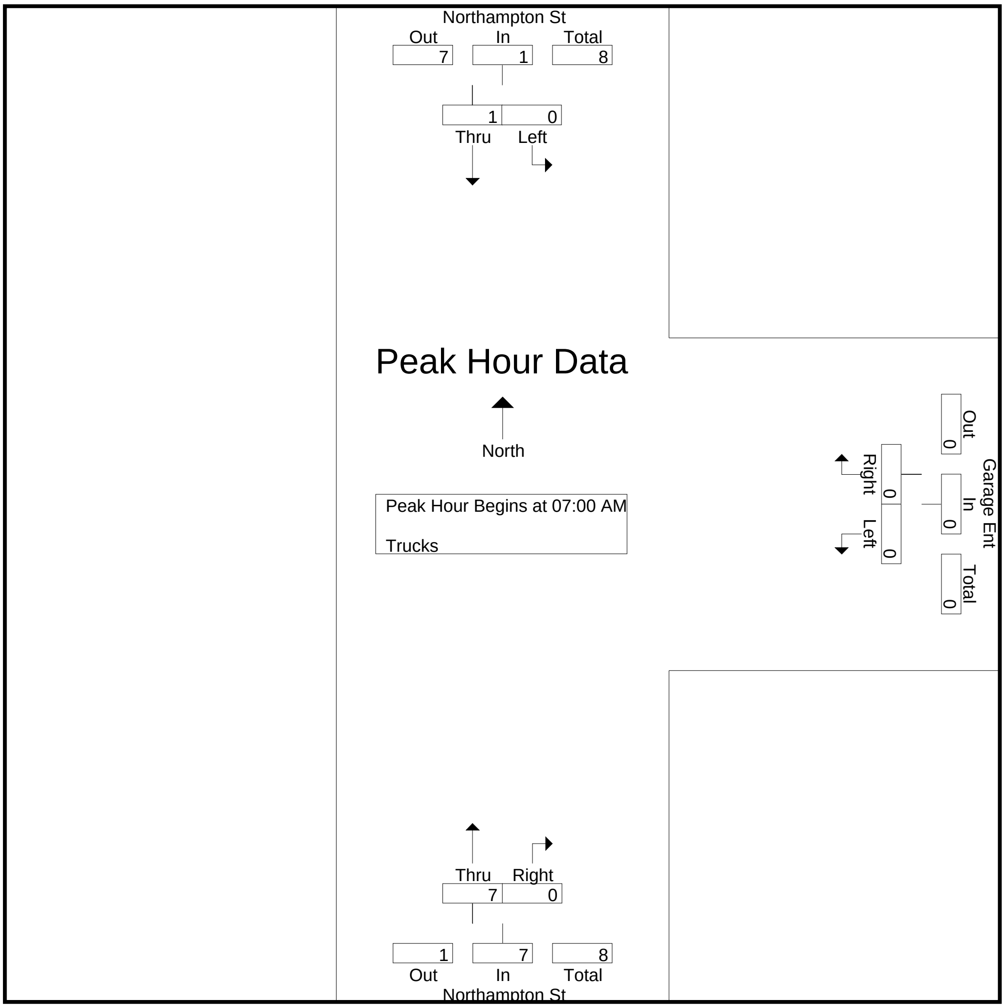
	Northampton St From North		Garage Ent From East		Northampton St From South		
Start Time	Left	Thru	Left	Right	Thru	Right	Int. Total
07:00 AM	0	0	0	0	1	0	1
07:15 AM	0	1	0	0	2	0	3
07:30 AM	0	0	0	0	1	0	1
07:45 AM	0	0	0	0	3	0	3
Total	0	1	0	0	7	0	8
08:00 AM	0	0	0	0	0	0	0
08:15 AM	0	1	0	0	1	0	2
08:30 AM	0	1	0	0	1	0	2
08:45 AM	0	0	0	0	1	0	1
Total	0	2	0	0	3	0	5
Grand Total	0	3	0	0	10	0	13
Apprch %	0	100	0	0	100	0	
Total %	0	23.1	0	0	76.9	0	

	Northampton St From North			Garage Ent From East			Northampton St From South			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:00 AM										
07:00 AM	0	0	0	0	0	0	1	0	1	1
07:15 AM	0	**1**	**1**	0	0	0	2	0	2	**3**
07:30 AM	0	0	0	0	0	0	1	0	1	1
07:45 AM	0	0	0	0	0	0	**3**	0	**3**	3
Total Volume	0	1	1	0	0	0	7	0	7	8
% App. Total	0	100		0	0		100	0		
PHF	.000	.250	.250	.000	.000	.000	.583	.000	.583	.667

Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Garage Entrance
City/State : Boston, MA
Weather : Cloudy

File Name : 11032003
Site Code : 11032003
Start Date : 8/8/2013



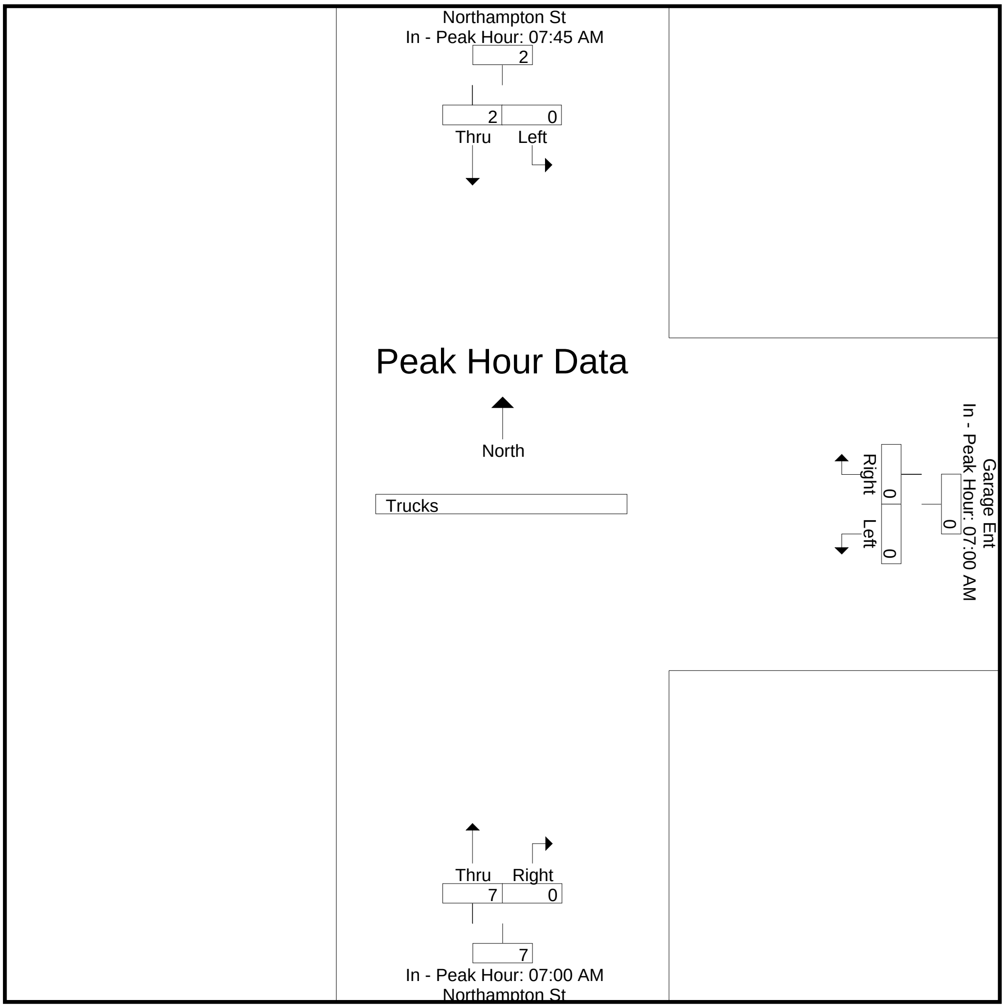
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:45 AM			07:00 AM			07:00 AM		
+0 mins.	0	0	0	0	0	0	1	0	1
+15 mins.	0	0	0	0	0	0	2	0	2
+30 mins.	0	**1**	**1**	0	0	0	1	0	1
+45 mins.	0	1	1	0	0	0	**3**	0	**3**
Total Volume	0	2	2	0	0	0	7	0	7
% App. Total	0	100		0	0		100	0	
PHF	.000	.500	.500	.000	.000	.000	.583	.000	.583

Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Garage Entrance
City/State : Boston, MA
Weather : Cloudy

File Name : 11032003
Site Code : 11032003
Start Date : 8/8/2013
Page No : 3



Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Garage Entrance
City/State : Boston, MA
Weather : Cloudy

File Name : 11032003
Site Code : 11032003
Start Date : 8/8/2013
Page No : 1

Groups Printed- Bikes Peds

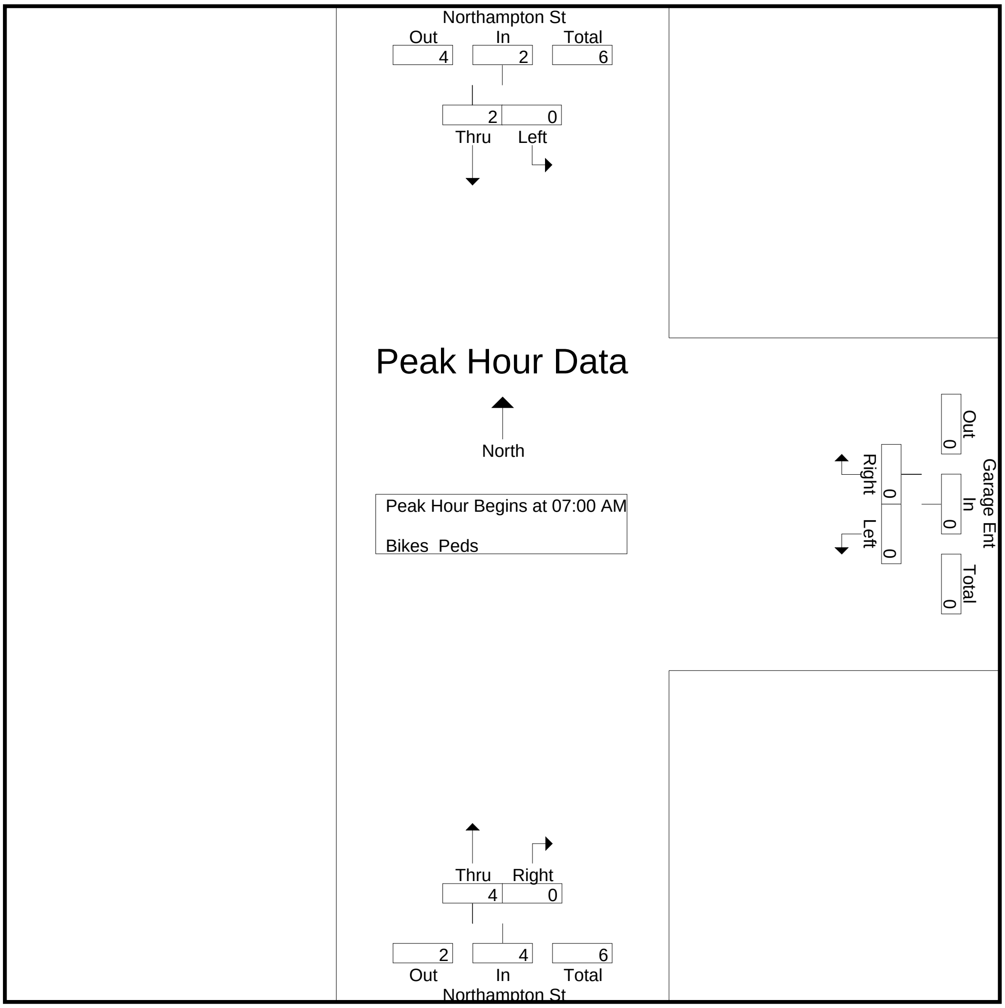
	Northampton St From North			Garage Ent From East			Northampton St From South					
Start Time	Left	Thru	Peds	Left	Right	Peds	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	0	7	0	0	10	2	0	3	20	2	22
07:15 AM	0	0	6	0	0	13	2	0	4	23	2	25
07:30 AM	0	1	1	0	0	16	0	0	2	19	1	20
07:45 AM	0	1	3	0	0	7	0	0	2	12	1	13
Total	0	2	17	0	0	46	4	0	11	74	6	80
08:00 AM	0	1	3	0	0	4	0	0	2	9	1	10
08:15 AM	0	0	5	0	0	12	0	0	3	20	0	20
08:30 AM	0	0	3	0	0	6	1	0	4	13	1	14
08:45 AM	0	0	11	0	0	18	1	0	2	31	1	32
Total	0	1	22	0	0	40	2	0	11	73	3	76
Grand Total	0	3	39	0	0	86	6	0	22	147	9	156
Apprch %	0	100		0	0		100	0				
Total %	0	33.3		0	0		66.7	0		94.2	5.8	

	Northampton St From North			Garage Ent From East			Northampton St From South			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:00 AM										
07:00 AM	0	0	0	0	0	0	**2**	0	**2**	**2**
07:15 AM	0	0	0	0	0	0	2	0	2	2
07:30 AM	0	**1**	**1**	0	0	0	0	0	0	1
07:45 AM	0	1	1	0	0	0	0	0	0	1
Total Volume	0	2	2	0	0	0	4	0	4	6
% App. Total	0	100		0	0		100	0		
PHF	.000	.500	.500	.000	.000	.000	.500	.000	.500	.750

Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Garage Entrance
City/State : Boston, MA
Weather : Cloudy

File Name : 11032003
Site Code : 11032003
Start Date : 8/8/2013
Page No : 2



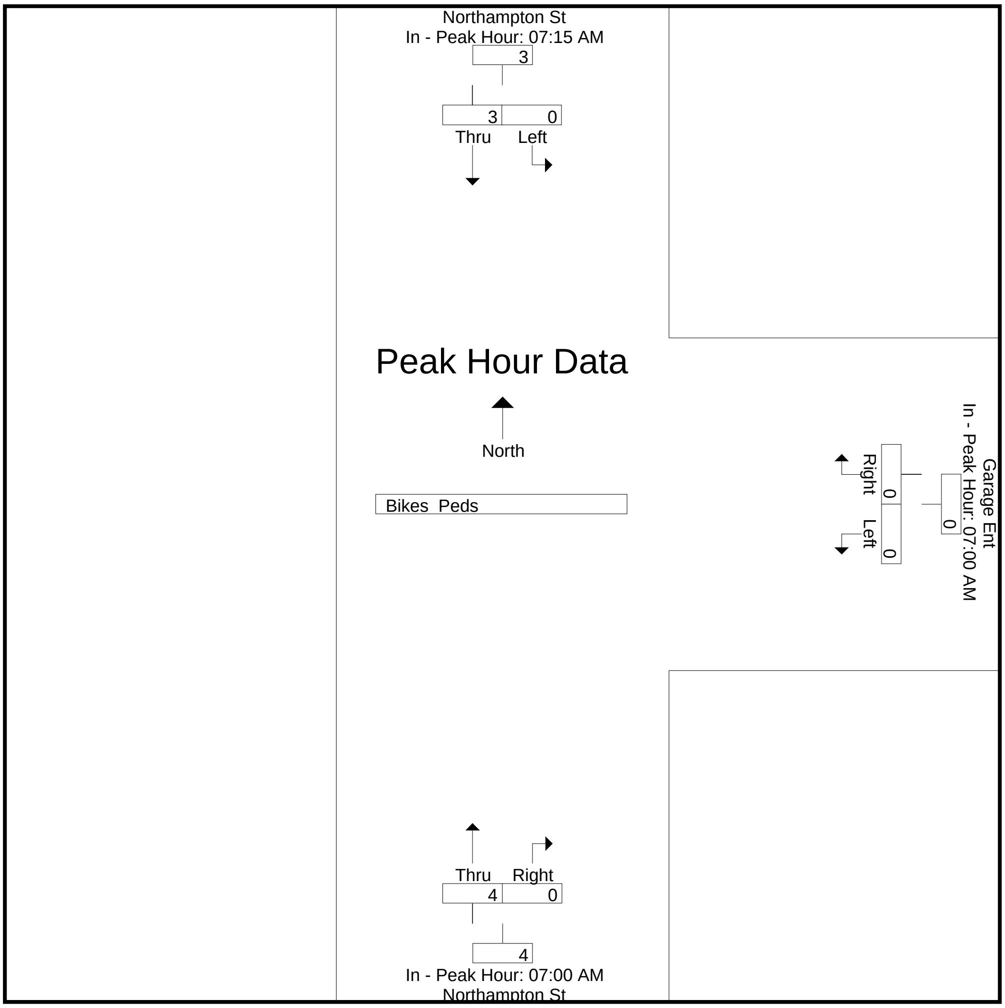
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:15 AM			07:00 AM			07:00 AM		
+0 mins.	0	0	0	0	0	0	**2**	0	**2**
+15 mins.	0	**1**	**1**	0	0	0	2	0	2
+30 mins.	0	1	1	0	0	0	0	0	0
+45 mins.	0	1	1	0	0	0	0	0	0
Total Volume	0	3	3	0	0	0	4	0	4
% App. Total	0	100		0	0		100	0	
PHF	.000	.750	.750	.000	.000	.000	.500	.000	.500

Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Garage Entrance
City/State : Boston, MA
Weather : Cloudy

File Name : 11032003
Site Code : 11032003
Start Date : 8/8/2013
Page No : 3



Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Garage Entrance
City/State : Boston, MA
Weather : Cloudy

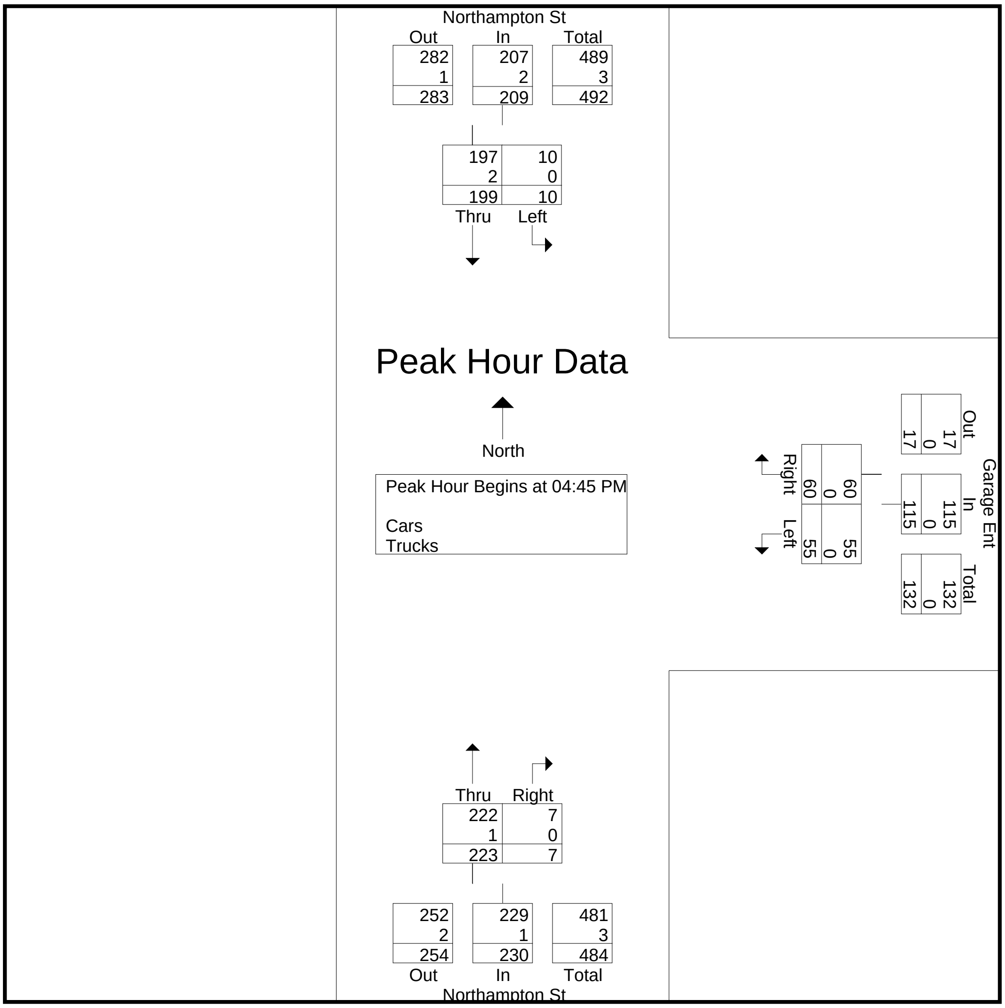
File Name : 11032003
Site Code : 11032003
Start Date : 8/8/2013
Page No : 1

Groups Printed- Cars - Trucks

	Northampton St From North		Garage Ent From East		Northampton St From South		
Start Time	Left	Thru	Left	Right	Thru	Right	Int. Total
04:00 PM	1	57	12	11	47	1	129
04:15 PM	3	51	6	6	52	1	119
04:30 PM	0	42	20	8	59	1	130
04:45 PM	2	42	15	18	59	1	137
Total	6	192	53	43	217	4	515
05:00 PM	5	51	18	18	55	3	150
05:15 PM	0	47	13	12	60	1	133
05:30 PM	3	59	9	12	49	2	134
05:45 PM	0	59	11	8	51	1	130
Total	8	216	51	50	215	7	547
Grand Total	14	408	104	93	432	11	1062
Apprch %	3.3	96.7	52.8	47.2	97.5	2.5	
Total %	1.3	38.4	9.8	8.8	40.7	1	
Cars	14	405	104	93	429	11	1056
% Cars	100	99.3	100	100	99.3	100	99.4
Trucks	0	3	0	0	3	0	6
% Trucks	0	0.7	0	0	0.7	0	0.6

	Northampton St From North			Garage Ent From East			Northampton St From South			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:45 PM										
04:45 PM	2	42	44	15	**18**	33	59	1	60	137
05:00 PM	**5**	51	56	**18**	18	**36**	55	**3**	58	**150**
05:15 PM	0	47	47	13	12	25	**60**	1	**61**	133
05:30 PM	3	**59**	**62**	9	12	21	49	2	51	134
Total Volume	10	199	209	55	60	115	223	7	230	554
% App. Total	4.8	95.2		47.8	52.2		97	3		
PHF	.500	.843	.843	.764	.833	.799	.929	.583	.943	.923
Cars	10	197	207	55	60	115	222	7	229	551
% Cars	100	99.0	99.0	100	100	100	99.6	100	99.6	99.5
Trucks	0	2	2	0	0	0	1	0	1	3
% Trucks	0	1.0	1.0	0	0	0	0.4	0	0.4	0.5

Accurate Counts
978-664-2565



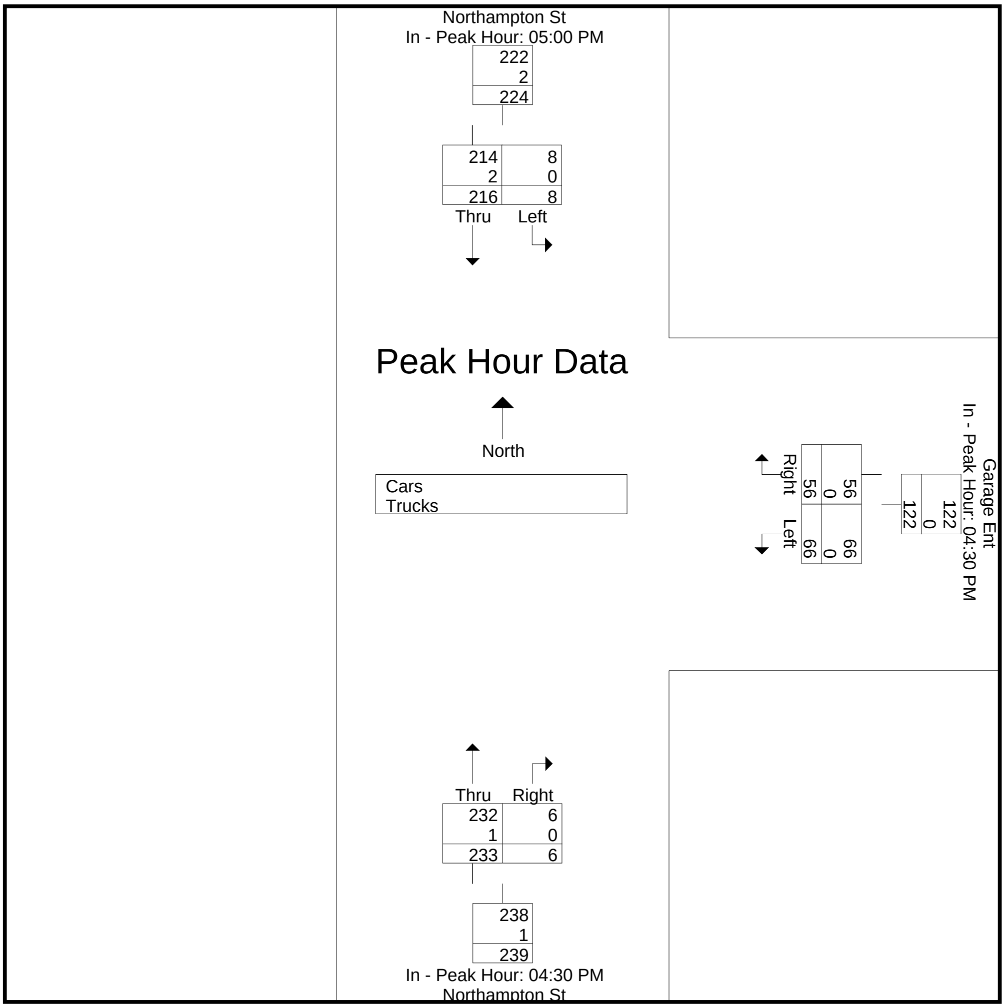
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	05:00 PM			04:30 PM			04:30 PM		
+0 mins.	**5**	51	56	**20**	8	28	59	1	60
+15 mins.	0	47	47	15	**18**	33	59	1	60
+30 mins.	3	**59**	**62**	18	18	**36**	55	**3**	58
+45 mins.	0	59	59	13	12	25	**60**	1	**61**
Total Volume	8	216	224	66	56	122	233	6	239
% App. Total	3.6	96.4		54.1	45.9		97.5	2.5	
PHF	.400	.915	.903	.825	.778	.847	.971	.500	.980
Cars	8	214	222	66	56	122	232	6	238
% Cars	100	99.1	99.1	100	100	100	99.6	100	99.6
Trucks	0	2	2	0	0	0	1	0	1
% Trucks	0	0.9	0.9	0	0	0	0.4	0	0.4

Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Garage Entrance
City/State : Boston, MA
Weather : Cloudy

File Name : 11032003
Site Code : 11032003
Start Date : 8/8/2013



Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Garage Entrance
City/State : Boston, MA
Weather : Cloudy

File Name : 11032003
Site Code : 11032003
Start Date : 8/8/2013
Page No : 1

Groups Printed- Cars

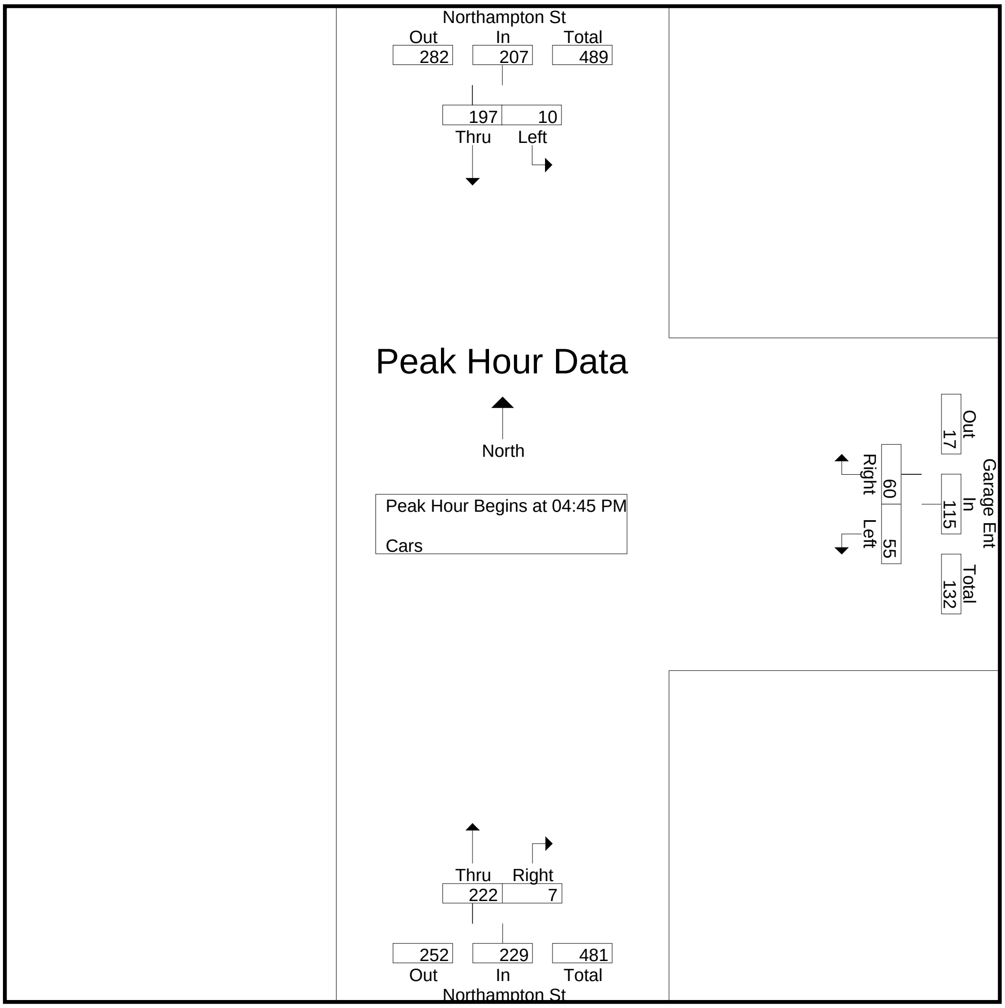
	Northampton St From North		Garage Ent From East		Northampton St From South		
Start Time	Left	Thru	Left	Right	Thru	Right	Int. Total
04:00 PM	1	57	12	11	45	1	127
04:15 PM	3	50	6	6	52	1	118
04:30 PM	0	42	20	8	59	1	130
04:45 PM	2	42	15	18	59	1	137
Total	6	191	53	43	215	4	512
05:00 PM	5	50	18	18	54	3	148
05:15 PM	0	47	13	12	60	1	133
05:30 PM	3	58	9	12	49	2	133
05:45 PM	0	59	11	8	51	1	130
Total	8	214	51	50	214	7	544
Grand Total	14	405	104	93	429	11	1056
Apprch %	3.3	96.7	52.8	47.2	97.5	2.5	
Total %	1.3	38.4	9.8	8.8	40.6	1	

	Northampton St From North			Garage Ent From East			Northampton St From South			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:45 PM										
04:45 PM	2	42	44	15	**18**	33	59	1	60	137
05:00 PM	**5**	50	55	**18**	18	**36**	54	**3**	57	**148**
05:15 PM	0	47	47	13	12	25	**60**	1	**61**	133
05:30 PM	3	**58**	**61**	9	12	21	49	2	51	133
Total Volume	10	197	207	55	60	115	222	7	229	551
% App. Total	4.8	95.2		47.8	52.2		96.9	3.1		
PHF	.500	.849	.848	.764	.833	.799	.925	.583	.939	.931

Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Garage Entrance
City/State : Boston, MA
Weather : Cloudy

File Name : 11032003
Site Code : 11032003
Start Date : 8/8/2013
Page No : 2



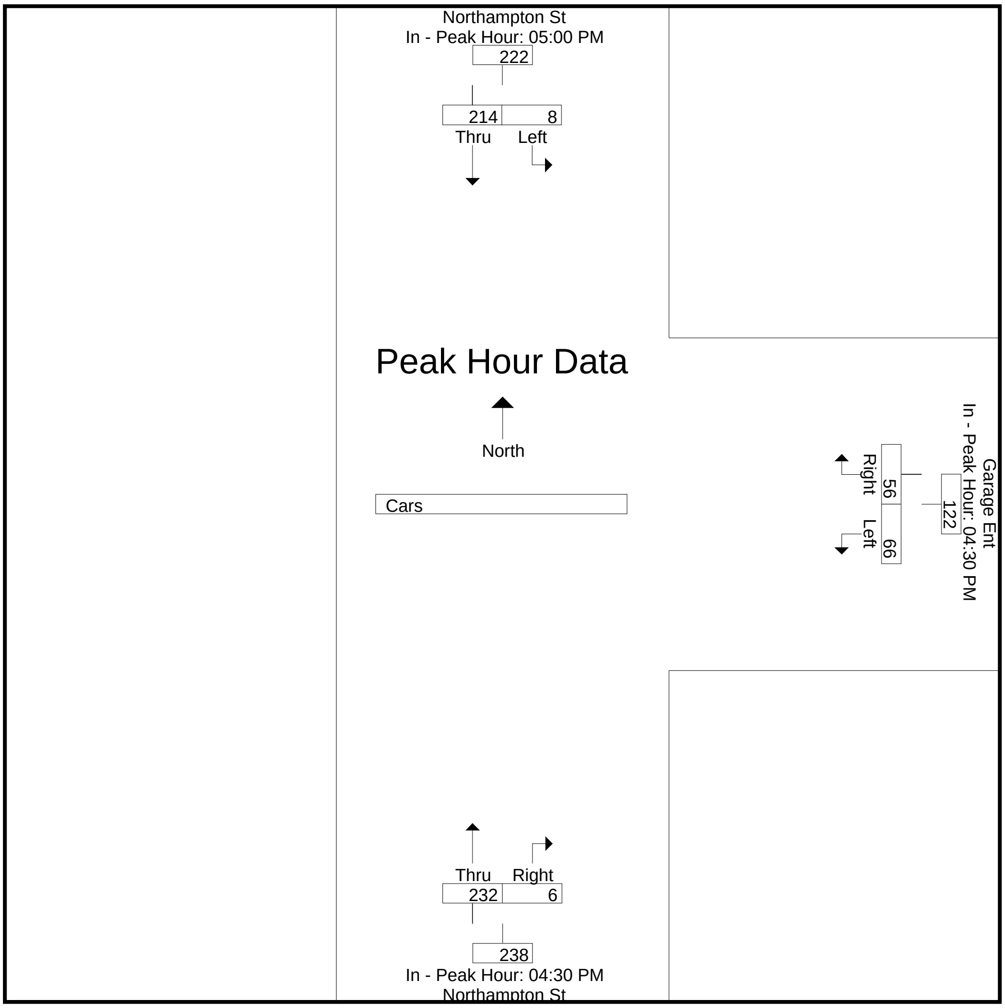
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	05:00 PM			04:30 PM			04:30 PM		
+0 mins.	**5**	50	55	**20**	8	28	59	1	60
+15 mins.	0	47	47	15	**18**	33	59	1	60
+30 mins.	3	58	**61**	18	18	**36**	54	**3**	57
+45 mins.	0	**59**	59	13	12	25	**60**	1	**61**
Total Volume	8	214	222	66	56	122	232	6	238
% App. Total	3.6	96.4		54.1	45.9		97.5	2.5	
PHF	.400	.907	.910	.825	.778	.847	.967	.500	.975

Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Garage Entrance
City/State : Boston, MA
Weather : Cloudy

File Name : 11032003
Site Code : 11032003
Start Date : 8/8/2013
Page No : 3



Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Garage Entrance
City/State : Boston, MA
Weather : Cloudy

File Name : 11032003
Site Code : 11032003
Start Date : 8/8/2013
Page No : 1

Groups Printed- Trucks

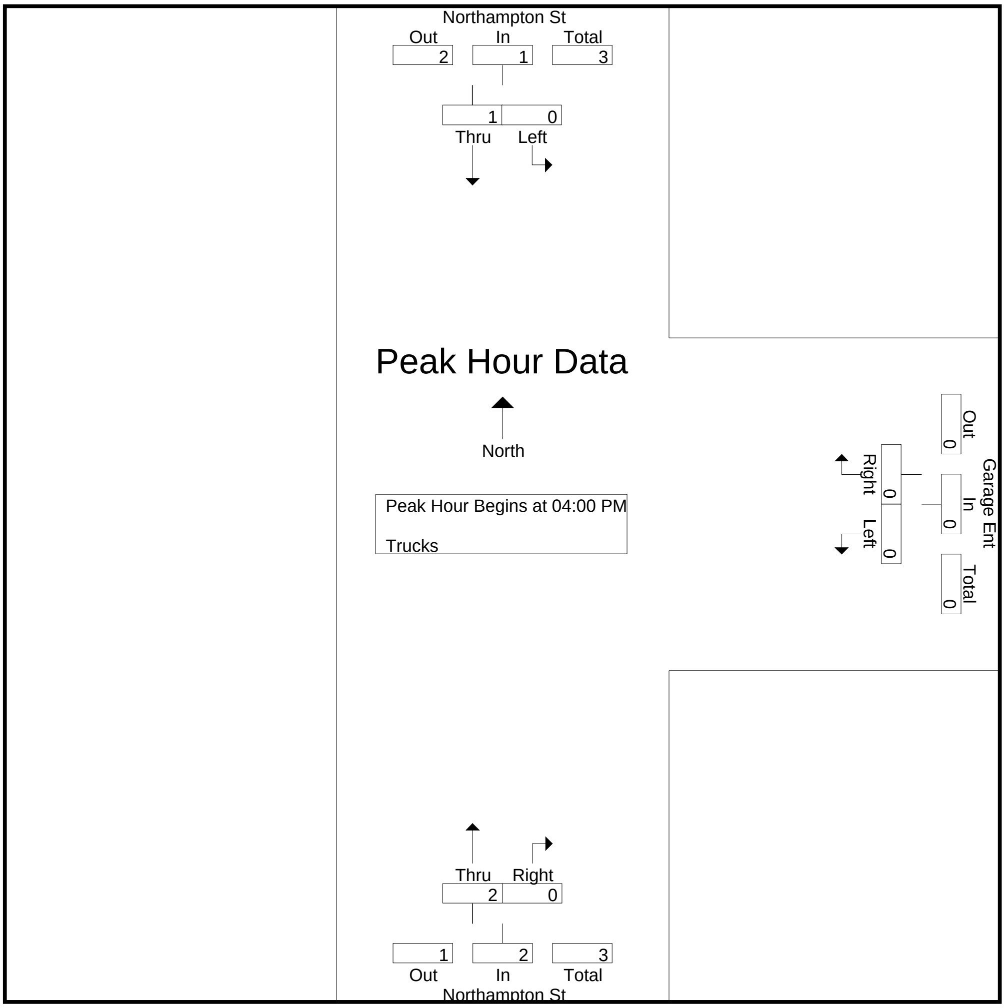
	Northampton St From North		**Garage Ent From East**		**Northampton St From South**		
Start Time	Left	Thru	Left	Right	Thru	Right	Int. Total
04:00 PM	0	0	0	0	2	0	2
04:15 PM	0	1	0	0	0	0	1
04:30 PM	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0
Total	0	1	0	0	2	0	3
05:00 PM	0	1	0	0	1	0	2
05:15 PM	0	0	0	0	0	0	0
05:30 PM	0	1	0	0	0	0	1
05:45 PM	0	0	0	0	0	0	0
Total	0	2	0	0	1	0	3
Grand Total	0	3	0	0	3	0	6
Apprch %	0	100	0	0	100	0	
Total %	0	50	0	0	50	0	

	Northampton St From North			**Garage Ent From East**			**Northampton St From South**			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:00 PM										
04:00 PM	0	0	0	0	0	0	**2**	0	**2**	**2**
04:15 PM	0	**1**	**1**	0	0	0	0	0	0	1
04:30 PM	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0
Total Volume	0	1	1	0	0	0	2	0	2	3
% App. Total	0	100		0	0		100	0		
PHF	.000	.250	.250	.000	.000	.000	.250	.000	.250	.375

Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Garage Entrance
City/State : Boston, MA
Weather : Cloudy

File Name : 11032003
Site Code : 11032003
Start Date : 8/8/2013
Page No : 2



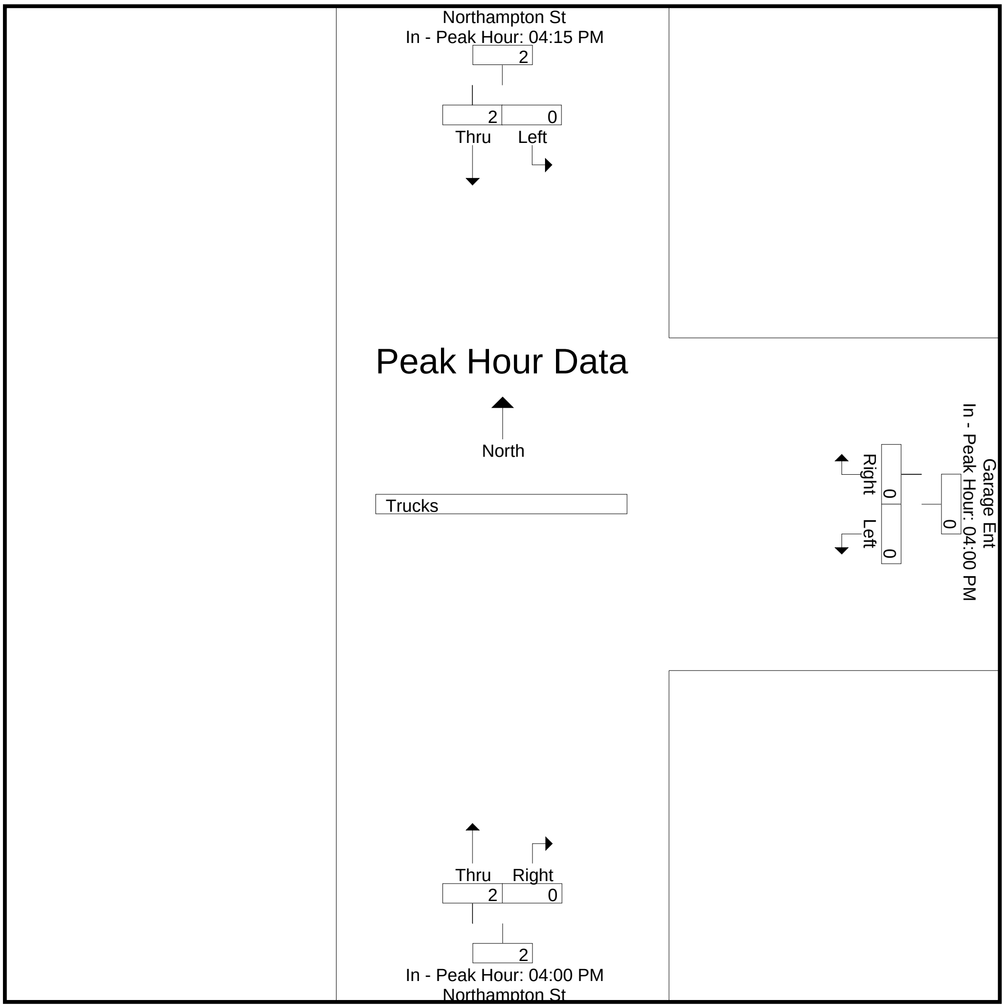
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:15 PM			04:00 PM			04:00 PM		
+0 mins.	0	**1**	**1**	0	0	0	**2**	0	**2**
+15 mins.	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0
+45 mins.	0	1	1	0	0	0	0	0	0
Total Volume	0	2	2	0	0	0	2	0	2
% App. Total	0	100		0	0		100	0	
PHF	.000	.500	.500	.000	.000	.000	.250	.000	.250

Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Garage Entrance
City/State : Boston, MA
Weather : Cloudy

File Name : 11032003
Site Code : 11032003
Start Date : 8/8/2013
Page No : 3



Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Garage Entrance
City/State : Boston, MA
Weather : Cloudy

File Name : 11032003
Site Code : 11032003
Start Date : 8/8/2013
Page No : 1

Groups Printed- Bikes Peds

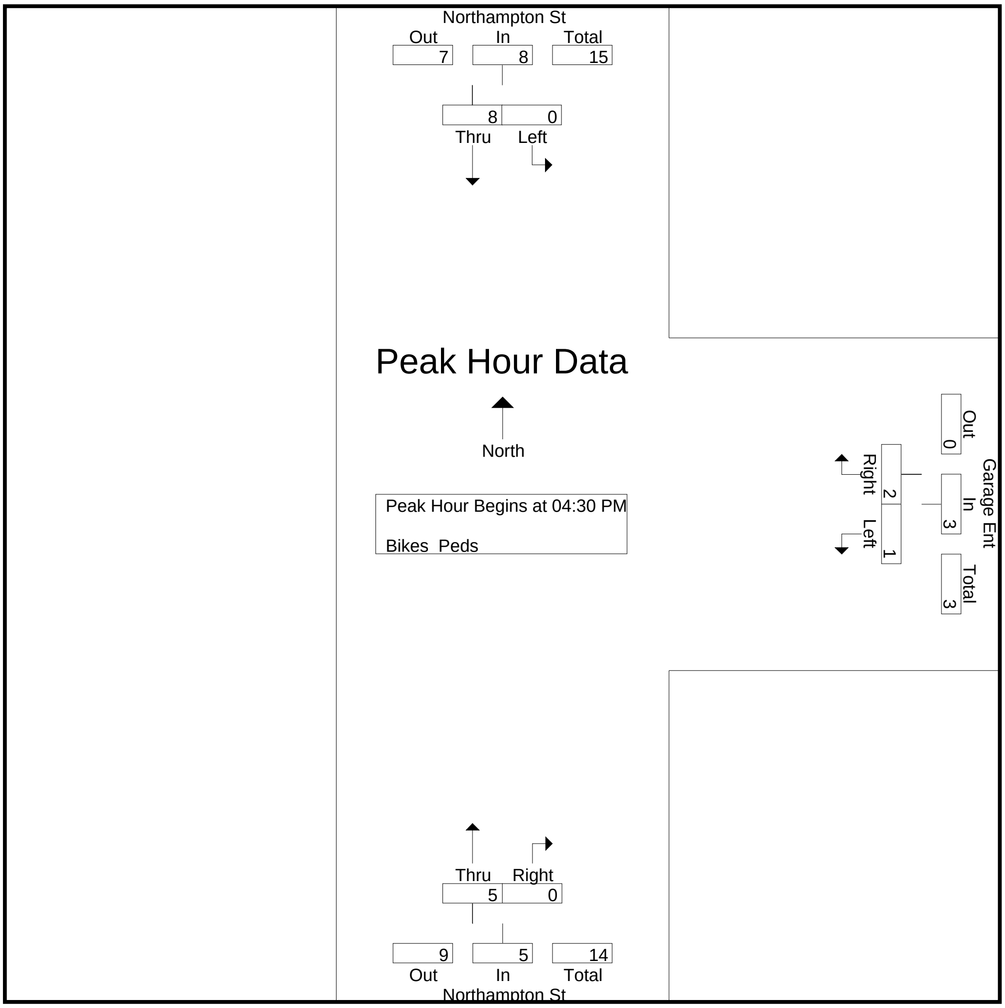
	Northampton St From North			Garage Ent From East			Northampton St From South					
Start Time	Left	Thru	Peds	Left	Right	Peds	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
04:00 PM	0	1	9	0	0	10	1	1	3	22	3	25
04:15 PM	0	0	3	0	1	10	1	0	5	18	2	20
04:30 PM	0	5	10	0	0	18	1	0	4	32	6	38
04:45 PM	0	1	6	0	0	13	1	0	4	23	2	25
Total	0	7	28	0	1	51	4	1	16	95	13	108
05:00 PM	0	0	3	0	2	16	3	0	4	23	5	28
05:15 PM	0	2	5	1	0	6	0	0	1	12	3	15
05:30 PM	0	0	13	0	1	8	2	0	4	25	3	28
05:45 PM	0	0	8	0	0	5	0	0	2	15	0	15
Total	0	2	29	1	3	35	5	0	11	75	11	86
Grand Total	0	9	57	1	4	86	9	1	27	170	24	194
Apprch %	0	100		20	80		90	10				
Total %	0	37.5		4.2	16.7		37.5	4.2		87.6	12.4	

	Northampton St From North			Garage Ent From East			Northampton St From South			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:30 PM										
04:30 PM	0	**5**	**5**	0	0	0	1	0	1	**6**
04:45 PM	0	1	1	0	0	0	1	0	1	2
05:00 PM	0	0	0	0	**2**	**2**	**3**	0	**3**	5
05:15 PM	0	2	2	**1**	0	1	0	0	0	3
Total Volume	0	8	8	1	2	3	5	0	5	16
% App. Total	0	100		33.3	66.7		100	0		
PHF	.000	.400	.400	.250	.250	.375	.417	.000	.417	.667

Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Garage Entrance
City/State : Boston, MA
Weather : Cloudy

File Name : 11032003
Site Code : 11032003
Start Date : 8/8/2013



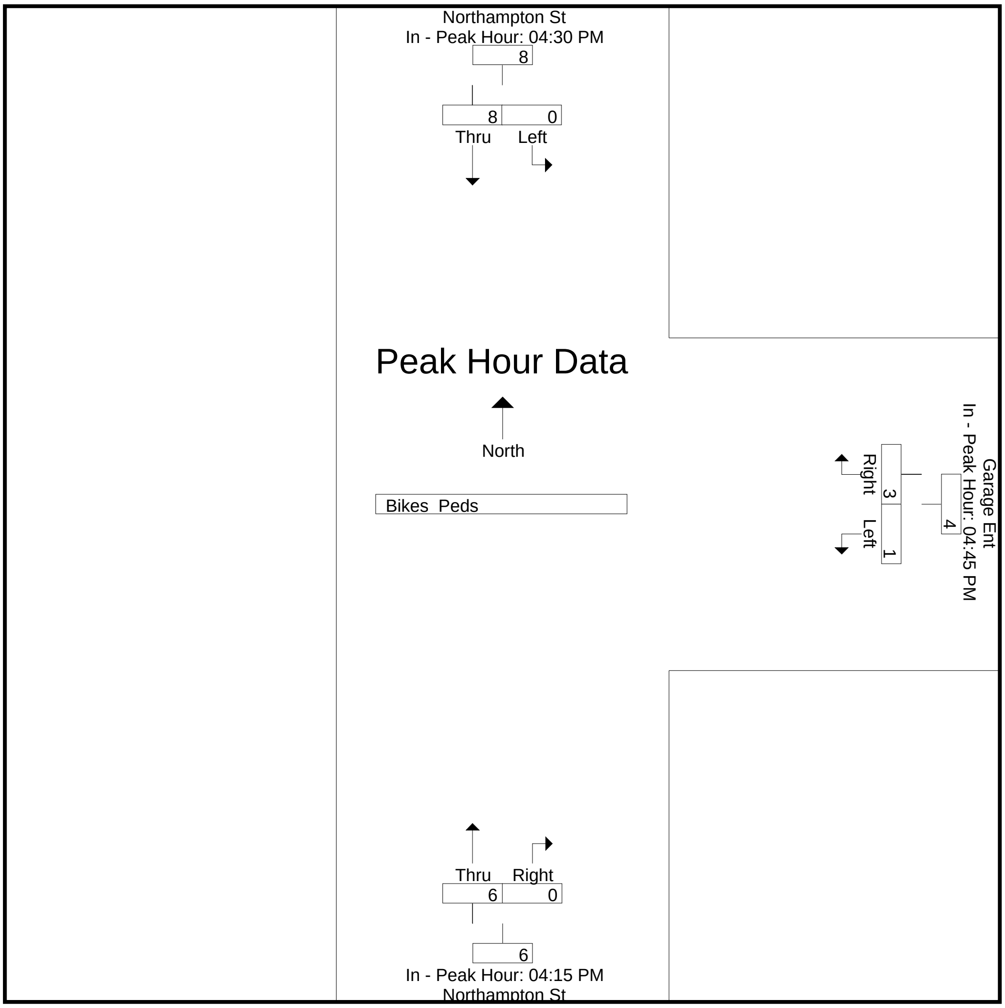
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:30 PM			04:45 PM			04:15 PM		
+0 mins.	0	**5**	**5**	0	0	0	1	0	1
+15 mins.	0	1	1	0	**2**	**2**	1	0	1
+30 mins.	0	0	0	**1**	0	1	1	0	1
+45 mins.	0	2	2	0	1	1	**3**	0	**3**
Total Volume	0	8	8	1	3	4	6	0	6
% App. Total	0	100		25	75		100	0	
PHF	.000	.400	.400	.250	.375	.500	.500	.000	.500

Accurate Counts
978-664-2565

N/S Street : Northampton Street
E/W Street: Garage Entrance
City/State : Boston, MA
Weather : Cloudy

File Name : 11032003
Site Code : 11032003
Start Date : 8/8/2013
Page No : 3

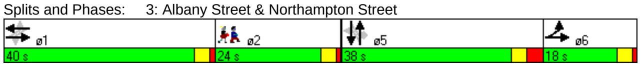


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Leading Detector (ft)	50	50		50	50		50	50	50	50	50		
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0		
Turning Speed (mph)	15		9	15		9	15		9	15		9	
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.985			0.968				0.850		0.947		
Flt Protected		0.984			0.994			0.990			0.983		
Satd. Flow (prot)	0	2973	0	0	2954	0	0	1661	1275	0	1540	0	
Flt Permitted		0.687			0.764			0.915			0.846		
Satd. Flow (perm)	0	2076	0	0	2270	0	0	1535	1275	0	1325	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		12			29				51		27		
Headway Factor	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		318			402			243			395		
Travel Time (s)		7.2			9.1			5.5			9.0		
Volume (vph)	219	362	64	26	185	54	11	78	28	51	32	64	
Peak Hour Factor	0.90	0.88	0.89	0.72	0.86	0.81	0.39	0.75	0.55	0.71	0.62	0.80	
Heavy Vehicles (%)	2%	7%	13%	0%	8%	2%	9%	0%	14%	4%	0%	5%	
Adj. Flow (vph)	243	411	72	36	215	67	28	104	51	72	52	80	
Lane Group Flow (vph)	0	726	0	0	318	0	0	132	51	0	204	0	
Turn Type	D.P+P			Perm			Perm		Perm	Perm			
Protected Phases	6	1 6			1			5			5		2
Permitted Phases	1			1			5		5	5			
Detector Phases	6	1 6		1	1		5	5	5	5	5		
Minimum Initial (s)	4.0			8.0	8.0		8.0	8.0	8.0	8.0	8.0		4.0
Minimum Split (s)	8.0			12.0	12.0		14.0	14.0	14.0	14.0	14.0		24.0
Total Split (s)	18.0	58.0	0.0	40.0	40.0	0.0	38.0	38.0	38.0	38.0	38.0	0.0	24.0
Total Split (%)	15.0%	48.3%	0.0%	33.3%	33.3%	0.0%	31.7%	31.7%	31.7%	31.7%	31.7%	0.0%	20%
Maximum Green (s)	14.0			36.0	36.0		32.0	32.0	32.0	32.0	32.0		20.0
Yellow Time (s)	3.0			3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0
All-Red Time (s)	1.0			1.0	1.0		3.0	3.0	3.0	3.0	3.0		1.0
Lead/Lag	Lag			Lead	Lead		Lead	Lead	Lead	Lead	Lead		Lag
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes
Vehicle Extension (s)	3.0			3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0
Recall Mode	None			C-Max	C-Max		None	None	None	None	None		None
Walk Time (s)													7.0
Flash Dont Walk (s)													13.0
Pedestrian Calls (#/hr)													5
Act Effct Green (s)		80.2			66.2			23.0	23.0		23.0		
Actuated g/C Ratio		0.67			0.55			0.19	0.19		0.19		
v/c Ratio		0.49			0.25			0.45	0.18		0.74		
Control Delay		11.9			24.0			46.1	10.9		54.4		
Queue Delay		0.0			0.0			0.0	0.0		0.0		
Total Delay		11.9			24.0			46.1	10.9		54.4		
LOS		B			C			D	B		D		
Approach Delay		11.9			24.0			36.2			54.4		
Approach LOS		B			C			D			D		
90th %ile Green (s)	14.0			37.0	37.0		31.0	31.0	31.0	31.0	31.0		20.0
90th %ile Term Code	Max			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Ped
70th %ile Green (s)	14.0			67.4	67.4		24.6	24.6	24.6	24.6	24.6		0.0
70th %ile Term Code	Max			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Skip
50th %ile Green (s)	14.0			71.3	71.3		20.7	20.7	20.7	20.7	20.7		0.0
50th %ile Term Code	Max			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Skip
30th %ile Green (s)	14.0			75.0	75.0		17.0	17.0	17.0	17.0	17.0		0.0
30th %ile Term Code	Max			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Skip
10th %ile Green (s)	14.0			80.2	80.2		11.8	11.8	11.8	11.8	11.8		0.0
10th %ile Term Code	Max			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Skip
Stops (vph)		264			196			76	5		117		
Fuel Used(gal)		5			3			1	0		3		
CO Emissions (g/hr)		323			224			99	10		191		
NOx Emissions (g/hr)		63			44			19	2		37		
VOC Emissions (g/hr)		75			52			23	2		44		
Dilemma Vehicles (#)		0			0			0	0		0		
Queue Length 50th (ft)		85			93			92	0		131		
Queue Length 95th (ft)		253			145			113	7		118		
Internal Link Dist (ft)		238			322			163			315		
Turn Bay Length (ft)													
Base Capacity (vph)		1496			1265			435	398		395		
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		0.49			0.25			0.30	0.13		0.52		

Intersection Summary

Area Type: CBD
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 76 (63%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 23.8 Intersection LOS: C
Intersection Capacity Utilization 54.9% ICU Level of Service A
Analysis Period (min) 15

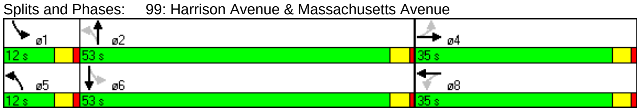
Splits and Phases: 3: Albany Street & Northampton Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥		↰	↑↱		↰	↑↱	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.95			0.97		0.94	0.91			0.95	
Frt		0.983			0.970			0.967			0.978	
Flt Protected		0.993			0.988		0.950			0.950		
Satd. Flow (prot)	0	1692	0	0	1619	0	1770	2925	0	1752	3121	0
Flt Permitted		0.869			0.676		0.234			0.135		
Satd. Flow (perm)	0	1470	0	0	1108	0	409	2925	0	249	3121	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			15			52			27	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		266			224			677			2154	
Travel Time (s)		6.0			5.1			15.4			49.0	
Volume (vph)	48	290	41	63	151	46	49	853	204	91	705	115
Confl. Peds. (#/hr)	75		202	202		75	119		139	139		119
Confl. Bikes (#/hr)			5			2			7			4
Peak Hour Factor	0.73	0.89	0.71	0.80	0.87	0.64	0.72	0.95	0.79	0.94	0.94	0.90
Heavy Vehicles (%)	11%	4%	5%	7%	13%	2%	2%	10%	4%	3%	8%	4%
Adj. Flow (vph)	66	326	58	79	174	72	68	898	258	97	750	128
Lane Group Flow (vph)	0	450	0	0	325	0	68	1156	0	97	878	0
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phases	4	4		8	8		5	2		1	6	
Minimum Initial (s)	8.0	8.0		8.0	8.0		6.0	8.0		6.0	8.0	
Minimum Split (s)	22.0	22.0		22.0	22.0		10.0	22.0		10.0	22.0	
Total Split (s)	35.0	35.0	0.0	35.0	35.0	0.0	12.0	53.0	0.0	12.0	53.0	0.0
Total Split (%)	35.0%	35.0%	0.0%	35.0%	35.0%	0.0%	12.0%	53.0%	0.0%	12.0%	53.0%	0.0%
Maximum Green (s)	31.0	31.0		31.0	31.0		8.0	49.0		8.0	49.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	C-Max		Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0			11.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)		31.0			31.0		56.0	49.0		58.4	52.0	
Actuated g/C Ratio		0.31			0.31		0.56	0.49		0.58	0.52	
v/c Ratio		0.98			0.92		0.21	0.79		0.36	0.54	
Control Delay		71.5			64.6		9.6	25.2		12.2	17.6	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		71.5			64.6		9.6	25.2		12.2	17.6	
LOS		E			E		A	C		B	B	
Approach Delay		71.5			64.6			24.3			17.1	
Approach LOS		E			E			C			B	
90th %ile Green (s)	31.0	31.0		31.0	31.0		8.0	49.0		8.0	49.0	
90th %ile Term Code	Max	Max		Max	Max		Max	Coord		MaxR	Coord	
70th %ile Green (s)	31.0	31.0		31.0	31.0		7.6	49.0		8.0	49.4	
70th %ile Term Code	Max	Max		Max	Max		Gap	Coord		MaxR	Coord	
50th %ile Green (s)	31.0	31.0		31.0	31.0		7.0	49.0		8.0	50.0	
50th %ile Term Code	Max	Max		Max	Max		Gap	Coord		MaxR	Coord	
30th %ile Green (s)	31.0	31.0		31.0	31.0		6.4	49.0		8.0	50.6	
30th %ile Term Code	Max	Max		Max	Max		Gap	Coord		MaxR	Coord	
10th %ile Green (s)	31.0	31.0		31.0	31.0		0.0	49.0		8.0	61.0	
10th %ile Term Code	Max	Max		Hold	Hold		Skip	Coord		MaxR	Coord	
Stops (vph)		319			214		19	823		37	518	
Fuel Used(gal)		8			5		0	16		2	20	
CO Emissions (g/hr)		565			354		32	1087		137	1368	
NOx Emissions (g/hr)		110			69		6	211		27	266	
VOC Emissions (g/hr)		131			82		7	252		32	317	
Dilemma Vehicles (#)		0			0		0	0		0	0	
Queue Length 50th (ft)		279			191		16	298		24	189	
Queue Length 95th (ft)		#475			#343		26	390		45	254	
Internal Link Dist (ft)		186			144			597			2074	
Turn Bay Length (ft)												
Base Capacity (vph)		461			354		342	1460		266	1636	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.98			0.92		0.20	0.79		0.36	0.54	

Intersection Summary
Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 32 (32%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.98
Intersection Signal Delay: 33.5 Intersection LOS: C
Intersection Capacity Utilization 72.0% 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: 99: Harrison Avenue & Massachusetts Avenue

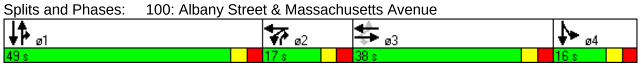


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	11	10	12	12	10	11	10
Storage Length (ft)	0		100	0		0	0		0	150		0
Storage Lanes	0		1	1		0	0		1	1		0
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Leading Detector (ft)	50	50	50	50	50			50	50	50	50	
Trailing Detector (ft)	0	0	0	0	0			0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.95	0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor		0.98	0.74	0.87	0.95					0.90	0.98	
Frt			0.850		0.945				0.850		0.988	
Flt Protected		0.990		0.950						0.950		
Satd. Flow (prot)	0	3239	1429	1517	2771	0	0	3374	1524	1574	3126	0
Flt Permitted		0.780		0.950						0.950		
Satd. Flow (perm)	0	2490	1062	1323	2771	0	0	3374	1524	1420	3126	0
Right Turn on Red			No			No			No			Yes
Satd. Flow (RTOR)											11	
Headway Factor	1.00	1.00	1.00	1.04	1.14	1.04	1.09	1.00	1.00	1.09	1.04	1.09
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		402			351			161			677	
Travel Time (s)		9.1			8.0			3.7			15.4	
Volume (vph)	74	314	53	122	212	87	0	944	387	87	675	52
Confl. Peds. (#/hr)	169		128	128		169	140		163	163		140
Confl. Bikes (#/hr)			2						1			6
Peak Hour Factor	0.77	0.88	0.78	0.85	0.93	0.66	0.25	0.92	0.94	0.84	0.99	0.88
Heavy Vehicles (%)	19%	8%	13%	15%	5%	8%	0%	7%	6%	7%	7%	24%
Parking (#/hr)					6	6						
Adj. Flow (vph)	96	357	68	144	228	132	0	1026	412	104	682	59
Lane Group Flow (vph)	0	453	68	144	360	0	0	1026	412	104	741	0
Turn Type	Perm		Perm	Prot					pt+ov	Prot		
Protected Phases		3		2	2 3			1	1 2	4	1 4	
Permitted Phases	3		3									
Detector Phases	3	3	3	2	2 3			1	1 2	4	1 4	
Minimum Initial (s)	8.0	8.0	8.0	8.0				8.0		8.0		
Minimum Split (s)	38.0	38.0	38.0	14.0				30.0		14.0		
Total Split (s)	38.0	38.0	38.0	17.0	55.0	0.0	0.0	49.0	66.0	16.0	65.0	0.0
Total Split (%)	31.7%	31.7%	31.7%	14.2%	45.8%	0.0%	0.0%	40.8%	55.0%	13.3%	54.2%	0.0%
Maximum Green (s)	32.0	32.0	32.0	11.0				43.0		10.0		
Yellow Time (s)	3.0	3.0	3.0	3.0				3.0		3.0		
All-Red Time (s)	3.0	3.0	3.0	3.0				3.0		3.0		
Lead/Lag	Lead	Lead	Lead	Lag				Lead		Lag		
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0	2.0	2.0				2.0		2.0		
Recall Mode	None	None	None	None				C-Max		None		
Walk Time (s)	8.0	8.0	8.0					8.0				
Flash Dont Walk (s)	24.0	24.0	24.0					16.0				
Pedestrian Calls (#/hr)	76	76	76					74				
Act Effct Green (s)		32.3	32.3	14.0	49.3			48.7	65.7	13.0	64.7	
Actuated g/C Ratio		0.27	0.27	0.12	0.41			0.41	0.55	0.11	0.54	
v/c Ratio		0.68	0.24	0.81	0.32			0.75	0.49	0.61	0.44	
Control Delay		42.7	36.6	84.6	24.2			35.5	20.3	67.0	18.1	
Queue Delay		0.6	0.0	0.0	0.0			0.0	0.2	3.8	0.0	
Total Delay		43.3	36.6	84.6	24.2			35.5	20.4	70.8	18.1	
LOS		D	D	F	C			D	C	E	B	
Approach Delay		42.4			41.5			31.2			24.6	
Approach LOS		D			D			C			C	
90th %ile Green (s)	32.0	32.0	32.0	11.0				43.0		10.0		
90th %ile Term Code	Max	Max	Max	Max				Coord		Max		
70th %ile Green (s)	32.0	32.0	32.0	11.0				43.0		10.0		
70th %ile Term Code	Ped	Ped	Ped	Max				Coord		Max		
50th %ile Green (s)	32.0	32.0	32.0	11.0				43.0		10.0		
50th %ile Term Code	Ped	Ped	Ped	Max				Coord		Max		
30th %ile Green (s)	32.0	32.0	32.0	11.0				43.0		10.0		
30th %ile Term Code	Ped	Ped	Ped	Max				Coord		Max		
10th %ile Green (s)	18.6	18.6	18.6	11.0				56.4		10.0		
10th %ile Term Code	Gap	Gap	Gap	Max				Coord		Max		
Stops (vph)		288	37	109	193			795	240	82	421	
Fuel Used(gal)		6	1	3	3			12	3	2	9	
CO Emissions (g/hr)		432	54	212	235			867	238	147	618	
NOx Emissions (g/hr)		84	10	41	46			169	46	29	120	
VOC Emissions (g/hr)		100	12	49	54			201	55	34	143	
Dilemma Vehicles (#)		0	0	0	0			0	0	0	0	
Queue Length 50th (ft)		136	34	111	93			366	200	78	181	
Queue Length 95th (ft)		208	m69	#202	131			453	293	129	232	
Internal Link Dist (ft)		322			271			81			597	
Turn Bay Length (ft)			100							150		
Base Capacity (vph)		726	310	177	1201			1368	834	171	1690	
Starvation Cap Reductn		0	0	0	0			0	0	0	0	
Spillback Cap Reductn		71	0	0	0			0	63	25	0	
Storage Cap Reductn		0	0	0	0			0	0	0	0	
Reduced v/c Ratio		0.69	0.22	0.81	0.30			0.75	0.53	0.71	0.44	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 92 (77%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 32.8 Intersection LOS: C
Intersection Capacity Utilization 85.9% ICU Level of Service E
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 100: Albany Street & Massachusetts Avenue



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Yield			Stop			Stop	
Volume (vph)	40	310	46	104	165	46	45	150	69	0	0	0
Peak Hour Factor	0.83	0.82	0.82	0.85	0.83	0.72	0.59	0.94	0.91	0.25	0.25	0.25
Hourly flow rate (vph)	48	378	56	122	199	64	76	160	76	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	482	385	312
Volume Left (vph)	48	122	76
Volume Right (vph)	56	64	76
Hadj (s)	0.02	0.05	-0.04
Departure Headway (s)	5.6	5.8	6.2
Degree Utilization, x	0.75	0.62	0.54
Capacity (veh/h)	625	589	540
Control Delay (s)	23.6	17.7	16.1
Approach Delay (s)	23.6	17.7	16.1
Approach LOS	C	C	C

Intersection Summary			
Delay	19.7		
HCM Level of Service	C		
Intersection Capacity Utilization	69.6%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	18	7	275	76	52	119
Peak Hour Factor	0.64	0.88	0.90	0.73	0.81	0.80
Hourly flow rate (vph)	28	8	306	104	64	149
Pedestrians	29		11			14
Lane Width (ft)	12.0		12.0			12.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	2		1			1
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			395			
pX, platoon unblocked	0.97	0.97			0.97	
vC, conflicting volume	675	401			439	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	665	382			421	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	93	99			94	
cM capacity (veh/h)	378	627			1087	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	28	8	410	213
Volume Left	28	0	0	64
Volume Right	0	8	104	0
cSH	378	627	1700	1087
Volume to Capacity	0.07	0.01	0.24	0.06
Queue Length 95th (ft)	6	1	0	5
Control Delay (s)	15.3	10.8	0.0	3.0
Lane LOS	C	B		A
Approach Delay (s)	14.3		0.0	3.0
Approach LOS	B			

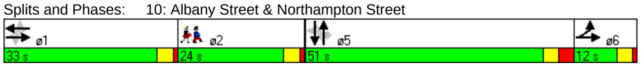
Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	49.0%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Leading Detector (ft)	50	50		50	50		50	50	50	50	50		
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0		
Turning Speed (mph)	15		9	15		9	15		9	15		9	
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.989			0.983				0.850		0.923		
Flt Protected		0.980			0.999			0.977			0.985		
Satd. Flow (prot)	0	2953	0	0	3109	0	0	1671	1454	0	1531	0	
Flt Permitted		0.548			0.943			0.758			0.862		
Satd. Flow (perm)	0	1651	0	0	2935	0	0	1296	1454	0	1339	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		7			11				118		66		
Headway Factor	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		337			412			200			383		
Travel Time (s)		7.7			9.4			4.5			8.7		
Volume (vph)	146	181	24	8	429	47	36	50	99	83	17	165	
Peak Hour Factor	0.83	0.81	0.75	0.67	0.80	0.69	0.64	0.78	0.84	0.86	0.47	0.92	
Heavy Vehicles (%)	1%	9%	21%	0%	3%	0%	0%	0%	0%	1%	6%	1%	
Adj. Flow (vph)	176	223	32	12	536	68	56	64	118	97	36	179	
Lane Group Flow (vph)	0	431	0	0	616	0	0	120	118	0	312	0	
Turn Type	D.P+P			Perm			Perm		Perm	Perm			
Protected Phases	6	1 6			1			5			5		2
Permitted Phases	1			1			5		5	5			
Detector Phases	6	1 6		1	1		5	5	5	5	5		
Minimum Initial (s)	4.0			8.0	8.0		6.0	6.0	6.0	6.0	6.0		4.0
Minimum Split (s)	8.0			12.0	12.0		12.0	12.0	12.0	12.0	12.0		24.0
Total Split (s)	12.0	45.0	0.0	33.0	33.0	0.0	51.0	51.0	51.0	51.0	51.0	0.0	24.0
Total Split (%)	10.0%	37.5%	0.0%	27.5%	27.5%	0.0%	42.5%	42.5%	42.5%	42.5%	42.5%	0.0%	20%
Maximum Green (s)	8.0			29.0	29.0		45.0	45.0	45.0	45.0	45.0		20.0
Yellow Time (s)	3.0			3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0
All-Red Time (s)	1.0			1.0	1.0		3.0	3.0	3.0	3.0	3.0		1.0
Lead/Lag	Lag			Lead	Lead		Lead	Lead	Lead	Lead	Lead		Lag
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes
Vehicle Extension (s)	3.0			3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0
Recall Mode	Max			C-Max	C-Max		None	None	None	None	None		None
Walk Time (s)													7.0
Flash Dont Walk (s)													13.0
Pedestrian Calls (#/hr)													5
Act Effct Green (s)		74.1			66.1			29.1	29.1		29.1		
Actuated g/C Ratio		0.62			0.55			0.24	0.24		0.24		
v/c Ratio		0.39			0.38			0.38	0.27		0.83		
Control Delay		14.1			28.3			39.2	6.6		51.6		
Queue Delay		0.0			0.0			0.0	0.0		0.0		
Total Delay		14.1			28.3			39.2	6.6		51.6		
LOS		B			C			D	A		D		
Approach Delay		14.1			28.3			23.0			51.6		
Approach LOS		B			C			C			D		
90th %ile Green (s)	8.0			34.4	34.4		39.6	39.6	39.6	39.6	39.6		20.0
90th %ile Term Code	MaxR			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Ped
70th %ile Green (s)	8.0			65.7	65.7		32.3	32.3	32.3	32.3	32.3		0.0
70th %ile Term Code	MaxR			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Skip
50th %ile Green (s)	8.0			71.5	71.5		26.5	26.5	26.5	26.5	26.5		0.0
50th %ile Term Code	MaxR			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Skip
30th %ile Green (s)	8.0			76.2	76.2		21.8	21.8	21.8	21.8	21.8		0.0
30th %ile Term Code	MaxR			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Skip
10th %ile Green (s)	8.0			82.7	82.7		15.3	15.3	15.3	15.3	15.3		0.0
10th %ile Term Code	MaxR			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Skip
Stops (vph)		151			293			68	12		199		
Fuel Used(gal)		3			6			1	0		5		
CO Emissions (g/hr)		193			417			84	25		327		
NOx Emissions (g/hr)		38			81			16	5		64		
VOC Emissions (g/hr)		45			97			19	6		76		
Dilemma Vehicles (#)		0			0			0	0		0		
Queue Length 50th (ft)		55			152			79	0		187		
Queue Length 95th (ft)		146			282			99	33		90		
Internal Link Dist (ft)		257			332			120			303		
Turn Bay Length (ft)													
Base Capacity (vph)		1109			1622			508	641		565		
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			0.38			0.24	0.18		0.55		

Intersection Summary

Area Type: CBD
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 72 (60%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 28.2 Intersection LOS: C
Intersection Capacity Utilization 60.3% ICU Level of Service B
Analysis Period (min) 15

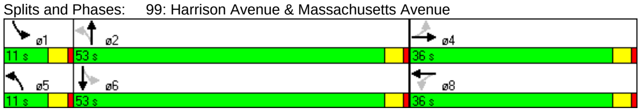
Splits and Phases: 10: Albany Street & Northampton Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.94			0.95			0.92		0.92	0.95	
Frt		0.972			0.980			0.971			0.976	
Flt Protected		0.990			0.987		0.950			0.950		
Satd. Flow (prot)	0	1621	0	0	1705	0	1703	3083	0	1736	3195	0
Flt Permitted		0.790			0.725		0.173			0.247		
Satd. Flow (perm)	0	1293	0	0	1210	0	310	3083	0	416	3195	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			9			40			30	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		267			224			677			2154	
Travel Time (s)		6.1			5.1			15.4			49.0	
Volume (vph)	44	172	47	103	269	54	86	650	140	56	796	142
Confl. Peds. (#/hr)	81		191	191		81	103		142	142		103
Confl. Bikes (#/hr)						4			7			1
Peak Hour Factor	0.75	0.93	0.75	0.80	0.94	0.75	0.82	0.95	0.87	0.84	0.91	0.86
Heavy Vehicles (%)	3%	6%	7%	4%	6%	6%	6%	5%	4%	4%	5%	5%
Adj. Flow (vph)	59	185	63	129	286	72	105	684	161	67	875	165
Lane Group Flow (vph)	0	307	0	0	487	0	105	845	0	67	1040	0
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phases	4	4		8	8		5	2		1	6	
Minimum Initial (s)	8.0	8.0		8.0	8.0		6.0	8.0		6.0	8.0	
Minimum Split (s)	22.0	22.0		22.0	22.0		10.0	22.0		10.0	22.0	
Total Split (s)	36.0	36.0	0.0	36.0	36.0	0.0	11.0	53.0	0.0	11.0	53.0	0.0
Total Split (%)	36.0%	36.0%	0.0%	36.0%	36.0%	0.0%	11.0%	53.0%	0.0%	11.0%	53.0%	0.0%
Maximum Green (s)	32.0	32.0		32.0	32.0		7.0	49.0		7.0	49.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	C-Max		Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0			11.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)		32.0			32.0		55.8	49.0		56.8	51.2	
Actuated g/C Ratio		0.32			0.32		0.56	0.49		0.57	0.51	
v/c Ratio		0.73			1.24		0.39	0.55		0.20	0.63	
Control Delay		40.2			159.0		13.1	18.6		10.0	19.8	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		40.2			159.0		13.1	18.6		10.0	19.8	
LOS		D			F		B	B		A	B	
Approach Delay		40.2			159.0			18.0			19.2	
Approach LOS		D			F			B			B	
90th %ile Green (s)	32.0	32.0		32.0	32.0		7.0	49.0		7.0	49.0	
90th %ile Term Code	Max	Max		Max	Max		Max	Coord		MaxR	Coord	
70th %ile Green (s)	32.0	32.0		32.0	32.0		7.0	49.0		7.0	49.0	
70th %ile Term Code	Max	Max		Max	Max		Max	Coord		MaxR	Coord	
50th %ile Green (s)	32.0	32.0		32.0	32.0		7.0	49.0		7.0	49.0	
50th %ile Term Code	Hold	Hold		Max	Max		Max	Coord		MaxR	Coord	
30th %ile Green (s)	32.0	32.0		32.0	32.0		7.0	49.0		7.0	49.0	
30th %ile Term Code	Hold	Hold		Max	Max		Max	Coord		MaxR	Coord	
10th %ile Green (s)	32.0	32.0		32.0	32.0		0.0	49.0		7.0	60.0	
10th %ile Term Code	Hold	Hold		Max	Max		Skip	Coord		MaxR	Coord	
Stops (vph)		219			331		37	507		23	641	
Fuel Used(gal)		4			16		1	10		1	23	
CO Emissions (g/hr)		274			1144		62	696		83	1613	
NOx Emissions (g/hr)		53			222		12	135		16	314	
VOC Emissions (g/hr)		64			265		14	161		19	374	
Dilemma Vehicles (#)		0			0		0	0		0	0	
Queue Length 50th (ft)		165			~386		26	181		17	245	
Queue Length 95th (ft)		#279			#587		44	239		32	316	
Internal Link Dist (ft)		187			144			597			2074	
Turn Bay Length (ft)												
Base Capacity (vph)		423			393		271	1531		328	1651	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.73			1.24		0.39	0.55		0.20	0.63	

Intersection Summary
Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 78 (78%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.24
Intersection Signal Delay: 44.9 Intersection LOS: D
Intersection Capacity Utilization 78.8% ICU Level of Service D
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 99: Harrison Avenue & Massachusetts Avenue

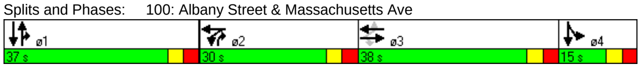


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑	↱	↰	↑↱			↑↑	↱	↰	↑↱	
Ideal Flow (vphpl)	1900	1900	1900	2100	2100	2100	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	11	10	12	12	10	11	10
Storage Length (ft)	0		100	0		0	0		0	150		0
Storage Lanes	0		1	1		0	0		1	1		0
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Leading Detector (ft)	50	50	50	50	50			50	50	50	50	
Trailing Detector (ft)	0	0	0	0	0			0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.95	0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor		0.98	0.79	0.87	0.98					0.83	0.99	
Frt			0.850		0.968				0.850		0.992	
Flt Protected		0.986		0.950						0.950		
Satd. Flow (prot)	0	3274	1599	1753	3226	0	0	3471	1495	1518	3266	0
Flt Permitted		0.683		0.950						0.950		
Satd. Flow (perm)	0	2220	1267	1528	3226	0	0	3471	1495	1266	3266	0
Right Turn on Red			No			No			No			Yes
Satd. Flow (RTOR)											6	
Headway Factor	1.00	1.00	1.00	1.04	1.14	1.04	1.09	1.00	1.00	1.09	1.04	1.09
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		412			351			161			677	
Travel Time (s)		9.4			8.0			3.7			15.4	
Volume (vph)	64	165	134	182	447	113	0	692	213	38	872	35
Confl. Peds. (#/hr)	152		102	102		152	138		191	191		138
Confl. Bikes (#/hr)									2			1
Peak Hour Factor	0.77	0.81	0.84	0.75	0.93	0.85	0.50	0.91	0.89	0.86	0.94	0.67
Heavy Vehicles (%)	13%	7%	1%	10%	6%	6%	0%	4%	8%	11%	4%	19%
Parking (#/hr)					6	6						
Adj. Flow (vph)	83	204	160	243	481	133	0	760	239	44	928	52
Lane Group Flow (vph)	0	287	160	243	614	0	0	760	239	44	980	0
Turn Type	Perm		Perm	Prot					pt+ov	Prot		
Protected Phases		3		2	2 3			1	1 2	4	1 4	
Permitted Phases	3		3									
Detector Phases	3	3	3	2	2 3			1	1 2	4	1 4	
Minimum Initial (s)	8.0	8.0	8.0	8.0				8.0		8.0		
Minimum Split (s)	38.0	38.0	38.0	14.0				30.0		14.0		
Total Split (s)	38.0	38.0	38.0	30.0	68.0	0.0	0.0	37.0	67.0	15.0	52.0	0.0
Total Split (%)	31.7%	31.7%	31.7%	25.0%	56.7%	0.0%	0.0%	30.8%	55.8%	12.5%	43.3%	0.0%
Maximum Green (s)	32.0	32.0	32.0	24.0				31.0		9.0		
Yellow Time (s)	3.0	3.0	3.0	3.0				3.0		3.0		
All-Red Time (s)	3.0	3.0	3.0	3.0				3.0		3.0		
Lead/Lag	Lag	Lag	Lag	Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0	2.0	2.0				2.0		2.0		
Recall Mode	None	None	None	None				C-Max		None		
Walk Time (s)	8.0	8.0	8.0					8.0				
Flash Dont Walk (s)	24.0	24.0	24.0					16.0				
Pedestrian Calls (#/hr)	86	86	86					85				
Act Effct Green (s)		30.9	30.9	23.6	57.5			41.5	68.1	12.0	56.5	
Actuated g/C Ratio		0.26	0.26	0.20	0.48			0.35	0.57	0.10	0.47	
v/c Ratio		0.50	0.49	0.71	0.40			0.63	0.28	0.29	0.64	
Control Delay		43.3	44.9	64.1	8.0			37.8	15.8	55.6	28.1	
Queue Delay		0.0	0.0	1.0	0.5			0.0	0.0	0.0	0.0	
Total Delay		43.3	44.9	65.1	8.4			37.8	15.8	55.6	28.1	
LOS		D	D	E	A			D	B	E	C	
Approach Delay		43.9			24.5			32.5			29.2	
Approach LOS		D			C			C			C	
90th %ile Green (s)	32.0	32.0	32.0	24.0				31.0		9.0		
90th %ile Term Code	Ped	Ped	Ped	Max				Coord		Max		
70th %ile Green (s)	32.0	32.0	32.0	24.0				31.0		9.0		
70th %ile Term Code	Ped	Ped	Ped	Max				Coord		Max		
50th %ile Green (s)	32.0	32.0	32.0	20.8				34.2		9.0		
50th %ile Term Code	Ped	Ped	Ped	Gap				Coord		Max		
30th %ile Green (s)	32.0	32.0	32.0	16.5				38.5		9.0		
30th %ile Term Code	Ped	Ped	Ped	Gap				Coord		Max		
10th %ile Green (s)	11.5	11.5	11.5	17.6				57.9		9.0		
10th %ile Term Code	Gap	Gap	Gap	Gap				Coord		Max		
Stops (vph)		181	107	167	177			579	111	35	680	
Fuel Used(gal)		4	2	4	3			9	2	1	14	
CO Emissions (g/hr)		263	157	265	239			657	109	58	960	
NOx Emissions (g/hr)		51	31	52	47			128	21	11	187	
VOC Emissions (g/hr)		61	36	61	55			152	25	13	222	
Dilemma Vehicles (#)		0	0	0	0			0	0	0	0	
Queue Length 50th (ft)		95	100	183	54			273	99	32	314	
Queue Length 95th (ft)		m117	m141	206	65			358	151	67	411	
Internal Link Dist (ft)		332			271			81			597	
Turn Bay Length (ft)			100							150		
Base Capacity (vph)		648	370	394	1655			1201	891	152	1541	
Starvation Cap Reductn		0	0	38	575			0	0	0	0	
Spillback Cap Reductn		0	0	0	0			0	19	0	0	
Storage Cap Reductn		0	0	0	0			0	0	0	0	
Reduced v/c Ratio		0.44	0.43	0.68	0.57			0.63	0.27	0.29	0.64	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 57 (48%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.71
Intersection Signal Delay: 31.0 Intersection LOS: C
Intersection Capacity Utilization 81.9% ICU Level of Service D
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 100: Albany Street & Massachusetts Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣				
Sign Control		Yield			Yield			Stop			Stop	
Volume (vph)	33	213	28	170	283	44	53	158	50	0	0	0
Peak Hour Factor	0.92	0.93	0.78	0.77	0.91	0.69	0.66	0.90	0.89	0.25	0.25	0.25
Hourly flow rate (vph)	36	229	36	221	311	64	80	176	56	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	301	596	312
Volume Left (vph)	36	221	80
Volume Right (vph)	36	64	56
Hadj (s)	-0.03	0.05	-0.05
Departure Headway (s)	5.9	5.5	6.2
Degree Utilization, x	0.49	0.91	0.54
Capacity (veh/h)	586	636	548
Control Delay (s)	14.4	40.5	16.4
Approach Delay (s)	14.4	40.5	16.4
Approach LOS	B	E	C

Intersection Summary			
Delay	27.8		
HCM Level of Service	D		
Intersection Capacity Utilization	80.5%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	55	60	223	7	10	199
Peak Hour Factor	0.76	0.83	0.93	0.58	0.50	0.84
Hourly flow rate (vph)	72	72	240	12	20	237
Pedestrians	43		13			27
Lane Width (ft)	12.0		12.0			12.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	4		1			2
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			383			
pX, platoon unblocked						
vC, conflicting volume	579	316			295	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	579	316			295	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	84	89			98	
cM capacity (veh/h)	451	687			1232	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	72	72	252	257
Volume Left	72	0	0	20
Volume Right	0	72	12	0
cSH	451	687	1700	1232
Volume to Capacity	0.16	0.11	0.15	0.02
Queue Length 95th (ft)	14	9	0	1
Control Delay (s)	14.5	10.9	0.0	0.8
Lane LOS	B	B		A
Approach Delay (s)	12.7		0.0	0.8
Approach LOS	B			

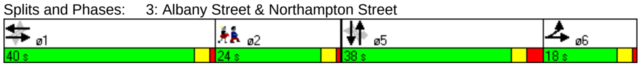
Intersection Summary			
Average Delay	3.1		
Intersection Capacity Utilization	36.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Leading Detector (ft)	50	50		50	50		50	50	50	50	50		
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0		
Turning Speed (mph)	15		9	15		9	15		9	15		9	
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.986			0.974				0.850		0.942		
Flt Protected		0.985			0.996			0.994			0.983		
Satd. Flow (prot)	0	2977	0	0	2964	0	0	1680	1275	0	1529	0	
Flt Permitted		0.670			0.785			0.958			0.864		
Satd. Flow (perm)	0	2025	0	0	2336	0	0	1620	1275	0	1344	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		11			21				32		32		
Headway Factor	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		318			402			243			395		
Travel Time (s)		7.2			9.1			5.5			9.0		
Volume (vph)	230	441	67	27	249	57	12	82	29	54	34	67	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	2%	7%	13%	0%	8%	2%	9%	0%	14%	4%	0%	5%	
Adj. Flow (vph)	250	479	73	29	271	62	13	89	32	59	37	73	
Lane Group Flow (vph)	0	802	0	0	362	0	0	102	32	0	169	0	
Turn Type	D.P+P			Perm			Perm		Perm	Perm			
Protected Phases	6	1 6			1			5			5		2
Permitted Phases	1			1			5		5	5			
Detector Phases	6	1 6		1	1		5	5	5	5	5		
Minimum Initial (s)	4.0			8.0	8.0		8.0	8.0	8.0	8.0	8.0		4.0
Minimum Split (s)	8.0			12.0	12.0		14.0	14.0	14.0	14.0	14.0		24.0
Total Split (s)	18.0	58.0	0.0	40.0	40.0	0.0	38.0	38.0	38.0	38.0	38.0	0.0	24.0
Total Split (%)	15.0%	48.3%	0.0%	33.3%	33.3%	0.0%	31.7%	31.7%	31.7%	31.7%	31.7%	0.0%	20%
Maximum Green (s)	14.0			36.0	36.0		32.0	32.0	32.0	32.0	32.0		20.0
Yellow Time (s)	3.0			3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0
All-Red Time (s)	1.0			1.0	1.0		3.0	3.0	3.0	3.0	3.0		1.0
Lead/Lag	Lag			Lead	Lead		Lead	Lead	Lead	Lead	Lead		Lag
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes
Vehicle Extension (s)	3.0			3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0
Recall Mode	None			C-Max	C-Max		None	None	None	None	None		None
Walk Time (s)													7.0
Flash Dont Walk (s)													13.0
Pedestrian Calls (#/hr)													5
Act Effct Green (s)		84.1			70.1			19.1	19.1		19.1		
Actuated g/C Ratio		0.70			0.58			0.16	0.16		0.16		
v/c Ratio		0.52			0.26			0.40	0.14		0.70		
Control Delay		10.6			21.8			48.1	13.9		53.2		
Queue Delay		0.0			0.0			0.0	0.0		0.0		
Total Delay		10.6			21.8			48.1	13.9		53.2		
LOS		B			C			D	B		D		
Approach Delay		10.6			21.8			40.0			53.2		
Approach LOS		B			C			D			D		
90th %ile Green (s)	14.0			42.7	42.7		25.3	25.3	25.3	25.3	25.3		20.0
90th %ile Term Code	Max			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Ped
70th %ile Green (s)	14.0			71.7	71.7		20.3	20.3	20.3	20.3	20.3		0.0
70th %ile Term Code	Max			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Skip
50th %ile Green (s)	14.0			75.1	75.1		16.9	16.9	16.9	16.9	16.9		0.0
50th %ile Term Code	Max			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Skip
30th %ile Green (s)	14.0			78.3	78.3		13.7	13.7	13.7	13.7	13.7		0.0
30th %ile Term Code	Max			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Skip
10th %ile Green (s)	14.0			82.8	82.8		9.2	9.2	9.2	9.2	9.2		0.0
10th %ile Term Code	Max			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Skip
Stops (vph)		279			245			81	8		116		
Fuel Used(gal)		5			4			2	0		3		
CO Emissions (g/hr)		347			271			108	13		196		
NOx Emissions (g/hr)		68			53			21	2		38		
VOC Emissions (g/hr)		80			63			25	3		45		
Dilemma Vehicles (#)		0			0			0	0		0		
Queue Length 50th (ft)		82			105			72	0		102		
Queue Length 95th (ft)		268			174			117	27		166		
Internal Link Dist (ft)		238			322			163			315		
Turn Bay Length (ft)													
Base Capacity (vph)		1534			1374			459	384		404		
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		0.52			0.26			0.22	0.08		0.42		

Intersection Summary

Area Type: CBD
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 76 (63%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.70
Intersection Signal Delay: 21.0 Intersection LOS: C
Intersection Capacity Utilization 60.4% ICU Level of Service B
Analysis Period (min) 15

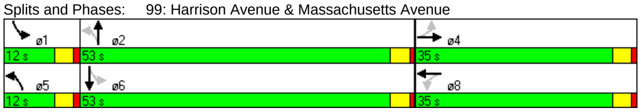
Splits and Phases: 3: Albany Street & Northampton Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.96			0.97		0.96	0.92			0.96	
Frt		0.987			0.972			0.969			0.981	
Flt Protected		0.994			0.989		0.950			0.950		
Satd. Flow (prot)	0	1722	0	0	1623	0	1770	2953	0	1752	3147	0
Flt Permitted		0.905			0.672		0.181			0.108		
Satd. Flow (perm)	0	1559	0	0	1103	0	323	2953	0	199	3147	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			13			45			23	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		266			224			677			2154	
Travel Time (s)		6.0			5.1			15.4			49.0	
Volume (vph)	50	343	43	67	172	62	51	914	234	134	814	121
Confl. Peds. (#/hr)	75		202	202		75	119		139	139		119
Confl. Bikes (#/hr)			5			2			7			4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	4%	5%	7%	13%	2%	2%	10%	4%	3%	8%	4%
Adj. Flow (vph)	54	373	47	73	187	67	55	993	254	146	885	132
Lane Group Flow (vph)	0	474	0	0	327	0	55	1247	0	146	1017	0
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phases	4	4		8	8		5	2		1	6	
Minimum Initial (s)	8.0	8.0		8.0	8.0		6.0	8.0		6.0	8.0	
Minimum Split (s)	22.0	22.0		22.0	22.0		10.0	22.0		10.0	22.0	
Total Split (s)	35.0	35.0	0.0	35.0	35.0	0.0	12.0	53.0	0.0	12.0	53.0	0.0
Total Split (%)	35.0%	35.0%	0.0%	35.0%	35.0%	0.0%	12.0%	53.0%	0.0%	12.0%	53.0%	0.0%
Maximum Green (s)	31.0	31.0		31.0	31.0		8.0	49.0		8.0	49.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	C-Max		Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0			11.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)		31.0			31.0		55.8	49.0		58.6	52.2	
Actuated g/C Ratio		0.31			0.31		0.56	0.49		0.59	0.52	
v/c Ratio		0.97			0.93		0.20	0.85		0.61	0.62	
Control Delay		69.8			67.5		9.7	28.3		22.7	19.1	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		69.8			67.5		9.7	28.3		22.7	19.1	
LOS		E			E		A	C		C	B	
Approach Delay		69.8			67.5			27.5			19.6	
Approach LOS		E			E			C			B	
90th %ile Green (s)	31.0	31.0		31.0	31.0		8.0	49.0		8.0	49.0	
90th %ile Term Code	Max	Max		Max	Max		Max	Coord		MaxR	Coord	
70th %ile Green (s)	31.0	31.0		31.0	31.0		7.2	49.0		8.0	49.8	
70th %ile Term Code	Max	Max		Max	Max		Gap	Coord		MaxR	Coord	
50th %ile Green (s)	31.0	31.0		31.0	31.0		6.7	49.0		8.0	50.3	
50th %ile Term Code	Max	Max		Max	Max		Gap	Coord		MaxR	Coord	
30th %ile Green (s)	31.0	31.0		31.0	31.0		6.2	49.0		8.0	50.8	
30th %ile Term Code	Max	Max		Max	Max		Gap	Coord		MaxR	Coord	
10th %ile Green (s)	31.0	31.0		31.0	31.0		0.0	49.0		8.0	61.0	
10th %ile Term Code	Max	Max		Hold	Hold		Skip	Coord		MaxR	Coord	
Stops (vph)		370			247		20	932		61	630	
Fuel Used(gal)		9			6		0	18		3	23	
CO Emissions (g/hr)		639			421		34	1246		224	1597	
NOx Emissions (g/hr)		124			82		7	242		44	311	
VOC Emissions (g/hr)		148			98		8	289		52	370	
Dilemma Vehicles (#)		0			0		0	0		0	0	
Queue Length 50th (ft)		294			195		13	341		37	233	
Queue Length 95th (ft)		#503			#370		28	443		#88	312	
Internal Link Dist (ft)		186			144			597			2074	
Turn Bay Length (ft)												
Base Capacity (vph)		487			351		300	1470		241	1653	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.97			0.93		0.18	0.85		0.61	0.62	

Intersection Summary
Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 32 (32%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.97
Intersection Signal Delay: 34.8 Intersection LOS: C
Intersection Capacity Utilization 81.2% 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: 99: Harrison Avenue & Massachusetts Avenue

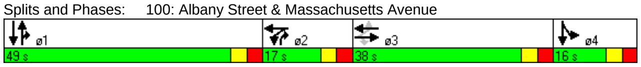


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	11	10	12	12	10	11	10
Storage Length (ft)	0		100	0		0	0		0	150		0
Storage Lanes	0		1	1		0	0		1	1		0
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Leading Detector (ft)	50	50	50	50	50			50	50	50	50	
Trailing Detector (ft)	0	0	0	0	0			0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.95	0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor		0.98	0.74	0.88	0.96					0.91	0.98	
Frt			0.850		0.952				0.850		0.989	
Flt Protected		0.992		0.950						0.950		
Satd. Flow (prot)	0	3261	1429	1517	2814	0	0	3374	1524	1574	3138	0
Flt Permitted		0.808		0.950						0.950		
Satd. Flow (perm)	0	2605	1062	1338	2814	0	0	3374	1524	1435	3138	0
Right Turn on Red			No			No			No			Yes
Satd. Flow (RTOR)											10	
Headway Factor	1.00	1.00	1.00	1.04	1.14	1.04	1.09	1.00	1.00	1.09	1.04	1.09
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		402			351			161			677	
Travel Time (s)		9.1			8.0			3.7			15.4	
Volume (vph)	78	391	56	158	231	108	0	1012	591	164	710	55
Confl. Peds. (#/hr)	169		128	128		169	140		163	163		140
Confl. Bikes (#/hr)			2						1			6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	19%	8%	13%	15%	5%	8%	0%	7%	6%	7%	7%	24%
Parking (#/hr)					6	6						
Adj. Flow (vph)	85	425	61	172	251	117	0	1100	642	178	772	60
Lane Group Flow (vph)	0	510	61	172	368	0	0	1100	642	178	832	0
Turn Type	Perm		Perm	Prot					pt+ov	Prot		
Protected Phases		3		2	2 3			1	1 2	4	1 4	
Permitted Phases	3		3									
Detector Phases	3	3	3	2	2 3			1	1 2	4	1 4	
Minimum Initial (s)	8.0	8.0	8.0	8.0				8.0		8.0		
Minimum Split (s)	38.0	38.0	38.0	14.0				30.0		14.0		
Total Split (s)	38.0	38.0	38.0	17.0	55.0	0.0	0.0	49.0	66.0	16.0	65.0	0.0
Total Split (%)	31.7%	31.7%	31.7%	14.2%	45.8%	0.0%	0.0%	40.8%	55.0%	13.3%	54.2%	0.0%
Maximum Green (s)	32.0	32.0	32.0	11.0				43.0		10.0		
Yellow Time (s)	3.0	3.0	3.0	3.0				3.0		3.0		
All-Red Time (s)	3.0	3.0	3.0	3.0				3.0		3.0		
Lead/Lag	Lead	Lead	Lead	Lag				Lead		Lag		
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0	2.0	2.0				2.0		2.0		
Recall Mode	None	None	None	None				C-Max		None		
Walk Time (s)	8.0	8.0	8.0					8.0				
Flash Dont Walk (s)	24.0	24.0	24.0					16.0				
Pedestrian Calls (#/hr)	76	76	76					74				
Act Effct Green (s)		32.4	32.4	14.0	49.4			48.6	65.6	13.0	64.6	
Actuated g/C Ratio		0.27	0.27	0.12	0.41			0.40	0.55	0.11	0.54	
v/c Ratio		0.73	0.21	0.97	0.32			0.80	0.77	1.04	0.49	
Control Delay		43.3	35.1	114.0	24.3			37.9	30.1	132.1	19.0	
Queue Delay		0.7	0.0	0.0	0.0			0.0	1.4	57.2	0.0	
Total Delay		44.0	35.1	114.0	24.3			37.9	31.5	189.3	19.0	
LOS		D	D	F	C			D	C	F	B	
Approach Delay		43.0			52.8			35.5			49.0	
Approach LOS		D			D			D			D	
90th %ile Green (s)	32.0	32.0	32.0	11.0				43.0		10.0		
90th %ile Term Code	Max	Max	Max	Max				Coord		Max		
70th %ile Green (s)	32.0	32.0	32.0	11.0				43.0		10.0		
70th %ile Term Code	Max	Max	Max	Max				Coord		Max		
50th %ile Green (s)	32.0	32.0	32.0	11.0				43.0		10.0		
50th %ile Term Code	Ped	Ped	Ped	Max				Coord		Max		
30th %ile Green (s)	32.0	32.0	32.0	11.0				43.0		10.0		
30th %ile Term Code	Ped	Ped	Ped	Max				Coord		Max		
10th %ile Green (s)	18.8	18.8	18.8	11.0				56.2		10.0		
10th %ile Term Code	Gap	Gap	Gap	Max				Coord		Max		
Stops (vph)		342	38	134	218			868	462	135	462	
Fuel Used(gal)		7	1	5	4			14	7	6	10	
CO Emissions (g/hr)		524	55	338	266			970	483	421	668	
NOx Emissions (g/hr)		102	11	66	52			189	94	82	130	
VOC Emissions (g/hr)		121	13	78	62			225	112	98	155	
Dilemma Vehicles (#)		0	0	0	0			0	0	0	0	
Queue Length 50th (ft)		145	30	135	95			405	393	~150	212	
Queue Length 95th (ft)		204	m65	#278	133			498	571	#295	268	
Internal Link Dist (ft)		322			271			81			597	
Turn Bay Length (ft)			100							150		
Base Capacity (vph)		760	310	177	1219			1367	834	171	1695	
Starvation Cap Reductn		20	0	0	0			0	0	0	0	
Spillback Cap Reductn		67	0	0	0			0	68	22	0	
Storage Cap Reductn		0	0	0	0			0	0	0	0	
Reduced v/c Ratio		0.74	0.20	0.97	0.30			0.80	0.84	1.19	0.49	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 92 (77%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.04
Intersection Signal Delay: 42.6 Intersection LOS: D
Intersection Capacity Utilization 90.2% ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 100: Albany Street & Massachusetts Avenue



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Yield			Stop			Stop	
Volume (vph)	42	364	48	109	201	48	47	158	73	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	46	396	52	118	218	52	51	172	79	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	493	389	302
Volume Left (vph)	46	118	51
Volume Right (vph)	52	52	79
Hadj (s)	0.03	0.07	-0.06
Departure Headway (s)	5.6	5.8	6.2
Degree Utilization, x	0.77	0.63	0.52
Capacity (veh/h)	629	590	538
Control Delay (s)	24.5	17.9	15.7
Approach Delay (s)	24.5	17.9	15.7
Approach LOS	C	C	C

Intersection Summary			
Delay	20.1		
HCM Level of Service	C		
Intersection Capacity Utilization	75.6%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	18	7	289	76	52	125
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	8	314	83	57	136
Pedestrians	29		11			14
Lane Width (ft)	12.0		12.0			12.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	2		1			1
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			395			
pX, platoon unblocked	0.98	0.98			0.98	
vC, conflicting volume	644	398			426	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	635	383			411	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	99			95	
cM capacity (veh/h)	399	629			1103	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	20	8	397	192
Volume Left	20	0	0	57
Volume Right	0	8	83	0
cSH	399	629	1700	1103
Volume to Capacity	0.05	0.01	0.23	0.05
Queue Length 95th (ft)	4	1	0	4
Control Delay (s)	14.5	10.8	0.0	2.8
Lane LOS	B	B		A
Approach Delay (s)	13.5		0.0	2.8
Approach LOS	B			

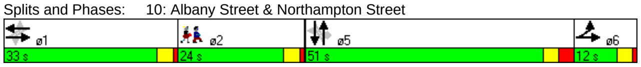
Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	50.1%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Leading Detector (ft)	50	50		50	50		50	50	50	50	50		
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0		
Turning Speed (mph)	15		9	15		9	15		9	15		9	
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.990			0.988				0.850		0.916		
Flt Protected		0.981			0.999			0.980			0.985		
Satd. Flow (prot)	0	2960	0	0	3122	0	0	1676	1454	0	1523	0	
Flt Permitted		0.552			0.948			0.810			0.869		
Satd. Flow (perm)	0	1666	0	0	2963	0	0	1385	1454	0	1343	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		6			7				113		81		
Headway Factor	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		337			412			200			383		
Travel Time (s)		7.7			9.4			4.5			8.7		
Volume (vph)	153	207	25	8	554	49	38	53	104	87	18	173	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	1%	9%	21%	0%	3%	0%	0%	0%	0%	1%	6%	1%	
Adj. Flow (vph)	166	225	27	9	602	53	41	58	113	95	20	188	
Lane Group Flow (vph)	0	418	0	0	664	0	0	99	113	0	303	0	
Turn Type	D.P+P			Perm			Perm		Perm	Perm			
Protected Phases	6	1 6			1			5			5		2
Permitted Phases	1			1			5		5	5			
Detector Phases	6	1 6		1	1		5	5	5	5	5		
Minimum Initial (s)	4.0			8.0	8.0		6.0	6.0	6.0	6.0	6.0		4.0
Minimum Split (s)	8.0			12.0	12.0		12.0	12.0	12.0	12.0	12.0		24.0
Total Split (s)	12.0	45.0	0.0	33.0	33.0	0.0	51.0	51.0	51.0	51.0	51.0	0.0	24.0
Total Split (%)	10.0%	37.5%	0.0%	27.5%	27.5%	0.0%	42.5%	42.5%	42.5%	42.5%	42.5%	0.0%	20%
Maximum Green (s)	8.0			29.0	29.0		45.0	45.0	45.0	45.0	45.0		20.0
Yellow Time (s)	3.0			3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0
All-Red Time (s)	1.0			1.0	1.0		3.0	3.0	3.0	3.0	3.0		1.0
Lead/Lag	Lag			Lead	Lead		Lead	Lead	Lead	Lead	Lead		Lag
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes
Vehicle Extension (s)	3.0			3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0
Recall Mode	Max			C-Max	C-Max		None	None	None	None	None		None
Walk Time (s)													7.0
Flash Dont Walk (s)													13.0
Pedestrian Calls (#/hr)													5
Act Effct Green (s)		76.2			68.2			27.0	27.0		27.0		
Actuated g/C Ratio		0.64			0.57			0.22	0.22		0.22		
v/c Ratio		0.36			0.39			0.32	0.27		0.83		
Control Delay		12.8			27.4			38.9	7.2		50.1		
Queue Delay		0.0			0.3			0.0	0.0		0.0		
Total Delay		12.8			27.7			38.9	7.2		50.1		
LOS		B			C			D	A		D		
Approach Delay		12.8			27.7			22.0			50.1		
Approach LOS		B			C			C			D		
90th %ile Green (s)	8.0			36.7	36.7		37.3	37.3	37.3	37.3	37.3		20.0
90th %ile Term Code	MaxR			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Ped
70th %ile Green (s)	8.0			67.9	67.9		30.1	30.1	30.1	30.1	30.1		0.0
70th %ile Term Code	MaxR			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Skip
50th %ile Green (s)	8.0			73.6	73.6		24.4	24.4	24.4	24.4	24.4		0.0
50th %ile Term Code	MaxR			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Skip
30th %ile Green (s)	8.0			78.2	78.2		19.8	19.8	19.8	19.8	19.8		0.0
30th %ile Term Code	MaxR			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Skip
10th %ile Green (s)	8.0			84.5	84.5		13.5	13.5	13.5	13.5	13.5		0.0
10th %ile Term Code	MaxR			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Skip
Stops (vph)		157			352			72	15		197		
Fuel Used(gal)		3			7			1	0		5		
CO Emissions (g/hr)		201			511			88	28		333		
NOx Emissions (g/hr)		39			99			17	5		65		
VOC Emissions (g/hr)		47			118			20	6		77		
Dilemma Vehicles (#)		0			0			0	0		0		
Queue Length 50th (ft)		49			149			65	0		170		
Queue Length 95th (ft)		156			345			101	41		245		
Internal Link Dist (ft)		257			332			120			303		
Turn Bay Length (ft)													
Base Capacity (vph)		1146			1687			542	638		575		
Starvation Cap Reductn		0			457			0	0		0		
Spillback Cap Reductn		0			0			0	0		0		
Storage Cap Reductn		0			0			0	0		0		
Reduced v/c Ratio		0.36			0.54			0.18	0.18		0.53		

Intersection Summary

Area Type: CBD
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 72 (60%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 27.3 Intersection LOS: C
Intersection Capacity Utilization 66.1% ICU Level of Service C
Analysis Period (min) 15

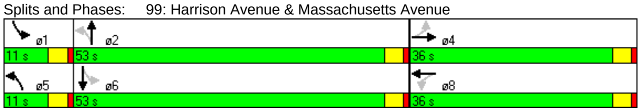
Splits and Phases: 10: Albany Street & Northampton Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.95			0.95			0.93		0.95	0.96	
Frt		0.977			0.976			0.974			0.978	
Flt Protected		0.992			0.990		0.950			0.950		
Satd. Flow (prot)	0	1651	0	0	1693	0	1703	3115	0	1736	3213	0
Flt Permitted		0.787			0.758		0.154			0.190		
Satd. Flow (perm)	0	1310	0	0	1262	0	276	3115	0	329	3213	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			12			35			28	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		267			224			677			2154	
Travel Time (s)		6.1			5.1			15.4			49.0	
Volume (vph)	46	194	49	110	318	94	90	753	158	72	858	149
Confl. Peds. (#/hr)	81		191	191		81	103		142	142		103
Confl. Bikes (#/hr)						4			7			1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	6%	7%	4%	6%	6%	6%	5%	4%	4%	5%	5%
Adj. Flow (vph)	50	211	53	120	346	102	98	818	172	78	933	162
Lane Group Flow (vph)	0	314	0	0	568	0	98	990	0	78	1095	0
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phases	4	4		8	8		5	2		1	6	
Minimum Initial (s)	8.0	8.0		8.0	8.0		6.0	8.0		6.0	8.0	
Minimum Split (s)	22.0	22.0		22.0	22.0		10.0	22.0		10.0	22.0	
Total Split (s)	36.0	36.0	0.0	36.0	36.0	0.0	11.0	53.0	0.0	11.0	53.0	0.0
Total Split (%)	36.0%	36.0%	0.0%	36.0%	36.0%	0.0%	11.0%	53.0%	0.0%	11.0%	53.0%	0.0%
Maximum Green (s)	32.0	32.0		32.0	32.0		7.0	49.0		7.0	49.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	C-Max		Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0			11.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)		32.0			32.0		55.8	49.0		56.8	51.2	
Actuated g/C Ratio		0.32			0.32		0.56	0.49		0.57	0.51	
v/c Ratio		0.74			1.38		0.39	0.64		0.27	0.66	
Control Delay		41.1			214.4		13.3	20.6		11.0	20.5	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		41.1			214.4		13.3	20.6		11.0	20.5	
LOS		D			F		B	C		B	C	
Approach Delay		41.1			214.4			19.9			19.9	
Approach LOS		D			F			B			B	
90th %ile Green (s)	32.0	32.0		32.0	32.0		7.0	49.0		7.0	49.0	
90th %ile Term Code	Max	Max		Max	Max		Max	Coord		MaxR	Coord	
70th %ile Green (s)	32.0	32.0		32.0	32.0		7.0	49.0		7.0	49.0	
70th %ile Term Code	Max	Max		Max	Max		Max	Coord		MaxR	Coord	
50th %ile Green (s)	32.0	32.0		32.0	32.0		7.0	49.0		7.0	49.0	
50th %ile Term Code	Hold	Hold		Max	Max		Max	Coord		MaxR	Coord	
30th %ile Green (s)	32.0	32.0		32.0	32.0		7.0	49.0		7.0	49.0	
30th %ile Term Code	Hold	Hold		Max	Max		Max	Coord		MaxR	Coord	
10th %ile Green (s)	32.0	32.0		32.0	32.0		0.0	49.0		7.0	60.0	
10th %ile Term Code	Hold	Hold		Max	Max		Skip	Coord		MaxR	Coord	
Stops (vph)		243			394		38	631		30	707	
Fuel Used(gal)		4			26		1	12		2	25	
CO Emissions (g/hr)		305			1812		65	847		107	1749	
NOx Emissions (g/hr)		59			353		13	165		21	340	
VOC Emissions (g/hr)		71			420		15	196		25	405	
Dilemma Vehicles (#)		0			0		0	0		0	0	
Queue Length 50th (ft)		171			~482		25	229		19	265	
Queue Length 95th (ft)		#298			#693		46	298		38	341	
Internal Link Dist (ft)		187			144			597			2074	
Turn Bay Length (ft)												
Base Capacity (vph)		427			412		254	1544		286	1659	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.74			1.38		0.39	0.64		0.27	0.66	

Intersection Summary
Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 78 (78%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.38
Intersection Signal Delay: 57.2 Intersection LOS: E
Intersection Capacity Utilization 87.6% ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 99: Harrison Avenue & Massachusetts Avenue



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	2100	2100	2100	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	11	10	12	12	10	11	10
Storage Length (ft)	0		100	0		0	0		0	150		0
Storage Lanes	0		1	1		0	0		1	1		0
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Leading Detector (ft)	50	50	50	50	50			50	50	50	50	
Trailing Detector (ft)	0	0	0	0	0			0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.95	0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor		0.98	0.79	0.87	0.97					0.84	0.99	
Frt			0.850		0.959				0.850		0.994	
Flt Protected		0.987		0.950						0.950		
Satd. Flow (prot)	0	3282	1599	1753	3179	0	0	3471	1495	1518	3289	0
Flt Permitted		0.674		0.950						0.950		
Satd. Flow (perm)	0	2206	1267	1526	3179	0	0	3471	1495	1280	3289	0
Right Turn on Red			No			No			No			Yes
Satd. Flow (RTOR)											4	
Headway Factor	1.00	1.00	1.00	1.04	1.14	1.04	1.09	1.00	1.00	1.09	1.04	1.09
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		412			351			161			677	
Travel Time (s)		9.4			8.0			3.7			15.4	
Volume (vph)	67	190	141	319	506	189	0	738	275	61	918	37
Confl. Peds. (#/hr)	152		102	102		152	138		191	191		138
Confl. Bikes (#/hr)									2			1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	13%	7%	1%	10%	6%	6%	0%	4%	8%	11%	4%	19%
Parking (#/hr)					6	6						
Adj. Flow (vph)	73	207	153	347	550	205	0	802	299	66	998	40
Lane Group Flow (vph)	0	280	153	347	755	0	0	802	299	66	1038	0
Turn Type	Perm		Perm	Prot					pt+ov	Prot		
Protected Phases		3		2	2 3			1	1 2	4	1 4	
Permitted Phases	3		3									
Detector Phases	3	3	3	2	2 3			1	1 2	4	1 4	
Minimum Initial (s)	8.0	8.0	8.0	8.0				8.0		8.0		
Minimum Split (s)	38.0	38.0	38.0	14.0				30.0		14.0		
Total Split (s)	38.0	38.0	38.0	30.0	68.0	0.0	0.0	37.0	67.0	15.0	52.0	0.0
Total Split (%)	31.7%	31.7%	31.7%	25.0%	56.7%	0.0%	0.0%	30.8%	55.8%	12.5%	43.3%	0.0%
Maximum Green (s)	32.0	32.0	32.0	24.0				31.0		9.0		
Yellow Time (s)	3.0	3.0	3.0	3.0				3.0		3.0		
All-Red Time (s)	3.0	3.0	3.0	3.0				3.0		3.0		
Lead/Lag	Lag	Lag	Lag	Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0	2.0	2.0				2.0		2.0		
Recall Mode	None	None	None	None				C-Max		None		
Walk Time (s)	8.0	8.0	8.0					8.0				
Flash Dont Walk (s)	24.0	24.0	24.0					16.0				
Pedestrian Calls (#/hr)	86	86	86					85				
Act Effct Green (s)		30.9	30.9	26.6	60.5			38.5	68.1	12.0	53.5	
Actuated g/C Ratio		0.26	0.26	0.22	0.50			0.32	0.57	0.10	0.45	
v/c Ratio		0.49	0.47	0.89	0.47			0.72	0.35	0.43	0.71	
Control Delay		43.5	44.5	73.3	10.1			42.0	16.8	60.4	31.6	
Queue Delay		0.0	0.0	22.5	0.6			0.0	0.0	0.0	0.5	
Total Delay		43.5	44.5	95.8	10.7			42.0	16.8	60.4	32.1	
LOS		D	D	F	B			D	B	E	C	
Approach Delay		43.8			37.5			35.2			33.8	
Approach LOS		D			D			D			C	
90th %ile Green (s)	32.0	32.0	32.0	24.0				31.0		9.0		
90th %ile Term Code	Ped	Ped	Ped	Max				Coord		Max		
70th %ile Green (s)	32.0	32.0	32.0	24.0				31.0		9.0		
70th %ile Term Code	Ped	Ped	Ped	Max				Coord		Max		
50th %ile Green (s)	32.0	32.0	32.0	24.0				31.0		9.0		
50th %ile Term Code	Ped	Ped	Ped	Max				Coord		Max		
30th %ile Green (s)	32.0	32.0	32.0	24.0				31.0		9.0		
30th %ile Term Code	Ped	Ped	Ped	Max				Coord		Max		
10th %ile Green (s)	11.5	11.5	11.5	22.2				53.3		9.0		
10th %ile Term Code	Gap	Gap	Gap	Gap				Coord		Max		
Stops (vph)		204	112	267	276			643	149	57	765	
Fuel Used(gal)		4	2	7	5			11	2	1	15	
CO Emissions (g/hr)		296	164	497	339			755	147	97	1077	
NOx Emissions (g/hr)		58	32	97	66			147	29	19	210	
VOC Emissions (g/hr)		69	38	115	79			175	34	22	250	
Dilemma Vehicles (#)		0	0	0	0			0	0	0	0	
Queue Length 50th (ft)		91	95	236	95			305	130	49	359	
Queue Length 95th (ft)		m125	m143	#429	103			383	196	97	444	
Internal Link Dist (ft)		332			271			81			597	
Turn Bay Length (ft)			100							150		
Base Capacity (vph)		643	370	394	1706			1112	853	152	1467	
Starvation Cap Reductn		0	0	53	550			0	0	0	0	
Spillback Cap Reductn		0	0	0	0			0	32	0	128	
Storage Cap Reductn		0	0	0	0			0	0	0	0	
Reduced v/c Ratio		0.44	0.41	1.02	0.65			0.72	0.36	0.43	0.78	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 57 (48%), Referenced to phase 1:NBSB, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 36.5   Intersection LOS: D

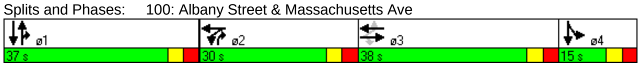
Intersection Capacity Utilization 86.5%   ICU Level of Service E

Analysis Period (min) 15

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

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

Splits and Phases: 100: Albany Street & Massachusetts Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣				
Sign Control		Yield			Yield			Stop			Stop	
Volume (vph)	35	237	29	179	358	46	56	166	53	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	38	258	32	195	389	50	61	180	58	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	327	634	299
Volume Left (vph)	38	195	61
Volume Right (vph)	32	50	58
Hadj (s)	-0.02	0.06	-0.06
Departure Headway (s)	5.9	5.6	6.4
Degree Utilization, x	0.54	0.98	0.53
Capacity (veh/h)	594	638	553
Control Delay (s)	15.7	53.3	16.4
Approach Delay (s)	15.7	53.3	16.4
Approach LOS	C	F	C

Intersection Summary			
Delay	34.8		
HCM Level of Service	D		
Intersection Capacity Utilization	88.0%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	55	60	234	7	10	209
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	60	65	254	8	11	227
Pedestrians	43		13			27
Lane Width (ft)	12.0		12.0			12.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	4		1			2
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			383			
pX, platoon unblocked						
vC, conflicting volume	563	328			305	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	563	328			305	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	87	90			99	
cM capacity (veh/h)	464	677			1222	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	60	65	262	238
Volume Left	60	0	0	11
Volume Right	0	65	8	0
cSH	464	677	1700	1222
Volume to Capacity	0.13	0.10	0.15	0.01
Queue Length 95th (ft)	11	8	0	1
Control Delay (s)	13.9	10.9	0.0	0.4
Lane LOS	B	B		A
Approach Delay (s)	12.3		0.0	0.4
Approach LOS	B			

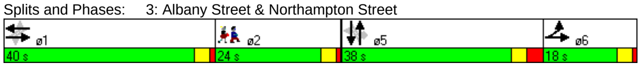
Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	37.2%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Leading Detector (ft)	50	50		50	50		50	50	50	50	50		
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0		
Turning Speed (mph)	15		9	15		9	15		9	15		9	
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.986			0.963				0.850		0.942		
Flt Protected		0.985			0.996			0.994			0.983		
Satd. Flow (prot)	0	2977	0	0	2942	0	0	1680	1275	0	1529	0	
Flt Permitted		0.650			0.791			0.958			0.864		
Satd. Flow (perm)	0	1965	0	0	2336	0	0	1620	1275	0	1344	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		11			38				32		32		
Headway Factor	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		318			402			243			395		
Travel Time (s)		7.2			9.1			5.5			9.0		
Volume (vph)	230	441	67	27	249	91	12	82	29	54	34	67	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	2%	7%	13%	0%	8%	2%	9%	0%	14%	4%	0%	5%	
Adj. Flow (vph)	250	479	73	29	271	99	13	89	32	59	37	73	
Lane Group Flow (vph)	0	802	0	0	399	0	0	102	32	0	169	0	
Turn Type	D.P+P			Perm			Perm		Perm	Perm			
Protected Phases	6	1 6			1			5			5		2
Permitted Phases	1			1			5		5	5			
Detector Phases	6	1 6		1	1		5	5	5	5	5		
Minimum Initial (s)	4.0			8.0	8.0		8.0	8.0	8.0	8.0	8.0		4.0
Minimum Split (s)	8.0			12.0	12.0		14.0	14.0	14.0	14.0	14.0		24.0
Total Split (s)	18.0	58.0	0.0	40.0	40.0	0.0	38.0	38.0	38.0	38.0	38.0	0.0	24.0
Total Split (%)	15.0%	48.3%	0.0%	33.3%	33.3%	0.0%	31.7%	31.7%	31.7%	31.7%	31.7%	0.0%	20%
Maximum Green (s)	14.0			36.0	36.0		32.0	32.0	32.0	32.0	32.0		20.0
Yellow Time (s)	3.0			3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0
All-Red Time (s)	1.0			1.0	1.0		3.0	3.0	3.0	3.0	3.0		1.0
Lead/Lag	Lag			Lead	Lead		Lead	Lead	Lead	Lead	Lead		Lag
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes
Vehicle Extension (s)	3.0			3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0
Recall Mode	None			C-Max	C-Max		None	None	None	None	None		None
Walk Time (s)													7.0
Flash Dont Walk (s)													13.0
Pedestrian Calls (#/hr)													5
Act Effct Green (s)		84.1			70.1			19.1	19.1		19.1		
Actuated g/C Ratio		0.70			0.58			0.16	0.16		0.16		
v/c Ratio		0.54			0.29			0.40	0.14		0.70		
Control Delay		10.8			21.0			48.1	13.9		53.2		
Queue Delay		0.0			0.0			0.0	0.0		0.0		
Total Delay		10.8			21.0			48.1	13.9		53.2		
LOS		B			C			D	B		D		
Approach Delay		10.8			21.0			40.0			53.2		
Approach LOS		B			C			D			D		
90th %ile Green (s)	14.0			42.7	42.7		25.3	25.3	25.3	25.3	25.3		20.0
90th %ile Term Code	Max			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Ped
70th %ile Green (s)	14.0			71.7	71.7		20.3	20.3	20.3	20.3	20.3		0.0
70th %ile Term Code	Max			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Skip
50th %ile Green (s)	14.0			75.1	75.1		16.9	16.9	16.9	16.9	16.9		0.0
50th %ile Term Code	Max			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Skip
30th %ile Green (s)	14.0			78.3	78.3		13.7	13.7	13.7	13.7	13.7		0.0
30th %ile Term Code	Max			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Skip
10th %ile Green (s)	14.0			82.8	82.8		9.2	9.2	9.2	9.2	9.2		0.0
10th %ile Term Code	Max			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Skip
Stops (vph)		279			257			81	8		116		
Fuel Used(gal)		5			4			2	0		3		
CO Emissions (g/hr)		349			289			108	13		196		
NOx Emissions (g/hr)		68			56			21	2		38		
VOC Emissions (g/hr)		81			67			25	3		45		
Dilemma Vehicles (#)		0			0			0	0		0		
Queue Length 50th (ft)		82			110			72	0		102		
Queue Length 95th (ft)		268			183			117	27		166		
Internal Link Dist (ft)		238			322			163			315		
Turn Bay Length (ft)													
Base Capacity (vph)		1499			1381			459	384		404		
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		0.54			0.29			0.22	0.08		0.42		

Intersection Summary

Area Type: CBD
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 76 (63%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.70
Intersection Signal Delay: 20.9 Intersection LOS: C
Intersection Capacity Utilization 61.6% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 3: Albany Street & Northampton Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.96			0.97		0.96	0.92			0.95	
Frt		0.987			0.973			0.969			0.980	
Flt Protected		0.994			0.989		0.950			0.950		
Satd. Flow (prot)	0	1722	0	0	1626	0	1770	2953	0	1752	3143	0
Flt Permitted		0.904			0.656		0.180			0.108		
Satd. Flow (perm)	0	1557	0	0	1078	0	322	2953	0	199	3143	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			13			45			23	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		266			224			677			2154	
Travel Time (s)		6.0			5.1			15.4			49.0	
Volume (vph)	50	343	43	71	172	62	52	914	234	134	814	122
Confl. Peds. (#/hr)	75		202	202		75	119		139	139		119
Confl. Bikes (#/hr)			5			2			7			4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	4%	5%	7%	13%	2%	2%	10%	4%	3%	8%	4%
Adj. Flow (vph)	54	373	47	77	187	67	57	993	254	146	885	133
Lane Group Flow (vph)	0	474	0	0	331	0	57	1247	0	146	1018	0
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phases	4	4		8	8		5	2		1	6	
Minimum Initial (s)	8.0	8.0		8.0	8.0		6.0	8.0		6.0	8.0	
Minimum Split (s)	22.0	22.0		22.0	22.0		10.0	22.0		10.0	22.0	
Total Split (s)	35.0	35.0	0.0	35.0	35.0	0.0	12.0	53.0	0.0	12.0	53.0	0.0
Total Split (%)	35.0%	35.0%	0.0%	35.0%	35.0%	0.0%	12.0%	53.0%	0.0%	12.0%	53.0%	0.0%
Maximum Green (s)	31.0	31.0		31.0	31.0		8.0	49.0		8.0	49.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	C-Max		Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0			11.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)		31.0			31.0		55.8	49.0		58.6	52.2	
Actuated g/C Ratio		0.31			0.31		0.56	0.49		0.59	0.52	
v/c Ratio		0.97			0.97		0.20	0.85		0.61	0.62	
Control Delay		69.9			75.1		9.8	28.3		22.7	19.2	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		69.9			75.1		9.8	28.3		22.7	19.2	
LOS		E			E		A	C		C	B	
Approach Delay		69.9			75.1			27.5			19.6	
Approach LOS		E			E			C			B	
90th %ile Green (s)	31.0	31.0		31.0	31.0		8.0	49.0		8.0	49.0	
90th %ile Term Code	Max	Max		Max	Max		Max	Coord		MaxR	Coord	
70th %ile Green (s)	31.0	31.0		31.0	31.0		7.3	49.0		8.0	49.7	
70th %ile Term Code	Max	Max		Max	Max		Gap	Coord		MaxR	Coord	
50th %ile Green (s)	31.0	31.0		31.0	31.0		6.7	49.0		8.0	50.3	
50th %ile Term Code	Max	Max		Max	Max		Gap	Coord		MaxR	Coord	
30th %ile Green (s)	31.0	31.0		31.0	31.0		6.2	49.0		8.0	50.8	
30th %ile Term Code	Max	Max		Max	Max		Gap	Coord		MaxR	Coord	
10th %ile Green (s)	31.0	31.0		31.0	31.0		0.0	49.0		8.0	61.0	
10th %ile Term Code	Max	Max		Hold	Hold		Skip	Coord		MaxR	Coord	
Stops (vph)		371			249		21	932		61	632	
Fuel Used(gal)		9			7		0	18		3	23	
CO Emissions (g/hr)		640			459		35	1246		224	1600	
NOx Emissions (g/hr)		125			89		7	242		44	311	
VOC Emissions (g/hr)		148			106		8	289		52	371	
Dilemma Vehicles (#)		0			0		0	0		0	0	
Queue Length 50th (ft)		294			200		13	341		37	234	
Queue Length 95th (ft)		#503			#382		29	443		#88	312	
Internal Link Dist (ft)		186			144			597			2074	
Turn Bay Length (ft)												
Base Capacity (vph)		487			343		299	1470		241	1650	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.97			0.97		0.19	0.85		0.61	0.62	

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 32 (32%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.97

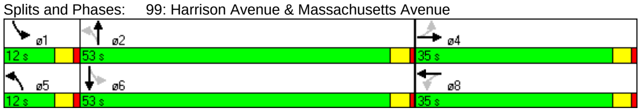
Intersection Signal Delay: 35.7 Intersection LOS: D

Intersection Capacity Utilization 82.2% ICU Level of Service E

Analysis Period (min) 15

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

Splits and Phases: 99: Harrison Avenue & Massachusetts Avenue



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	11	10	12	12	10	11	10
Storage Length (ft)	0		100	0		0	0		0	150		0
Storage Lanes	0		1	1		0	0		1	1		0
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Leading Detector (ft)	50	50	50	50	50			50	50	50	50	
Trailing Detector (ft)	0	0	0	0	0			0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.95	0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor		0.98	0.74	0.88	0.96					0.91	0.98	
Frt			0.850		0.952				0.850		0.989	
Flt Protected		0.992		0.950						0.950		
Satd. Flow (prot)	0	3261	1429	1517	2814	0	0	3374	1524	1574	3138	0
Flt Permitted		0.808		0.950						0.950		
Satd. Flow (perm)	0	2605	1062	1338	2814	0	0	3374	1524	1435	3138	0
Right Turn on Red			No			No			No			Yes
Satd. Flow (RTOR)											10	
Headway Factor	1.00	1.00	1.00	1.04	1.14	1.04	1.09	1.00	1.00	1.09	1.04	1.09
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		402			351			161			677	
Travel Time (s)		9.1			8.0			3.7			15.4	
Volume (vph)	78	391	74	158	231	108	0	1013	591	164	710	55
Confl. Peds. (#/hr)	169		128	128		169	140		163	163		140
Confl. Bikes (#/hr)			2						1			6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	19%	8%	13%	15%	5%	8%	0%	7%	6%	7%	7%	24%
Parking (#/hr)					6	6						
Adj. Flow (vph)	85	425	80	172	251	117	0	1101	642	178	772	60
Lane Group Flow (vph)	0	510	80	172	368	0	0	1101	642	178	832	0
Turn Type	Perm		Perm	Prot					pt+ov	Prot		
Protected Phases		3		2	2 3			1	1 2	4	1 4	
Permitted Phases	3		3									
Detector Phases	3	3	3	2	2 3			1	1 2	4	1 4	
Minimum Initial (s)	8.0	8.0	8.0	8.0				8.0		8.0		
Minimum Split (s)	38.0	38.0	38.0	14.0				30.0		14.0		
Total Split (s)	38.0	38.0	38.0	17.0	55.0	0.0	0.0	49.0	66.0	16.0	65.0	0.0
Total Split (%)	31.7%	31.7%	31.7%	14.2%	45.8%	0.0%	0.0%	40.8%	55.0%	13.3%	54.2%	0.0%
Maximum Green (s)	32.0	32.0	32.0	11.0				43.0		10.0		
Yellow Time (s)	3.0	3.0	3.0	3.0				3.0		3.0		
All-Red Time (s)	3.0	3.0	3.0	3.0				3.0		3.0		
Lead/Lag	Lead	Lead	Lead	Lag				Lead		Lag		
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0	2.0	2.0				2.0		2.0		
Recall Mode	None	None	None	None				C-Max		None		
Walk Time (s)	8.0	8.0	8.0					8.0				
Flash Dont Walk (s)	24.0	24.0	24.0					16.0				
Pedestrian Calls (#/hr)	76	76	76					74				
Act Effct Green (s)		32.3	32.3	14.0	49.3			48.7	65.7	13.0	64.7	
Actuated g/C Ratio		0.27	0.27	0.12	0.41			0.41	0.55	0.11	0.54	
v/c Ratio		0.73	0.28	0.97	0.32			0.80	0.77	1.04	0.49	
Control Delay		43.3	36.2	114.0	24.3			37.9	30.1	132.1	19.0	
Queue Delay		0.7	0.0	0.0	0.0			0.0	1.4	57.2	0.0	
Total Delay		44.0	36.2	114.0	24.3			37.9	31.4	189.3	19.0	
LOS		D	D	F	C			D	C	F	B	
Approach Delay		42.9			52.8			35.5			49.0	
Approach LOS		D			D			D			D	
90th %ile Green (s)	32.0	32.0	32.0	11.0				43.0		10.0		
90th %ile Term Code	Max	Max	Max	Max				Coord		Max		
70th %ile Green (s)	32.0	32.0	32.0	11.0				43.0		10.0		
70th %ile Term Code	Max	Max	Max	Max				Coord		Max		
50th %ile Green (s)	32.0	32.0	32.0	11.0				43.0		10.0		
50th %ile Term Code	Ped	Ped	Ped	Max				Coord		Max		
30th %ile Green (s)	32.0	32.0	32.0	11.0				43.0		10.0		
30th %ile Term Code	Ped	Ped	Ped	Max				Coord		Max		
10th %ile Green (s)	18.7	18.7	18.7	11.0				56.3		10.0		
10th %ile Term Code	Gap	Gap	Gap	Max				Coord		Max		
Stops (vph)		346	50	134	218			871	462	135	462	
Fuel Used(gal)		8	1	5	4			14	7	6	10	
CO Emissions (g/hr)		525	74	338	266			972	483	421	668	
NOx Emissions (g/hr)		102	14	66	52			189	94	82	130	
VOC Emissions (g/hr)		122	17	78	62			225	112	98	155	
Dilemma Vehicles (#)		0	0	0	0			0	0	0	0	
Queue Length 50th (ft)		146	42	135	95			406	393	~150	212	
Queue Length 95th (ft)		206	m82	#278	133			500	571	#295	268	
Internal Link Dist (ft)		322			271			81			597	
Turn Bay Length (ft)			100							150		
Base Capacity (vph)		760	310	177	1219			1368	834	171	1695	
Starvation Cap Reductn		20	0	0	0			0	0	0	0	
Spillback Cap Reductn		67	0	0	0			0	68	22	0	
Storage Cap Reductn		0	0	0	0			0	0	0	0	
Reduced v/c Ratio		0.74	0.26	0.97	0.30			0.80	0.84	1.19	0.49	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 92 (77%), Referenced to phase 1:NBSB, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.04

Intersection Signal Delay: 42.6 Intersection LOS: D

Intersection Capacity Utilization 90.2% ICU Level of Service E

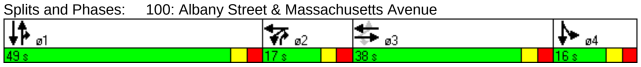
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

Splits and Phases: 100: Albany Street & Massachusetts Avenue



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣				
Sign Control		Yield			Yield			Stop			Stop	
Volume (vph)	42	364	53	111	201	48	65	158	77	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	46	396	58	121	218	52	71	172	84	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	499	391	326
Volume Left (vph)	46	121	71
Volume Right (vph)	58	52	84
Hadj (s)	0.02	0.07	-0.05
Departure Headway (s)	5.7	5.9	6.3
Degree Utilization, x	0.79	0.64	0.57
Capacity (veh/h)	615	577	536
Control Delay (s)	26.7	18.9	17.1
Approach Delay (s)	26.7	18.9	17.1
Approach LOS	D	C	C

Intersection Summary			
Delay	21.7		
HCM Level of Service	C		
Intersection Capacity Utilization	78.0%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	36	28	289	80	60	125
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	39	30	314	87	65	136
Pedestrians	29		11			14
Lane Width (ft)	12.0		12.0			12.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	2		1			1
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			395			
pX, platoon unblocked	0.98	0.98			0.98	
vC, conflicting volume	664	401			430	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	658	391			421	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	90	95			94	
cM capacity (veh/h)	387	628			1103	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	39	30	401	201
Volume Left	39	0	0	65
Volume Right	0	30	87	0
cSH	387	628	1700	1103
Volume to Capacity	0.10	0.05	0.24	0.06
Queue Length 95th (ft)	8	4	0	5
Control Delay (s)	15.4	11.0	0.0	3.1
Lane LOS	C	B		A
Approach Delay (s)	13.5		0.0	3.1
Approach LOS	B			

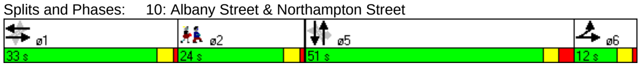
Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	50.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Leading Detector (ft)	50	50		50	50		50	50	50	50	50		
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0		
Turning Speed (mph)	15		9	15		9	15		9	15		9	
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.990			0.985				0.850		0.916		
Flt Protected		0.981			0.999			0.980			0.985		
Satd. Flow (prot)	0	2960	0	0	3114	0	0	1676	1454	0	1523	0	
Flt Permitted		0.553			0.948			0.810			0.869		
Satd. Flow (perm)	0	1669	0	0	2955	0	0	1385	1454	0	1343	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		6			9				113		81		
Headway Factor	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		337			412			200			383		
Travel Time (s)		7.7			9.4			4.5			8.7		
Volume (vph)	153	207	25	8	554	63	38	53	104	87	18	173	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	1%	9%	21%	0%	3%	0%	0%	0%	0%	1%	6%	1%	
Adj. Flow (vph)	166	225	27	9	602	68	41	58	113	95	20	188	
Lane Group Flow (vph)	0	418	0	0	679	0	0	99	113	0	303	0	
Turn Type	D.P+P			Perm			Perm		Perm	Perm			
Protected Phases	6	1 6			1			5			5		2
Permitted Phases	1			1			5		5	5			
Detector Phases	6	1 6		1	1		5	5	5	5	5		
Minimum Initial (s)	4.0			8.0	8.0		6.0	6.0	6.0	6.0	6.0		4.0
Minimum Split (s)	8.0			12.0	12.0		12.0	12.0	12.0	12.0	12.0		24.0
Total Split (s)	12.0	45.0	0.0	33.0	33.0	0.0	51.0	51.0	51.0	51.0	51.0	0.0	24.0
Total Split (%)	10.0%	37.5%	0.0%	27.5%	27.5%	0.0%	42.5%	42.5%	42.5%	42.5%	42.5%	0.0%	20%
Maximum Green (s)	8.0			29.0	29.0		45.0	45.0	45.0	45.0	45.0		20.0
Yellow Time (s)	3.0			3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0
All-Red Time (s)	1.0			1.0	1.0		3.0	3.0	3.0	3.0	3.0		1.0
Lead/Lag	Lag			Lead	Lead		Lead	Lead	Lead	Lead	Lead		Lag
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes
Vehicle Extension (s)	3.0			3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0
Recall Mode	Max			C-Max	C-Max		None	None	None	None	None		None
Walk Time (s)													7.0
Flash Dont Walk (s)													13.0
Pedestrian Calls (#/hr)													5
Act Effct Green (s)		76.2			68.2			27.0	27.0		27.0		
Actuated g/C Ratio		0.64			0.57			0.22	0.22		0.22		
v/c Ratio		0.36			0.40			0.32	0.27		0.83		
Control Delay		12.8			27.3			38.9	7.2		50.1		
Queue Delay		0.0			0.3			0.0	0.0		0.0		
Total Delay		12.8			27.6			38.9	7.2		50.1		
LOS		B			C			D	A		D		
Approach Delay		12.8			27.6			22.0			50.1		
Approach LOS		B			C			C			D		
90th %ile Green (s)	8.0			36.7	36.7		37.3	37.3	37.3	37.3	37.3		20.0
90th %ile Term Code	MaxR			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Ped
70th %ile Green (s)	8.0			67.9	67.9		30.1	30.1	30.1	30.1	30.1		0.0
70th %ile Term Code	MaxR			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Skip
50th %ile Green (s)	8.0			73.6	73.6		24.4	24.4	24.4	24.4	24.4		0.0
50th %ile Term Code	MaxR			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Skip
30th %ile Green (s)	8.0			78.2	78.2		19.8	19.8	19.8	19.8	19.8		0.0
30th %ile Term Code	MaxR			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Skip
10th %ile Green (s)	8.0			84.5	84.5		13.5	13.5	13.5	13.5	13.5		0.0
10th %ile Term Code	MaxR			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Skip
Stops (vph)		157			360			72	15		197		
Fuel Used(gal)		3			7			1	0		5		
CO Emissions (g/hr)		201			522			88	28		333		
NOx Emissions (g/hr)		39			102			17	5		65		
VOC Emissions (g/hr)		47			121			20	6		77		
Dilemma Vehicles (#)		0			0			0	0		0		
Queue Length 50th (ft)		49			152			65	0		170		
Queue Length 95th (ft)		156			351			101	41		245		
Internal Link Dist (ft)		257			332			120			303		
Turn Bay Length (ft)													
Base Capacity (vph)		1148			1683			542	638		575		
Starvation Cap Reductn		0			449			0	0		0		
Spillback Cap Reductn		0			0			0	0		0		
Storage Cap Reductn		0			0			0	0		0		
Reduced v/c Ratio		0.36			0.55			0.18	0.18		0.53		

Intersection Summary

Area Type: CBD
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 72 (60%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 27.2 Intersection LOS: C
Intersection Capacity Utilization 66.6% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 10: Albany Street & Northampton Street

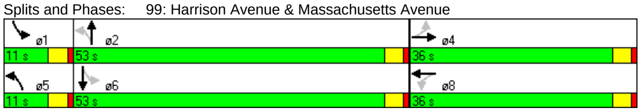


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.95			0.95			0.93		0.95	0.95	
Frt		0.977			0.976			0.974			0.977	
Flt Protected		0.992			0.989		0.950			0.950		
Satd. Flow (prot)	0	1651	0	0	1692	0	1703	3115	0	1736	3206	0
Flt Permitted		0.788			0.752		0.153			0.190		
Satd. Flow (perm)	0	1312	0	0	1252	0	274	3115	0	329	3206	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			12			35			28	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		267			224			677			2154	
Travel Time (s)		6.1			5.1			15.4			49.0	
Volume (vph)	46	194	49	113	318	94	94	753	158	72	858	153
Confl. Peds. (#/hr)	81		191	191		81	103		142	142		103
Confl. Bikes (#/hr)						4			7			1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	6%	7%	4%	6%	6%	6%	5%	4%	4%	5%	5%
Adj. Flow (vph)	50	211	53	123	346	102	102	818	172	78	933	166
Lane Group Flow (vph)	0	314	0	0	571	0	102	990	0	78	1099	0
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phases	4	4		8	8		5	2		1	6	
Minimum Initial (s)	8.0	8.0		8.0	8.0		6.0	8.0		6.0	8.0	
Minimum Split (s)	22.0	22.0		22.0	22.0		10.0	22.0		10.0	22.0	
Total Split (s)	36.0	36.0	0.0	36.0	36.0	0.0	11.0	53.0	0.0	11.0	53.0	0.0
Total Split (%)	36.0%	36.0%	0.0%	36.0%	36.0%	0.0%	11.0%	53.0%	0.0%	11.0%	53.0%	0.0%
Maximum Green (s)	32.0	32.0		32.0	32.0		7.0	49.0		7.0	49.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	C-Max		Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0			11.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)		32.0			32.0		55.8	49.0		56.8	51.2	
Actuated g/C Ratio		0.32			0.32		0.56	0.49		0.57	0.51	
v/c Ratio		0.74			1.40		0.41	0.64		0.27	0.66	
Control Delay		41.0			221.8		13.7	20.6		11.0	20.6	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		41.0			221.8		13.7	20.6		11.0	20.6	
LOS		D			F		B	C		B	C	
Approach Delay		41.0			221.8			20.0			20.0	
Approach LOS		D			F			B			B	
90th %ile Green (s)	32.0	32.0		32.0	32.0		7.0	49.0		7.0	49.0	
90th %ile Term Code	Max	Max		Max	Max		Max	Coord		MaxR	Coord	
70th %ile Green (s)	32.0	32.0		32.0	32.0		7.0	49.0		7.0	49.0	
70th %ile Term Code	Max	Max		Max	Max		Max	Coord		MaxR	Coord	
50th %ile Green (s)	32.0	32.0		32.0	32.0		7.0	49.0		7.0	49.0	
50th %ile Term Code	Hold	Hold		Max	Max		Max	Coord		MaxR	Coord	
30th %ile Green (s)	32.0	32.0		32.0	32.0		7.0	49.0		7.0	49.0	
30th %ile Term Code	Hold	Hold		Max	Max		Max	Coord		MaxR	Coord	
10th %ile Green (s)	32.0	32.0		32.0	32.0		0.0	49.0		7.0	60.0	
10th %ile Term Code	Hold	Hold		Max	Max		Skip	Coord		MaxR	Coord	
Stops (vph)		243			394		40	631		30	714	
Fuel Used(gal)		4			27		1	12		2	25	
CO Emissions (g/hr)		305			1873		68	847		107	1759	
NOx Emissions (g/hr)		59			364		13	165		21	342	
VOC Emissions (g/hr)		71			434		16	196		25	408	
Dilemma Vehicles (#)		0			0		0	0		0	0	
Queue Length 50th (ft)		171			~488		26	229		19	267	
Queue Length 95th (ft)		#297			#699		48	298		38	343	
Internal Link Dist (ft)		187			144			597			2074	
Turn Bay Length (ft)												
Base Capacity (vph)		427			409		253	1544		286	1655	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.74			1.40		0.40	0.64		0.27	0.66	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 78 (78%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.40
Intersection Signal Delay: 58.6 Intersection LOS: E
Intersection Capacity Utilization 88.6% ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 99: Harrison Avenue & Massachusetts Avenue

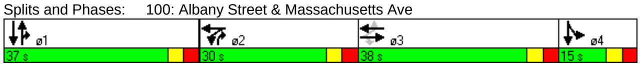


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	2100	2100	2100	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	11	10	12	12	10	11	10
Storage Length (ft)	0		100	0		0	0		0	150		0
Storage Lanes	0		1	1		0	0		1	1		0
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Leading Detector (ft)	50	50	50	50	50			50	50	50	50	
Trailing Detector (ft)	0	0	0	0	0			0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.95	0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor		0.98	0.79	0.87	0.97					0.84	0.99	
Frt			0.850		0.959				0.850		0.994	
Flt Protected		0.987		0.950						0.950		
Satd. Flow (prot)	0	3282	1599	1753	3179	0	0	3471	1495	1518	3289	0
Flt Permitted		0.674		0.950						0.950		
Satd. Flow (perm)	0	2206	1267	1526	3179	0	0	3471	1495	1281	3289	0
Right Turn on Red			No			No			No			Yes
Satd. Flow (RTOR)											4	
Headway Factor	1.00	1.00	1.00	1.04	1.14	1.04	1.09	1.00	1.00	1.09	1.04	1.09
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		412			351			161			677	
Travel Time (s)		9.4			8.0			3.7			15.4	
Volume (vph)	67	190	153	319	506	189	0	742	275	61	918	37
Confl. Peds. (#/hr)	152		102	102		152	138		191	191		138
Confl. Bikes (#/hr)									2			1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	13%	7%	1%	10%	6%	6%	0%	4%	8%	11%	4%	19%
Parking (#/hr)					6	6						
Adj. Flow (vph)	73	207	166	347	550	205	0	807	299	66	998	40
Lane Group Flow (vph)	0	280	166	347	755	0	0	807	299	66	1038	0
Turn Type	Perm		Perm	Prot					pt+ov	Prot		
Protected Phases		3		2	2 3			1	1 2	4	1 4	
Permitted Phases	3		3									
Detector Phases	3	3	3	2	2 3			1	1 2	4	1 4	
Minimum Initial (s)	8.0	8.0	8.0	8.0				8.0		8.0		
Minimum Split (s)	38.0	38.0	38.0	14.0				30.0		14.0		
Total Split (s)	38.0	38.0	38.0	30.0	68.0	0.0	0.0	37.0	67.0	15.0	52.0	0.0
Total Split (%)	31.7%	31.7%	31.7%	25.0%	56.7%	0.0%	0.0%	30.8%	55.8%	12.5%	43.3%	0.0%
Maximum Green (s)	32.0	32.0	32.0	24.0				31.0		9.0		
Yellow Time (s)	3.0	3.0	3.0	3.0				3.0		3.0		
All-Red Time (s)	3.0	3.0	3.0	3.0				3.0		3.0		
Lead/Lag	Lag	Lag	Lag	Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0	2.0	2.0				2.0		2.0		
Recall Mode	None	None	None	None				C-Max		None		
Walk Time (s)	8.0	8.0	8.0					8.0				
Flash Dont Walk (s)	24.0	24.0	24.0					16.0				
Pedestrian Calls (#/hr)	86	86	86					85				
Act Effct Green (s)		30.9	30.9	26.6	60.5			38.5	68.1	12.0	53.5	
Actuated g/C Ratio		0.26	0.26	0.22	0.50			0.32	0.57	0.10	0.45	
v/c Ratio		0.49	0.51	0.89	0.47			0.73	0.35	0.43	0.71	
Control Delay		43.4	45.7	73.3	10.1			42.2	16.8	60.4	31.6	
Queue Delay		0.0	0.0	22.5	0.6			0.0	0.0	0.0	0.6	
Total Delay		43.4	45.7	95.8	10.7			42.2	16.8	60.4	32.2	
LOS		D	D	F	B			D	B	E	C	
Approach Delay		44.2			37.5			35.3			33.9	
Approach LOS		D			D			D			C	
90th %ile Green (s)	32.0	32.0	32.0	24.0				31.0		9.0		
90th %ile Term Code	Ped	Ped	Ped	Max				Coord		Max		
70th %ile Green (s)	32.0	32.0	32.0	24.0				31.0		9.0		
70th %ile Term Code	Ped	Ped	Ped	Max				Coord		Max		
50th %ile Green (s)	32.0	32.0	32.0	24.0				31.0		9.0		
50th %ile Term Code	Ped	Ped	Ped	Max				Coord		Max		
30th %ile Green (s)	32.0	32.0	32.0	24.0				31.0		9.0		
30th %ile Term Code	Ped	Ped	Ped	Max				Coord		Max		
10th %ile Green (s)	11.5	11.5	11.5	22.2				53.3		9.0		
10th %ile Term Code	Gap	Gap	Gap	Gap				Coord		Max		
Stops (vph)		204	124	267	276			648	149	57	765	
Fuel Used(gal)		4	3	7	5			11	2	1	15	
CO Emissions (g/hr)		296	182	497	339			761	147	97	1077	
NOx Emissions (g/hr)		58	35	97	66			148	29	19	210	
VOC Emissions (g/hr)		69	42	115	79			176	34	22	250	
Dilemma Vehicles (#)		0	0	0	0			0	0	0	0	
Queue Length 50th (ft)		91	103	236	95			307	130	49	359	
Queue Length 95th (ft)		m125	m154	#429	103			386	196	97	444	
Internal Link Dist (ft)		332			271			81			597	
Turn Bay Length (ft)			100							150		
Base Capacity (vph)		643	370	394	1706			1112	853	152	1467	
Starvation Cap Reductn		0	0	53	550			0	0	0	0	
Spillback Cap Reductn		0	0	0	0			0	32	0	153	
Storage Cap Reductn		0	0	0	0			0	0	0	0	
Reduced v/c Ratio		0.44	0.45	1.02	0.65			0.73	0.36	0.43	0.79	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 57 (48%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 36.6 Intersection LOS: D
Intersection Capacity Utilization 86.6% ICU Level of Service E
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 100: Albany Street & Massachusetts Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣				
Sign Control		Yield			Yield			Stop			Stop	
Volume (vph)	35	237	47	187	358	46	68	166	56	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	38	258	51	203	389	50	74	180	61	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	347	642	315
Volume Left (vph)	38	203	74
Volume Right (vph)	51	50	61
Hadj (s)	-0.05	0.06	-0.06
Departure Headway (s)	5.9	5.7	6.4
Degree Utilization, x	0.57	1.01	0.56
Capacity (veh/h)	591	627	541
Control Delay (s)	16.6	62.9	17.3
Approach Delay (s)	16.6	62.9	17.3
Approach LOS	C	F	C

Intersection Summary			
Delay	39.5		
HCM Level of Service	E		
Intersection Capacity Utilization	90.9%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	67	74	234	21	35	209
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	73	80	254	23	38	227
Pedestrians	43		13			27
Lane Width (ft)	12.0		12.0			12.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	4		1			2
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			383			
pX, platoon unblocked						
vC, conflicting volume	625	336			320	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	625	336			320	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	83	88			97	
cM capacity (veh/h)	417	670			1206	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	73	80	277	265
Volume Left	73	0	0	38
Volume Right	0	80	23	0
cSH	417	670	1700	1206
Volume to Capacity	0.17	0.12	0.16	0.03
Queue Length 95th (ft)	16	10	0	2
Control Delay (s)	15.4	11.1	0.0	1.4
Lane LOS	C	B		A
Approach Delay (s)	13.2		0.0	1.4
Approach LOS	B			

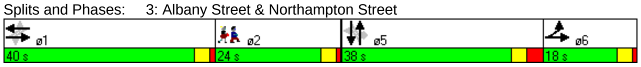
Intersection Summary			
Average Delay	3.4		
Intersection Capacity Utilization	49.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Leading Detector (ft)	50	50		50	50		50	50	50	50	50		
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0		
Turning Speed (mph)	15		9	15		9	15		9	15		9	
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.986			0.969				0.850		0.942		
Flt Protected		0.985			0.996			0.994			0.983		
Satd. Flow (prot)	0	2977	0	0	2954	0	0	1680	1275	0	1529	0	
Flt Permitted		0.662			0.787			0.958			0.864		
Satd. Flow (perm)	0	2001	0	0	2334	0	0	1620	1275	0	1344	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		11			27				32		32		
Headway Factor	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		318			402			243			395		
Travel Time (s)		7.2			9.1			5.5			9.0		
Volume (vph)	230	441	67	27	249	71	12	82	29	54	34	67	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	2%	7%	13%	0%	8%	2%	9%	0%	14%	4%	0%	5%	
Adj. Flow (vph)	250	479	73	29	271	77	13	89	32	59	37	73	
Lane Group Flow (vph)	0	802	0	0	377	0	0	102	32	0	169	0	
Turn Type	D.P+P			Perm			Perm		Perm	Perm			
Protected Phases	6	1 6			1			5			5		2
Permitted Phases	1			1			5		5	5			
Detector Phases	6	1 6		1	1		5	5	5	5	5		
Minimum Initial (s)	4.0			8.0	8.0		8.0	8.0	8.0	8.0	8.0		4.0
Minimum Split (s)	8.0			12.0	12.0		14.0	14.0	14.0	14.0	14.0		24.0
Total Split (s)	18.0	58.0	0.0	40.0	40.0	0.0	38.0	38.0	38.0	38.0	38.0	0.0	24.0
Total Split (%)	15.0%	48.3%	0.0%	33.3%	33.3%	0.0%	31.7%	31.7%	31.7%	31.7%	31.7%	0.0%	20%
Maximum Green (s)	14.0			36.0	36.0		32.0	32.0	32.0	32.0	32.0		20.0
Yellow Time (s)	3.0			3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0
All-Red Time (s)	1.0			1.0	1.0		3.0	3.0	3.0	3.0	3.0		1.0
Lead/Lag	Lag			Lead	Lead		Lead	Lead	Lead	Lead	Lead		Lag
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes
Vehicle Extension (s)	3.0			3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0
Recall Mode	None			C-Max	C-Max		None	None	None	None	None		None
Walk Time (s)													7.0
Flash Dont Walk (s)													13.0
Pedestrian Calls (#/hr)													5
Act Effct Green (s)		84.1			70.1			19.1	19.1		19.1		
Actuated g/C Ratio		0.70			0.58			0.16	0.16		0.16		
v/c Ratio		0.53			0.27			0.40	0.14		0.70		
Control Delay		10.7			21.5			48.1	13.9		53.2		
Queue Delay		0.0			0.0			0.0	0.0		0.0		
Total Delay		10.7			21.5			48.1	13.9		53.2		
LOS		B			C			D	B		D		
Approach Delay		10.7			21.5			40.0			53.2		
Approach LOS		B			C			D			D		
90th %ile Green (s)	14.0			42.7	42.7		25.3	25.3	25.3	25.3	25.3		20.0
90th %ile Term Code	Max			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Ped
70th %ile Green (s)	14.0			71.7	71.7		20.3	20.3	20.3	20.3	20.3		0.0
70th %ile Term Code	Max			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Skip
50th %ile Green (s)	14.0			75.1	75.1		16.9	16.9	16.9	16.9	16.9		0.0
50th %ile Term Code	Max			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Skip
30th %ile Green (s)	14.0			78.3	78.3		13.7	13.7	13.7	13.7	13.7		0.0
30th %ile Term Code	Max			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Skip
10th %ile Green (s)	14.0			82.8	82.8		9.2	9.2	9.2	9.2	9.2		0.0
10th %ile Term Code	Max			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Skip
Stops (vph)		279			249			81	8		116		
Fuel Used(gal)		5			4			2	0		3		
CO Emissions (g/hr)		348			278			108	13		196		
NOx Emissions (g/hr)		68			54			21	2		38		
VOC Emissions (g/hr)		81			65			25	3		45		
Dilemma Vehicles (#)		0			0			0	0		0		
Queue Length 50th (ft)		82			107			72	0		102		
Queue Length 95th (ft)		268			177			117	27		166		
Internal Link Dist (ft)		238			322			163			315		
Turn Bay Length (ft)													
Base Capacity (vph)		1520			1375			459	384		404		
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		0.53			0.27			0.22	0.08		0.42		

Intersection Summary

Area Type: CBD
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 76 (63%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.70
Intersection Signal Delay: 20.9 Intersection LOS: C
Intersection Capacity Utilization 60.9% ICU Level of Service B
Analysis Period (min) 15

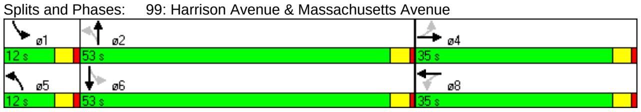
Splits and Phases: 3: Albany Street & Northampton Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣		↰	↑↱		↰	↑↱	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.96			0.97		0.96	0.92			0.95	
Frt		0.987			0.972			0.969			0.980	
Flt Protected		0.994			0.989		0.950			0.950		
Satd. Flow (prot)	0	1721	0	0	1623	0	1770	2953	0	1752	3140	0
Flt Permitted		0.892			0.673		0.179			0.108		
Satd. Flow (perm)	0	1535	0	0	1104	0	320	2953	0	199	3140	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			13			45			24	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		266			224			677			2154	
Travel Time (s)		6.0			5.1			15.4			49.0	
Volume (vph)	54	343	43	67	172	62	55	914	234	134	814	125
Confl. Peds. (#/hr)	75		202	202		75	119		139	139		119
Confl. Bikes (#/hr)			5			2			7			4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	4%	5%	7%	13%	2%	2%	10%	4%	3%	8%	4%
Adj. Flow (vph)	59	373	47	73	187	67	60	993	254	146	885	136
Lane Group Flow (vph)	0	479	0	0	327	0	60	1247	0	146	1021	0
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phases	4	4		8	8		5	2		1	6	
Minimum Initial (s)	8.0	8.0		8.0	8.0		6.0	8.0		6.0	8.0	
Minimum Split (s)	22.0	22.0		22.0	22.0		10.0	22.0		10.0	22.0	
Total Split (s)	35.0	35.0	0.0	35.0	35.0	0.0	12.0	53.0	0.0	12.0	53.0	0.0
Total Split (%)	35.0%	35.0%	0.0%	35.0%	35.0%	0.0%	12.0%	53.0%	0.0%	12.0%	53.0%	0.0%
Maximum Green (s)	31.0	31.0		31.0	31.0		8.0	49.0		8.0	49.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	C-Max		Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0			11.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)		31.0			31.0		55.9	49.0		58.5	52.1	
Actuated g/C Ratio		0.31			0.31		0.56	0.49		0.58	0.52	
v/c Ratio		1.00			0.93		0.22	0.85		0.61	0.62	
Control Delay		76.2			67.5		9.9	28.3		22.7	19.3	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		76.2			67.5		9.9	28.3		22.7	19.3	
LOS		E			E		A	C		C	B	
Approach Delay		76.2			67.5			27.5			19.7	
Approach LOS		E			E			C			B	
90th %ile Green (s)	31.0	31.0		31.0	31.0		8.0	49.0		8.0	49.0	
90th %ile Term Code	Max	Max		Max	Max		Max	Coord		MaxR	Coord	
70th %ile Green (s)	31.0	31.0		31.0	31.0		7.4	49.0		8.0	49.6	
70th %ile Term Code	Max	Max		Max	Max		Gap	Coord		MaxR	Coord	
50th %ile Green (s)	31.0	31.0		31.0	31.0		6.8	49.0		8.0	50.2	
50th %ile Term Code	Max	Max		Max	Max		Gap	Coord		MaxR	Coord	
30th %ile Green (s)	31.0	31.0		31.0	31.0		6.3	49.0		8.0	50.7	
30th %ile Term Code	Max	Max		Max	Max		Gap	Coord		MaxR	Coord	
10th %ile Green (s)	31.0	31.0		31.0	31.0		0.0	49.0		8.0	61.0	
10th %ile Term Code	Max	Max		Hold	Hold		Skip	Coord		MaxR	Coord	
Stops (vph)		373			247		23	932		61	635	
Fuel Used(gal)		10			6		1	18		3	23	
CO Emissions (g/hr)		686			421		37	1246		224	1605	
NOx Emissions (g/hr)		133			82		7	242		44	312	
VOC Emissions (g/hr)		159			98		9	289		52	372	
Dilemma Vehicles (#)		0			0		0	0		0	0	
Queue Length 50th (ft)		301			194		14	341		37	235	
Queue Length 95th (ft)		#516			#369		30	443		#88	313	
Internal Link Dist (ft)		186			144			597			2074	
Turn Bay Length (ft)												
Base Capacity (vph)		480			351		298	1470		241	1648	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		1.00			0.93		0.20	0.85		0.61	0.62	

Intersection Summary
Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 32 (32%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.00
Intersection Signal Delay: 35.8 Intersection LOS: D
Intersection Capacity Utilization 80.4% 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: 99: Harrison Avenue & Massachusetts Avenue

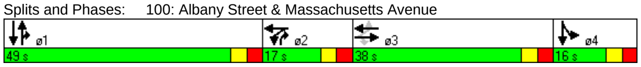


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑	↱	↰	↑↱			↑↑	↱	↰	↑↱	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	11	10	12	12	10	11	10
Storage Length (ft)	0		100	0		0	0		0	150		0
Storage Lanes	0		1	1		0	0		1	1		0
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Leading Detector (ft)	50	50	50	50	50			50	50	50	50	
Trailing Detector (ft)	0	0	0	0	0			0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.95	0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor		0.98	0.74	0.88	0.96					0.91	0.98	
Frt			0.850		0.952				0.850		0.989	
Flt Protected		0.992		0.950						0.950		
Satd. Flow (prot)	0	3261	1429	1517	2814	0	0	3374	1524	1574	3138	0
Flt Permitted		0.808		0.950						0.950		
Satd. Flow (perm)	0	2605	1062	1338	2814	0	0	3374	1524	1436	3138	0
Right Turn on Red			No			No			No			Yes
Satd. Flow (RTOR)											10	
Headway Factor	1.00	1.00	1.00	1.04	1.14	1.04	1.09	1.00	1.00	1.09	1.04	1.09
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		402			351			161			677	
Travel Time (s)		9.1			8.0			3.7			15.4	
Volume (vph)	78	391	73	158	231	108	0	1016	591	164	710	55
Confl. Peds. (#/hr)	169		128	128		169	140		163	163		140
Confl. Bikes (#/hr)			2						1			6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	19%	8%	13%	15%	5%	8%	0%	7%	6%	7%	7%	24%
Parking (#/hr)					6	6						
Adj. Flow (vph)	85	425	79	172	251	117	0	1104	642	178	772	60
Lane Group Flow (vph)	0	510	79	172	368	0	0	1104	642	178	832	0
Turn Type	Perm		Perm	Prot					pt+ov	Prot		
Protected Phases		3		2	2 3			1	1 2	4	1 4	
Permitted Phases	3		3									
Detector Phases	3	3	3	2	2 3			1	1 2	4	1 4	
Minimum Initial (s)	8.0	8.0	8.0	8.0				8.0		8.0		
Minimum Split (s)	38.0	38.0	38.0	14.0				30.0		14.0		
Total Split (s)	38.0	38.0	38.0	17.0	55.0	0.0	0.0	49.0	66.0	16.0	65.0	0.0
Total Split (%)	31.7%	31.7%	31.7%	14.2%	45.8%	0.0%	0.0%	40.8%	55.0%	13.3%	54.2%	0.0%
Maximum Green (s)	32.0	32.0	32.0	11.0				43.0		10.0		
Yellow Time (s)	3.0	3.0	3.0	3.0				3.0		3.0		
All-Red Time (s)	3.0	3.0	3.0	3.0				3.0		3.0		
Lead/Lag	Lead	Lead	Lead	Lag				Lead		Lag		
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0	2.0	2.0				2.0		2.0		
Recall Mode	None	None	None	None				C-Max		None		
Walk Time (s)	8.0	8.0	8.0					8.0				
Flash Dont Walk (s)	24.0	24.0	24.0					16.0				
Pedestrian Calls (#/hr)	76	76	76					74				
Act Effct Green (s)		32.3	32.3	14.0	49.3			48.7	65.7	13.0	64.7	
Actuated g/C Ratio		0.27	0.27	0.12	0.41			0.41	0.55	0.11	0.54	
v/c Ratio		0.73	0.28	0.97	0.32			0.81	0.77	1.04	0.49	
Control Delay		43.4	36.2	114.0	24.3			38.0	30.1	132.1	19.0	
Queue Delay		0.7	0.0	0.0	0.0			0.0	1.4	57.2	0.0	
Total Delay		44.1	36.2	114.0	24.3			38.0	31.4	189.3	19.0	
LOS		D	D	F	C			D	C	F	B	
Approach Delay		43.0			52.8			35.6			49.0	
Approach LOS		D			D			D			D	
90th %ile Green (s)	32.0	32.0	32.0	11.0				43.0		10.0		
90th %ile Term Code	Max	Max	Max	Max				Coord		Max		
70th %ile Green (s)	32.0	32.0	32.0	11.0				43.0		10.0		
70th %ile Term Code	Max	Max	Max	Max				Coord		Max		
50th %ile Green (s)	32.0	32.0	32.0	11.0				43.0		10.0		
50th %ile Term Code	Ped	Ped	Ped	Max				Coord		Max		
30th %ile Green (s)	32.0	32.0	32.0	11.0				43.0		10.0		
30th %ile Term Code	Ped	Ped	Ped	Max				Coord		Max		
10th %ile Green (s)	18.7	18.7	18.7	11.0				56.3		10.0		
10th %ile Term Code	Gap	Gap	Gap	Max				Coord		Max		
Stops (vph)		345	50	134	218			872	462	135	462	
Fuel Used(gal)		8	1	5	4			14	7	6	10	
CO Emissions (g/hr)		526	73	338	266			976	483	421	668	
NOx Emissions (g/hr)		102	14	66	52			190	94	82	130	
VOC Emissions (g/hr)		122	17	78	62			226	112	98	155	
Dilemma Vehicles (#)		0	0	0	0			0	0	0	0	
Queue Length 50th (ft)		146	41	135	95			407	393	~150	212	
Queue Length 95th (ft)		206	m81	#278	133			501	571	#295	268	
Internal Link Dist (ft)		322			271			81			597	
Turn Bay Length (ft)			100							150		
Base Capacity (vph)		760	310	177	1219			1368	834	171	1695	
Starvation Cap Reductn		20	0	0	0			0	0	0	0	
Spillback Cap Reductn		67	0	0	0			0	68	22	0	
Storage Cap Reductn		0	0	0	0			0	0	0	0	
Reduced v/c Ratio		0.74	0.25	0.97	0.30			0.81	0.84	1.19	0.49	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 92 (77%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.04
Intersection Signal Delay: 42.6 Intersection LOS: D
Intersection Capacity Utilization 90.3% ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 100: Albany Street & Massachusetts Avenue



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Yield			Stop			Stop	
Volume (vph)	42	364	66	117	201	48	64	158	77	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	46	396	72	127	218	52	70	172	84	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	513	398	325
Volume Left (vph)	46	127	70
Volume Right (vph)	72	52	84
Hadj (s)	0.00	0.08	-0.05
Departure Headway (s)	5.7	5.9	6.3
Degree Utilization, x	0.81	0.66	0.57
Capacity (veh/h)	615	575	531
Control Delay (s)	28.7	19.6	17.3
Approach Delay (s)	28.7	19.6	17.3
Approach LOS	D	C	C

Intersection Summary			
Delay	22.8		
HCM Level of Service	C		
Intersection Capacity Utilization	80.8%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	35	28	289	90	78	125
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	38	30	314	98	85	136
Pedestrians	29		11			14
Lane Width (ft)	12.0		12.0			12.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	2		1			1
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			395			
pX, platoon unblocked	0.98	0.98			0.98	
vC, conflicting volume	708	406			441	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	701	391			427	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	89	95			92	
cM capacity (veh/h)	355	623			1088	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	38	30	412	221
Volume Left	38	0	0	85
Volume Right	0	30	98	0
cSH	355	623	1700	1088
Volume to Capacity	0.11	0.05	0.24	0.08
Queue Length 95th (ft)	9	4	0	6
Control Delay (s)	16.4	11.1	0.0	3.7
Lane LOS	C	B		A
Approach Delay (s)	14.0		0.0	3.7
Approach LOS	B			

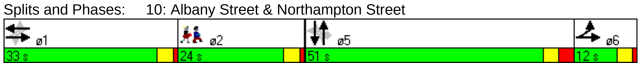
Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	52.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Leading Detector (ft)	50	50		50	50		50	50	50	50	50		
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0		
Turning Speed (mph)	15		9	15		9	15		9	15		9	
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.990			0.985				0.850		0.916		
Flt Protected		0.981			0.999			0.980			0.985		
Satd. Flow (prot)	0	2960	0	0	3114	0	0	1676	1454	0	1523	0	
Flt Permitted		0.553			0.948			0.810			0.869		
Satd. Flow (perm)	0	1669	0	0	2955	0	0	1385	1454	0	1343	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		6			9				113		81		
Headway Factor	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		337			412			200			383		
Travel Time (s)		7.7			9.4			4.5			8.7		
Volume (vph)	153	207	25	8	554	63	38	53	104	87	18	173	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	1%	9%	21%	0%	3%	0%	0%	0%	0%	1%	6%	1%	
Adj. Flow (vph)	166	225	27	9	602	68	41	58	113	95	20	188	
Lane Group Flow (vph)	0	418	0	0	679	0	0	99	113	0	303	0	
Turn Type	D.P+P			Perm			Perm		Perm	Perm			
Protected Phases	6	1 6			1			5			5		2
Permitted Phases	1			1			5		5	5			
Detector Phases	6	1 6		1	1		5	5	5	5	5		
Minimum Initial (s)	4.0			8.0	8.0		6.0	6.0	6.0	6.0	6.0		4.0
Minimum Split (s)	8.0			12.0	12.0		12.0	12.0	12.0	12.0	12.0		24.0
Total Split (s)	12.0	45.0	0.0	33.0	33.0	0.0	51.0	51.0	51.0	51.0	51.0	0.0	24.0
Total Split (%)	10.0%	37.5%	0.0%	27.5%	27.5%	0.0%	42.5%	42.5%	42.5%	42.5%	42.5%	0.0%	20%
Maximum Green (s)	8.0			29.0	29.0		45.0	45.0	45.0	45.0	45.0		20.0
Yellow Time (s)	3.0			3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0
All-Red Time (s)	1.0			1.0	1.0		3.0	3.0	3.0	3.0	3.0		1.0
Lead/Lag	Lag			Lead	Lead		Lead	Lead	Lead	Lead	Lead		Lag
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes
Vehicle Extension (s)	3.0			3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0
Recall Mode	Max			C-Max	C-Max		None	None	None	None	None		None
Walk Time (s)													7.0
Flash Dont Walk (s)													13.0
Pedestrian Calls (#/hr)													5
Act Effct Green (s)		76.2			68.2			27.0	27.0		27.0		
Actuated g/C Ratio		0.64			0.57			0.22	0.22		0.22		
v/c Ratio		0.36			0.40			0.32	0.27		0.83		
Control Delay		12.8			27.3			38.9	7.2		50.1		
Queue Delay		0.0			0.3			0.0	0.0		0.0		
Total Delay		12.8			27.6			38.9	7.2		50.1		
LOS		B			C			D	A		D		
Approach Delay		12.8			27.6			22.0			50.1		
Approach LOS		B			C			C			D		
90th %ile Green (s)	8.0			36.7	36.7		37.3	37.3	37.3	37.3	37.3		20.0
90th %ile Term Code	MaxR			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Ped
70th %ile Green (s)	8.0			67.9	67.9		30.1	30.1	30.1	30.1	30.1		0.0
70th %ile Term Code	MaxR			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Skip
50th %ile Green (s)	8.0			73.6	73.6		24.4	24.4	24.4	24.4	24.4		0.0
50th %ile Term Code	MaxR			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Skip
30th %ile Green (s)	8.0			78.2	78.2		19.8	19.8	19.8	19.8	19.8		0.0
30th %ile Term Code	MaxR			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Skip
10th %ile Green (s)	8.0			84.5	84.5		13.5	13.5	13.5	13.5	13.5		0.0
10th %ile Term Code	MaxR			Coord	Coord		Gap	Gap	Gap	Gap	Gap		Skip
Stops (vph)		157			360			72	15		197		
Fuel Used(gal)		3			7			1	0		5		
CO Emissions (g/hr)		201			522			88	28		333		
NOx Emissions (g/hr)		39			102			17	5		65		
VOC Emissions (g/hr)		47			121			20	6		77		
Dilemma Vehicles (#)		0			0			0	0		0		
Queue Length 50th (ft)		49			152			65	0		170		
Queue Length 95th (ft)		156			351			101	41		245		
Internal Link Dist (ft)		257			332			120			303		
Turn Bay Length (ft)													
Base Capacity (vph)		1148			1683			542	638		575		
Starvation Cap Reductn		0			449			0	0		0		
Spillback Cap Reductn		0			0			0	0		0		
Storage Cap Reductn		0			0			0	0		0		
Reduced v/c Ratio		0.36			0.55			0.18	0.18		0.53		

Intersection Summary

Area Type: CBD
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 72 (60%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 27.2 Intersection LOS: C
Intersection Capacity Utilization 66.6% ICU Level of Service C
Analysis Period (min) 15

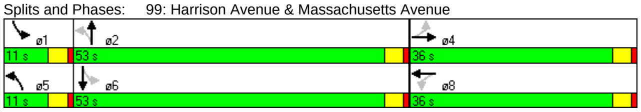
Splits and Phases: 10: Albany Street & Northampton Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.95			0.95			0.93		0.95	0.95	
Frt		0.978			0.976			0.974			0.977	
Flt Protected		0.991			0.990		0.950			0.950		
Satd. Flow (prot)	0	1653	0	0	1693	0	1703	3115	0	1736	3206	0
Flt Permitted		0.765			0.758		0.153			0.190		
Satd. Flow (perm)	0	1276	0	0	1263	0	274	3115	0	329	3206	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			12			35			28	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		267			224			677			2154	
Travel Time (s)		6.1			5.1			15.4			49.0	
Volume (vph)	51	194	49	110	318	94	94	753	158	72	858	153
Confl. Peds. (#/hr)	81		191	191		81	103		142	142		103
Confl. Bikes (#/hr)						4			7			1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	6%	7%	4%	6%	6%	6%	5%	4%	4%	5%	5%
Adj. Flow (vph)	55	211	53	120	346	102	102	818	172	78	933	166
Lane Group Flow (vph)	0	319	0	0	568	0	102	990	0	78	1099	0
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phases	4	4		8	8		5	2		1	6	
Minimum Initial (s)	8.0	8.0		8.0	8.0		6.0	8.0		6.0	8.0	
Minimum Split (s)	22.0	22.0		22.0	22.0		10.0	22.0		10.0	22.0	
Total Split (s)	36.0	36.0	0.0	36.0	36.0	0.0	11.0	53.0	0.0	11.0	53.0	0.0
Total Split (%)	36.0%	36.0%	0.0%	36.0%	36.0%	0.0%	11.0%	53.0%	0.0%	11.0%	53.0%	0.0%
Maximum Green (s)	32.0	32.0		32.0	32.0		7.0	49.0		7.0	49.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	C-Max		Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0			11.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)		32.0			32.0		55.8	49.0		56.8	51.2	
Actuated g/C Ratio		0.32			0.32		0.56	0.49		0.57	0.51	
v/c Ratio		0.77			1.38		0.41	0.64		0.27	0.66	
Control Delay		43.6			214.4		13.7	20.6		11.0	20.6	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		43.6			214.4		13.7	20.6		11.0	20.6	
LOS		D			F		B	C		B	C	
Approach Delay		43.6			214.4			20.0			20.0	
Approach LOS		D			F			B			B	
90th %ile Green (s)	32.0	32.0		32.0	32.0		7.0	49.0		7.0	49.0	
90th %ile Term Code	Max	Max		Max	Max		Max	Coord		MaxR	Coord	
70th %ile Green (s)	32.0	32.0		32.0	32.0		7.0	49.0		7.0	49.0	
70th %ile Term Code	Max	Max		Max	Max		Max	Coord		MaxR	Coord	
50th %ile Green (s)	32.0	32.0		32.0	32.0		7.0	49.0		7.0	49.0	
50th %ile Term Code	Hold	Hold		Max	Max		Max	Coord		MaxR	Coord	
30th %ile Green (s)	32.0	32.0		32.0	32.0		7.0	49.0		7.0	49.0	
30th %ile Term Code	Hold	Hold		Max	Max		Max	Coord		MaxR	Coord	
10th %ile Green (s)	32.0	32.0		32.0	32.0		0.0	49.0		7.0	60.0	
10th %ile Term Code	Hold	Hold		Max	Max		Skip	Coord		MaxR	Coord	
Stops (vph)		245			393		40	631		30	714	
Fuel Used(gal)		5			26		1	12		2	25	
CO Emissions (g/hr)		319			1811		68	847		107	1759	
NOx Emissions (g/hr)		62			352		13	165		21	342	
VOC Emissions (g/hr)		74			420		16	196		25	408	
Dilemma Vehicles (#)		0			0		0	0		0	0	
Queue Length 50th (ft)		176			~481		26	229		19	267	
Queue Length 95th (ft)		#313			#692		48	298		38	343	
Internal Link Dist (ft)		187			144			597			2074	
Turn Bay Length (ft)												
Base Capacity (vph)		416			412		253	1544		286	1655	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.77			1.38		0.40	0.64		0.27	0.66	

Intersection Summary
Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 78 (78%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.38
Intersection Signal Delay: 57.3   Intersection LOS: E
Intersection Capacity Utilization 86.6%   ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 99: Harrison Avenue & Massachusetts Avenue

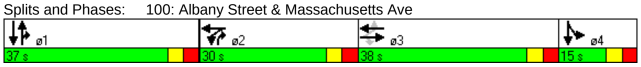


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	2100	2100	2100	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	11	10	12	12	10	11	10
Storage Length (ft)	0		100	0		0	0		0	150		0
Storage Lanes	0		1	1		0	0		1	1		0
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Leading Detector (ft)	50	50	50	50	50			50	50	50	50	
Trailing Detector (ft)	0	0	0	0	0			0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.95	0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor		0.98	0.79	0.87	0.97					0.84	0.99	
Frt			0.850		0.959				0.850		0.994	
Flt Protected		0.987		0.950						0.950		
Satd. Flow (prot)	0	3282	1599	1753	3179	0	0	3471	1495	1518	3289	0
Flt Permitted		0.674		0.950						0.950		
Satd. Flow (perm)	0	2206	1267	1526	3179	0	0	3471	1495	1281	3289	0
Right Turn on Red			No			No			No			Yes
Satd. Flow (RTOR)											4	
Headway Factor	1.00	1.00	1.00	1.04	1.14	1.04	1.09	1.00	1.00	1.09	1.04	1.09
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		412			351			161			677	
Travel Time (s)		9.4			8.0			3.7			15.4	
Volume (vph)	67	190	163	319	506	189	0	742	275	61	918	37
Confl. Peds. (#/hr)	152		102	102		152	138		191	191		138
Confl. Bikes (#/hr)									2			1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	13%	7%	1%	10%	6%	6%	0%	4%	8%	11%	4%	19%
Parking (#/hr)					6	6						
Adj. Flow (vph)	73	207	177	347	550	205	0	807	299	66	998	40
Lane Group Flow (vph)	0	280	177	347	755	0	0	807	299	66	1038	0
Turn Type	Perm		Perm	Prot					pt+ov	Prot		
Protected Phases		3		2	2 3			1	1 2	4	1 4	
Permitted Phases	3		3									
Detector Phases	3	3	3	2	2 3			1	1 2	4	1 4	
Minimum Initial (s)	8.0	8.0	8.0	8.0				8.0		8.0		
Minimum Split (s)	38.0	38.0	38.0	14.0				30.0		14.0		
Total Split (s)	38.0	38.0	38.0	30.0	68.0	0.0	0.0	37.0	67.0	15.0	52.0	0.0
Total Split (%)	31.7%	31.7%	31.7%	25.0%	56.7%	0.0%	0.0%	30.8%	55.8%	12.5%	43.3%	0.0%
Maximum Green (s)	32.0	32.0	32.0	24.0				31.0		9.0		
Yellow Time (s)	3.0	3.0	3.0	3.0				3.0		3.0		
All-Red Time (s)	3.0	3.0	3.0	3.0				3.0		3.0		
Lead/Lag	Lag	Lag	Lag	Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0	2.0	2.0				2.0		2.0		
Recall Mode	None	None	None	None				C-Max		None		
Walk Time (s)	8.0	8.0	8.0					8.0				
Flash Dont Walk (s)	24.0	24.0	24.0					16.0				
Pedestrian Calls (#/hr)	86	86	86					85				
Act Effct Green (s)		30.9	30.9	26.6	60.5			38.5	68.1	12.0	53.5	
Actuated g/C Ratio		0.26	0.26	0.22	0.50			0.32	0.57	0.10	0.45	
v/c Ratio		0.49	0.54	0.89	0.47			0.73	0.35	0.43	0.71	
Control Delay		43.3	46.9	73.3	10.1			42.2	16.8	60.4	31.6	
Queue Delay		0.0	0.0	22.5	0.6			0.0	0.0	0.0	0.6	
Total Delay		43.3	46.9	95.8	10.7			42.2	16.8	60.4	32.2	
LOS		D	D	F	B			D	B	E	C	
Approach Delay		44.7			37.5			35.3			33.9	
Approach LOS		D			D			D			C	
90th %ile Green (s)	32.0	32.0	32.0	24.0				31.0		9.0		
90th %ile Term Code	Ped	Ped	Ped	Max				Coord		Max		
70th %ile Green (s)	32.0	32.0	32.0	24.0				31.0		9.0		
70th %ile Term Code	Ped	Ped	Ped	Max				Coord		Max		
50th %ile Green (s)	32.0	32.0	32.0	24.0				31.0		9.0		
50th %ile Term Code	Ped	Ped	Ped	Max				Coord		Max		
30th %ile Green (s)	32.0	32.0	32.0	24.0				31.0		9.0		
30th %ile Term Code	Ped	Ped	Ped	Max				Coord		Max		
10th %ile Green (s)	11.5	11.5	11.5	22.2				53.3		9.0		
10th %ile Term Code	Gap	Gap	Gap	Gap				Coord		Max		
Stops (vph)		204	133	267	276			648	149	57	765	
Fuel Used(gal)		4	3	7	5			11	2	1	15	
CO Emissions (g/hr)		296	197	497	339			761	147	97	1077	
NOx Emissions (g/hr)		58	38	97	66			148	29	19	210	
VOC Emissions (g/hr)		69	46	115	79			176	34	22	250	
Dilemma Vehicles (#)		0	0	0	0			0	0	0	0	
Queue Length 50th (ft)		92	112	236	95			307	130	49	359	
Queue Length 95th (ft)		m125	m162	#429	103			386	196	97	444	
Internal Link Dist (ft)		332			271			81			597	
Turn Bay Length (ft)			100							150		
Base Capacity (vph)		643	370	394	1706			1112	853	152	1467	
Starvation Cap Reductn		0	0	53	550			0	0	0	0	
Spillback Cap Reductn		0	0	0	0			0	32	0	153	
Storage Cap Reductn		0	0	0	0			0	0	0	0	
Reduced v/c Ratio		0.44	0.48	1.02	0.65			0.73	0.36	0.43	0.79	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 57 (48%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 36.7 Intersection LOS: D
Intersection Capacity Utilization 86.6% ICU Level of Service E
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 100: Albany Street & Massachusetts Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣				
Sign Control		Yield			Yield			Stop			Stop	
Volume (vph)	35	237	47	187	358	46	78	166	58	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	38	258	51	203	389	50	85	180	63	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	347	642	328
Volume Left (vph)	38	203	85
Volume Right (vph)	51	50	63
Hadj (s)	-0.05	0.06	-0.05
Departure Headway (s)	6.0	5.7	6.4
Degree Utilization, x	0.58	1.03	0.59
Capacity (veh/h)	585	621	541
Control Delay (s)	16.9	66.3	18.1
Approach Delay (s)	16.9	66.3	18.1
Approach LOS	C	F	C

Intersection Summary			
Delay	41.3		
HCM Level of Service	E		
Intersection Capacity Utilization	91.6%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	77	87	234	21	35	209
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	84	95	254	23	38	227
Pedestrians	43		13			27
Lane Width (ft)	12.0		12.0			12.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	4		1			2
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			383			
pX, platoon unblocked						
vC, conflicting volume	625	336			320	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	625	336			320	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	80	86			97	
cM capacity (veh/h)	417	670			1206	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	84	95	277	265
Volume Left	84	0	0	38
Volume Right	0	95	23	0
cSH	417	670	1700	1206
Volume to Capacity	0.20	0.14	0.16	0.03
Queue Length 95th (ft)	18	12	0	2
Control Delay (s)	15.8	11.3	0.0	1.4
Lane LOS	C	B		A
Approach Delay (s)	13.4		0.0	1.4
Approach LOS	B			

Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	49.6%	ICU Level of Service	A
Analysis Period (min)	15		

MEMORANDUM

To:	Hank Keating, Eva Erlich – Trinity Financial Jamie Fay – Fort Point Associates	Date:	January 19, 2012
From:	Joe SanClemente, P.E., AICP Jared Hite, Jane Howard	HSH Project No.:	2011032
Subject:	35 Northampton Parking Garage		

Executive Summary

Howard Stein Hudson Associates, Inc. (HSH) evaluated the operations at the existing 539-space parking garage located at 35 Northampton Street in the South End neighborhood of Boston and its adequacy to serve additional parking demand associated with the proposed 11 new accessible dwelling units at 35 Northampton Street and the proposed new market rate high-rise including 236 new units. The key objectives of this effort were to:

- Confirm the total number of parking spaces within the garage;
- Evaluate parking usage by time of day;
- Identify the current users of the garage (i.e., transient vs. monthly, origin, etc.); and
- Assess potential impacts of future development on parking supply and demand.

HSH conducted a detailed assessment of parking supply and demand; collected and reviewed vehicle entrance and exit data at the garage driveway; and conducted a survey of garage patrons exiting the garage during May and June of 2011.

A review of entrance and exit gate data provided by the Boston Public Health Commission (BPHC) indicate that monthly card holders account for 80% of all activity within the garage, on average, while transient activity generally accounts for only 20% of garage use, on average, during a typical week. According to data provided by BPHC, there are currently approximately 663 outstanding monthly cards of which a majority are for public parkers such as Boston Medical Center (BMC) employees and/or workers in nearby businesses (252 monthly cards or 38%); BPHC employees (200 monthly cards or 30%); and residents of McCormack Towers (103 monthly cards or 15%). It is notable that parking demand at the McCormack Towers corresponds to only approximately 0.30 monthly cards per residential unit (103 cards/(234+112 units) = 0.30).

Due to the shared use nature of the garage (i.e., residential demand is typically lowest during the weekday mid-day period and on weekends when office demand is at its peak), the existing 539-space Northampton Garage is currently underutilized throughout the week, with an average occupancy of only approximately 80% during the weekday peak periods (typically between 9:00 AM and 2:00 PM). During the weekday evening and throughout the day on Saturday and Sunday (when office demand is low) the garage is typically less than 30% occupied.

Consequently, the parking demand for the proposed 247 new residential units can be easily accommodated within the existing garage without any impact to current monthly lease agreements or transient activity. It is expected that parking demand associated with the new residential units could yield up to nearly $146,000 in new annual revenue for the garage assuming current rates for monthly parking at the McCormack Towers.

The following sections of this memorandum detail the existing site conditions; the garage user survey; existing and future parking supply and demand; and a brief summary.

Existing Site Conditions

Garage Layout and Supply

The existing parking garage is located at 35 Northampton Street in the South End neighborhood of Boston and is owned and operated by the Boston Public Health Commission (BPHC). The existing garage abuts several buildings, which it primarily serves, including the McCormack Residential Towers (35 Northampton Street and 860 Harrison Avenue); the Carter Auditorium on Northampton Street; the South End Fitness Center on Northampton Street; the Miranda Creamer Building (BPHC) on Albany Street; and 721-729 Massachusetts Avenue (Boston Medical Center (BMC)).

According to a parking space inventory conducted by HSH on Friday, May 27, 2011, the existing parking garage currently contains 539 parking spaces within a 3-level structure, including 177 spaces on Level 1 (basement level), 173 spaces on Level 2 (ground floor level), and 189 spaces on Level 3.

Vehicular access to the garage is provided at Level 2 on Northampton Street with 1 gate-controlled entrance driveway and 2 gate-controlled exit driveways. Entering patrons receive a ticket at the entrance gate. Then, when leaving the garage, patrons use one of two automated pay stations before returning to their vehicles. The pay stations are located on the fourth floor hallway connecting 35 Northampton and the Miranda Creamer Building and also at the ground level, adjacent to the elevators, of the 35 Northampton Tower entrance. A second vehicular access point located on Albany Street is dedicated for loading and service activity only.

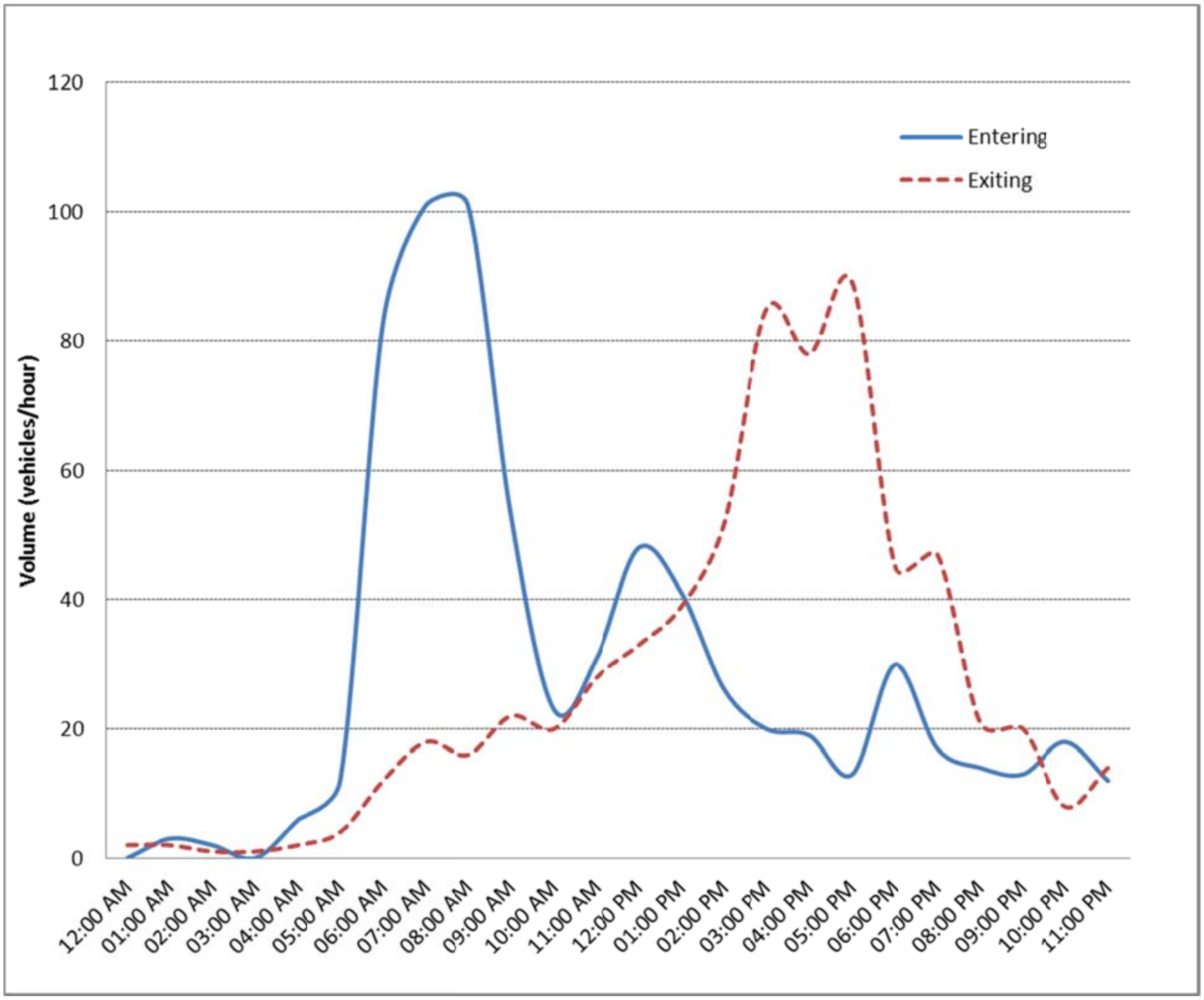
The garage has multiple pedestrian entrances/exits, including one at the main entrance at 35 Northampton Street; one on each level of the garage at 35 Northampton, 860 Harrison, and at the Miranda Creamer Building; and a spiral staircase that provides key-card-only access to the pedestrian bridge connection over to the Boston Medical Center (BMC).

Garage Operations

Vehicular Demand

In order to determine the total number of users of the garage on a typical weekday, HSH collected traffic volume data at the entrance and exit driveways of the garage on Northampton Street, as well as at the loading/service driveway on Albany Street, using an automatic traffic recorder (ATR) for a 24-hour period on Wednesday, June 8, 2011. According to the ATR data, a total of 686 vehicles entered the garage and 659 vehicles exited the garage over the course of the entire day, for an overall space turnover rate of 1.27, reflecting a mixture of long-term and short-term demand. The number of vehicles utilizing the service/loading driveway on Albany Street was negligible throughout the day. **Figure 1** illustrates the total number of vehicles entering and exiting the garage by hour.

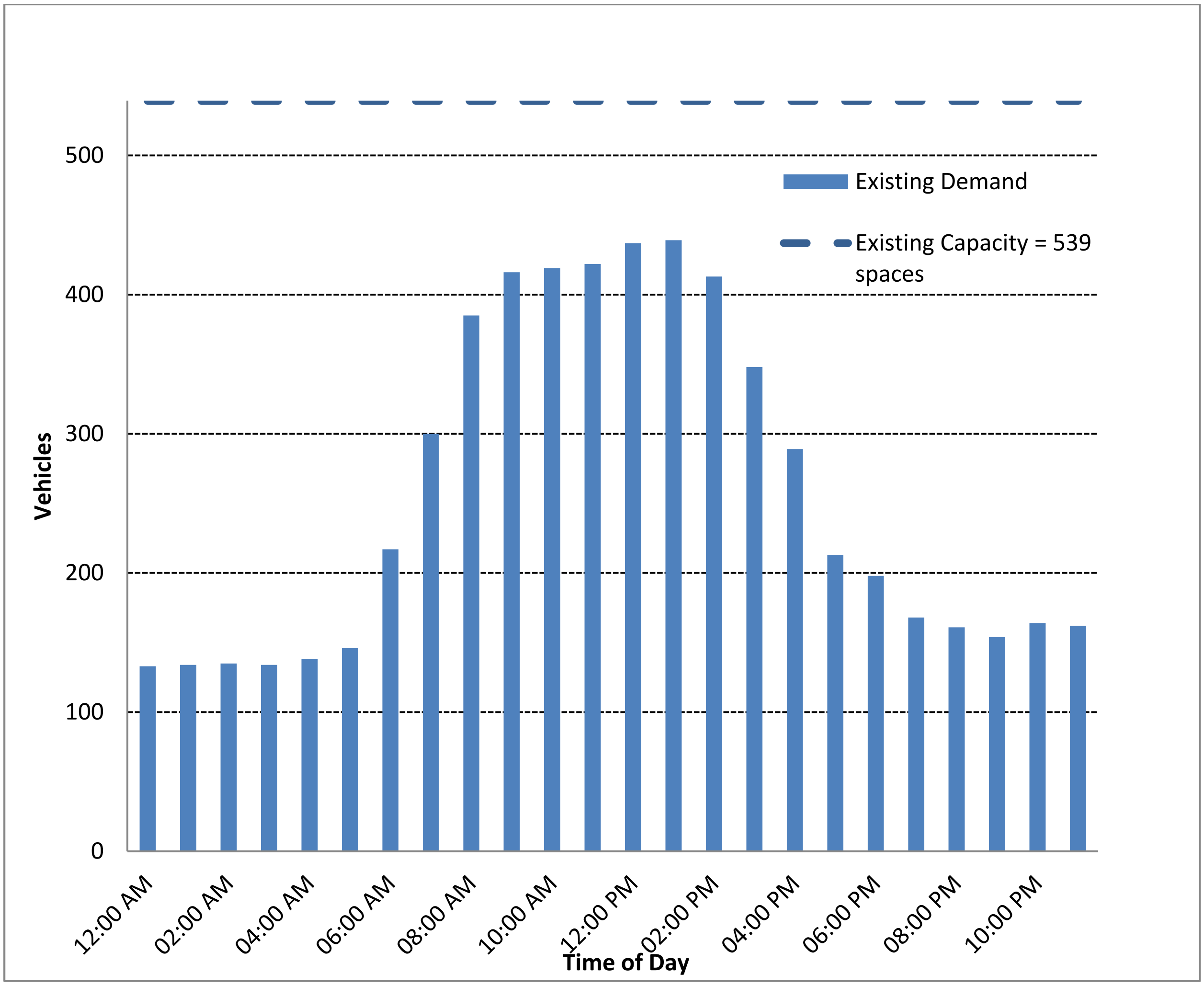
Figure 1. Vehicles Entering and Exiting by Hour (Wednesday, June 8, 2011)



As shown in Figure 1, the garage experiences peak activity during the commuter peak hours with a majority of vehicles entering the garage between the hours of 6:00 a.m. and 9:00 a.m. and a majority of vehicles leaving between 2:00 p.m. and 6:00 p.m. The garage also experiences moderate activity throughout the day, which is typical for a shared-use facility.

HSH also conducted vehicle occupancy counts on Wednesday, June 8, 2011. The demand of the garage by hour is illustrated in Figure 2.

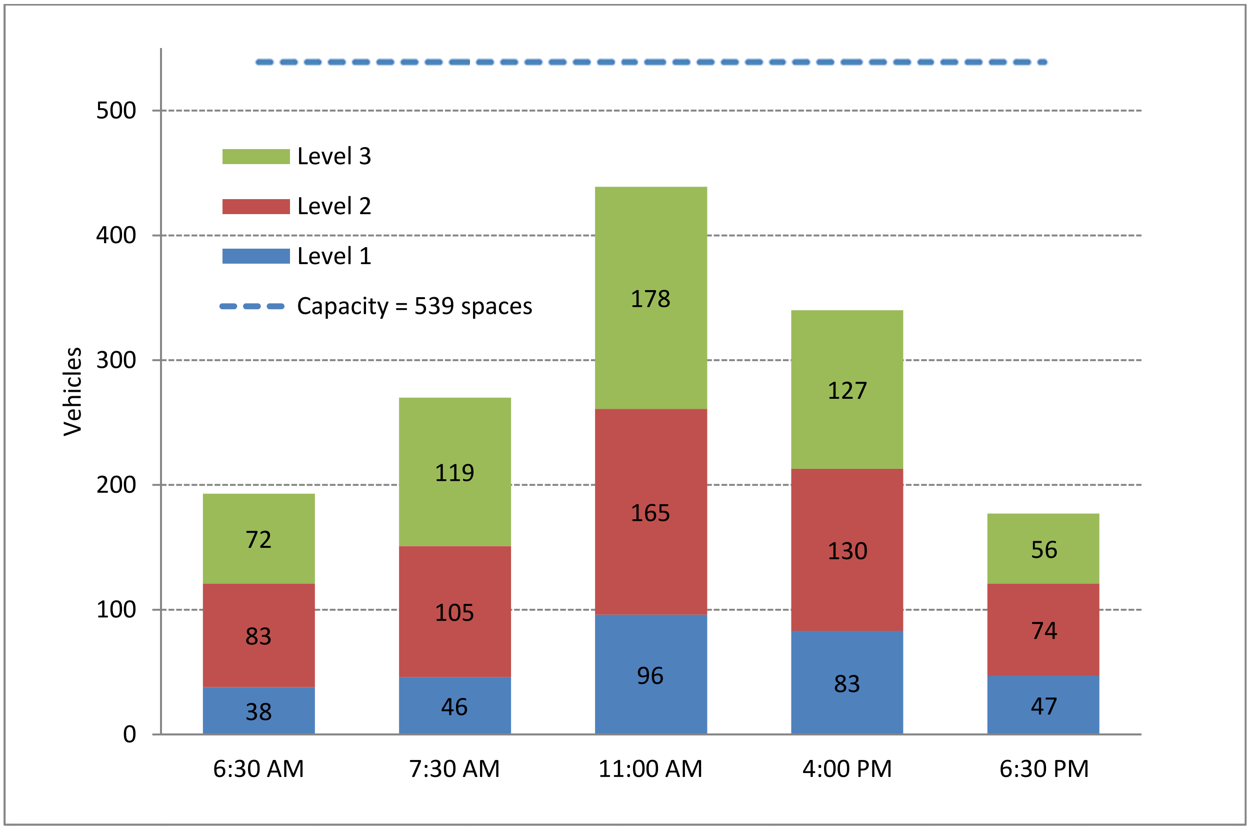
Figure 2. Total Demand by Hour (Wednesday, June 8, 2011)



As shown in **Figure 2**, the garage reached its peak occupancy at 2:00 p.m. with 439 vehicles parked (approximately 81% occupied) – 100 vehicles fewer than the striped capacity of 539 spaces. It should be noted that 90% occupancy is typically considered the effective capacity of large public parking garages, because turnover always occurs and transient parkers need to be able to easily find a space upon entering – this would correspond to an effective capacity of approximately 486 spaces. Overnight parking demand was approximately 140 to 170 vehicles, which is likely attributed to the residential users at the McCormack Towers as well as night shift personnel at BMC.

It is notable that Level 1 of the garage only reached approximately 54% of capacity during the peak mid-day period; while Level 2 and Level 3 reached peak occupancies of approximately 95% on each level during the mid-day peak (see **Figure 3**).

Figure 3. Demand by Level (Wednesday, June 8, 2011)

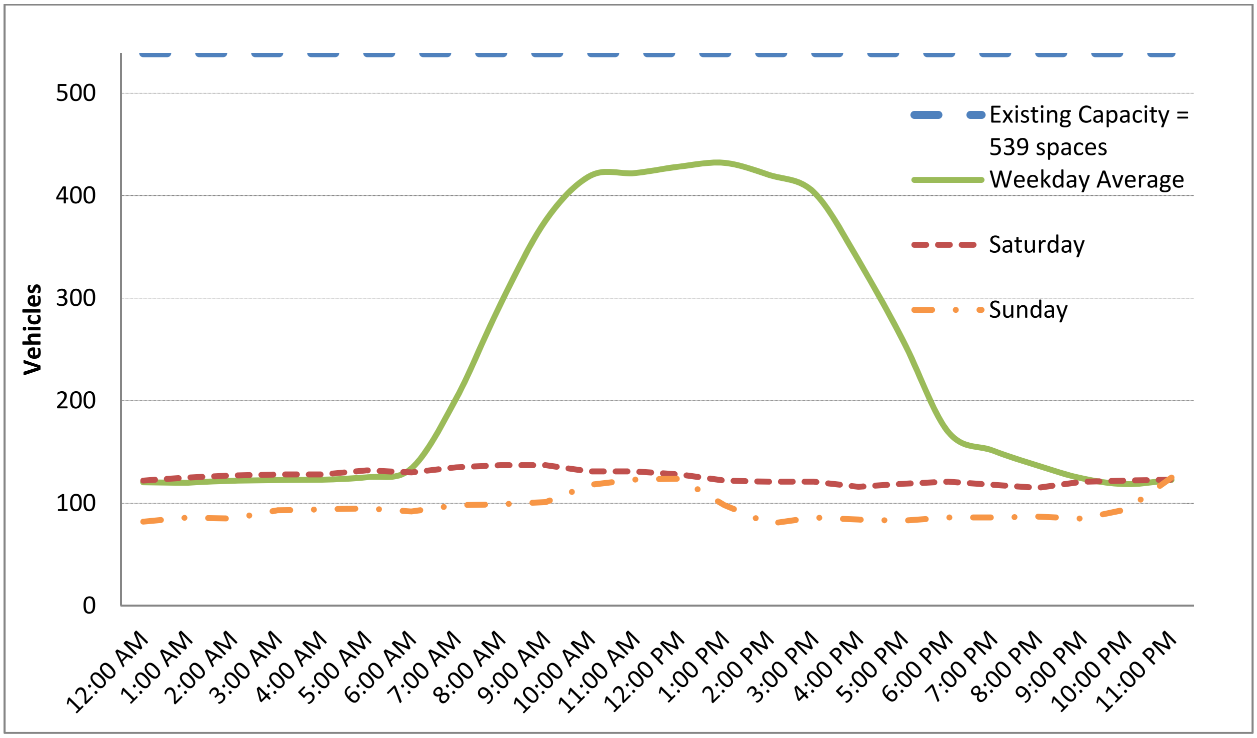


At approximately 4:00 p.m. HSH staff noted that approximately 30 spaces on Level 3 were closed off for cleaning; however, this temporary closure did not impact demand within the garage as there was sufficient available supply after 4:00 p.m.

Weekday vs. Weekend Activity

Using gate provided by the BPHC for the week of Sunday, June 5 through Saturday, June 11, 2011, HSH evaluated the average weekday, Saturday, and Sunday parking demand for the Northampton Garage (see Figure 4).

Figure 4. Weekday vs. Weekend Demand (June 5 – June 11, 2011)



As shown in **Figure 4**, during the weekdays the Northampton Garage only reached an average peak occupancy of approximately 80% and was underutilized during the evening hours. On Saturday and Sunday, the garage was only approximately 30% occupied throughout the day.

Transient vs. Monthly Activity

The existing garage is currently used by monthly card holders and transient users (i.e., hourly). According to the data provided by the BPHC in June 2011, there are currently approximately 663 outstanding monthly cards for the various users of the garage, as summarized in **Table 1** – this corresponds to roughly 1.2 monthly cards per space within the garage. Due to the shared use nature of the garage (i.e., residential demand is typically lowest during the mid-day period when office demand is at its peak), the garage is able to serve more users than spaces on a typical day (i.e., parking turn-over).

Table 1 Outstanding Monthly Card Holders

Card Holder Type	Number of Cards[2]	% of Cards
BPHC Complimentary Parkers	135	20%
BPHC Employees	65	10%
Contractors	2	1%
TB Clinic	4	1%
McCormack Tower Residents[1]	103	15%
Public Parkers	252	38%
Contracted Parkers	102	15%
TOTAL	**663**	**100%**

1. 35 Northampton Street and 860 Harrison Avenue.
2. Card holder data provided by BPHC on June 2, 2011.

As shown in **Table 1,** a majority of the outstanding monthly cards are for public parkers (252 or 38%) and BPHC complimentary employees and parkers (200 or 30%). Public parkers consist of a variety of different user types, such as Boston Medical Center employees, area residents, workers in nearby businesses, etc. BPHC complimentary parkers are BPHC staff, who are provided complimentary parking due to the nature of their job duties. The common magnetic card for BPHC employees also serves as their BPHC identification badge.

Located in the Miranda Creamer Building are the headquarters of the Boston Medical Emergency Services (EMS). The EMS staffers are included within the BPHC employee and BPHC complimentary parker categories. The EMS vehicles generally park on Level 1 of the parking garage, adjacent to the EMS entrance.

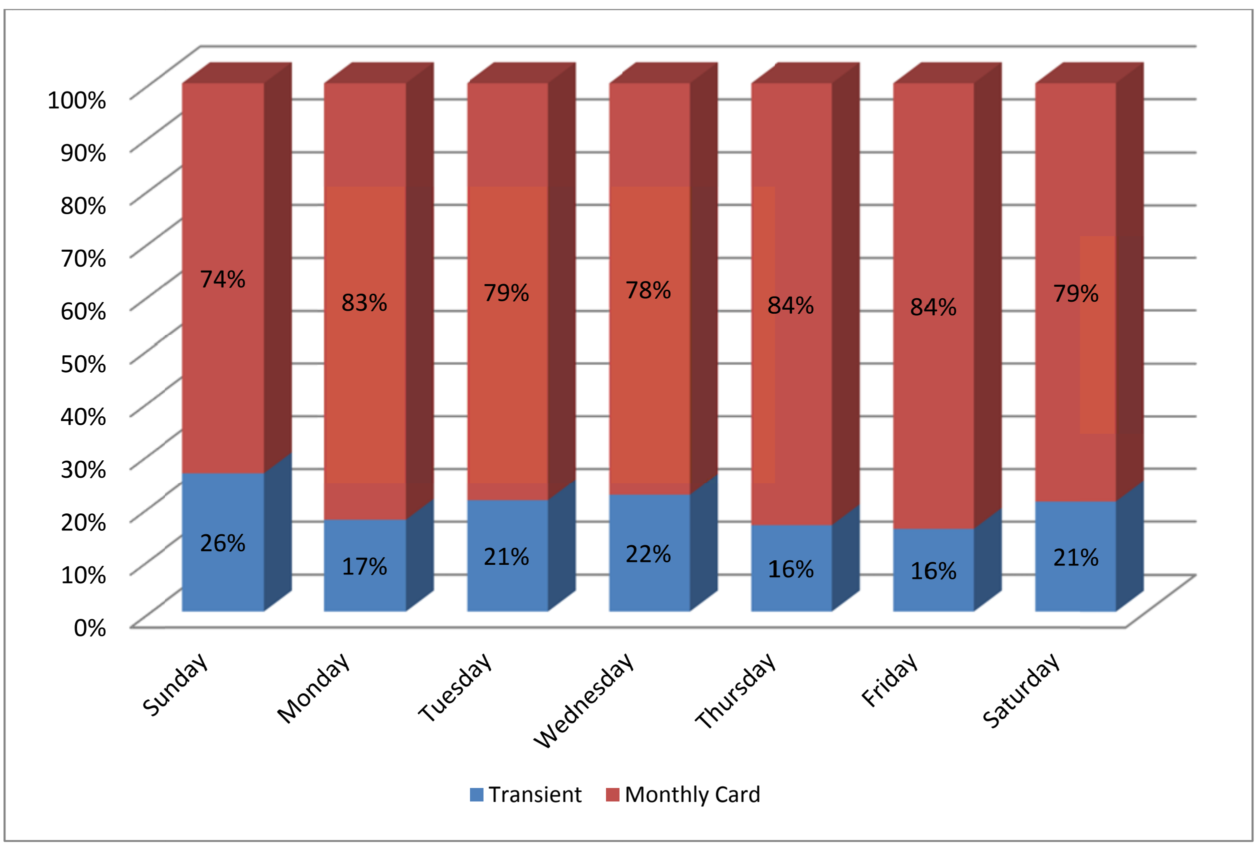
Residents of McCormack Towers account for only 103 monthly cards (or approximately 15%) – this corresponds to approximately 0.30 monthly cards per residential unit (103 cards/(234+112 units) = 0.30).

Contracted parkers are agencies/groups who lease blocks of spaces from BPHC for employee parking.

Members of the South End Fitness Center are considered transient activity as they are provided with complimentary parking for 2 ½-hours.

The BPHC provided driveway gate data for the garage during the week of Sunday, June 5 through Saturday, June 11, 2011, which provides a breakdown of monthly card holder versus transit activity. **Figure 5** compares the percentage of monthly card holder versus transient parkers ***entering*** the garage throughout the week. As shown in **Figure 5,** transient activity accounts for only approximately 20% of garage users, on average, during a typical week.

Figure 5. Transient vs. Monthly Card Activity by Day of Week (June 5 – 11, 2011)



Garage User Survey

Survey Methodology

HSH conducted an 11-hour parking garage user survey of patrons ***exiting*** the garage on Wednesday, June 8, 2011 from 7:30 a.m. to 6:00 p.m. – these times, and day of week, were selected based on review of garage entrance/exit gate data provided by BPHC for a typical weekday and through discussions with BPHC staff.

During the survey HSH staff was positioned at the exit gates of the garage to interview users as they approached the gate with their vehicles. Garage users were then asked a few brief questions while they either inserted their tickets or tapped their monthly cards at the exit gate. The survey included the following questions in order to differentiate the users of the garage (e.g., monthly pass vs. transient, purpose of trip, etc.):

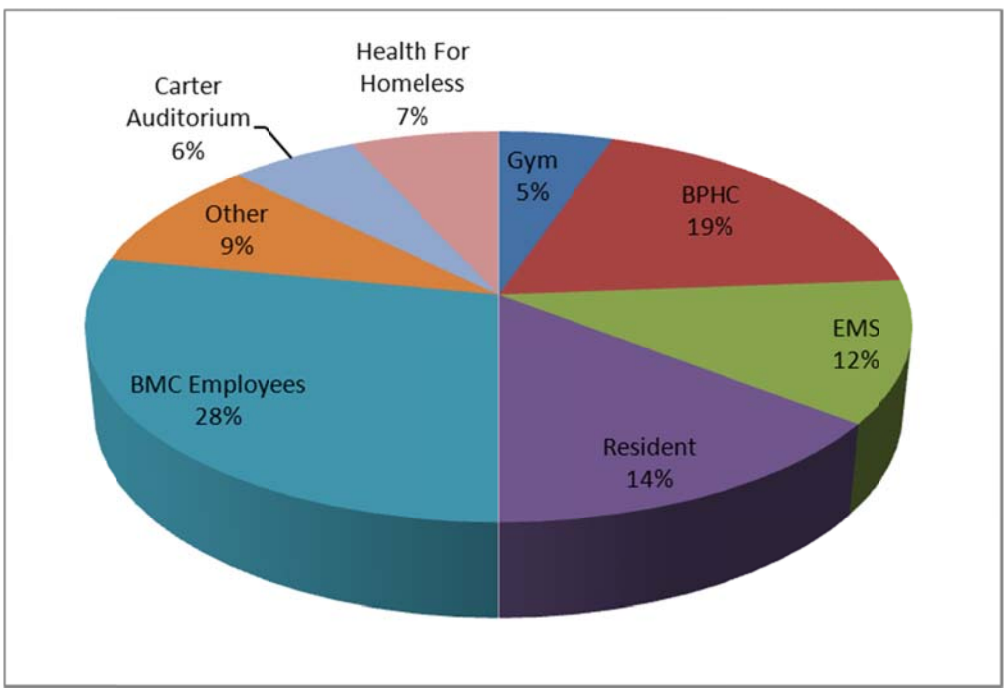
1. Are you a monthly pass user or hourly parker?
2. If monthly, who provided you with the pass card (an employer, etc.)?
3. What building/address did you come from?
4. Approximately how long were you parked for?

In an effort to minimize wait times for patrons exiting the garage, HSH staff surveyed only a sample of users exiting the garage during the busiest time periods.

Survey Results

During the 11-hour survey, HSH received a total of 325 survey responses. According to the ATR data at the exit driveways, 525 vehicles exited the garage during the same time period – which corresponds to a response rate of approximately 62%. A majority of the garage patrons were willing to participate in the short survey, while only a few declined. Approximately 20% (65) of the responses came from transient parkers and 80% (260) from monthly parkers – consistent with the gate data provided by BPHC. The percentage of responses by user type is shown in **Figure 6** – it should be noted that **Figure 6** includes both monthly card and transient users.

Figure 6. Survey Responses by User Type



As shown in **Figure 6**, a majority (31%) of those surveyed were BPHC employees (including BPHC staff (19%) and EMS (12%)), BMC employees (28%), and McCormack Tower residents (14%).

A significant number of survey responses were obtained from patrons associated with the Boston Health Care for the Homeless (7%), located at 780 Albany Street, and the Carter Auditorium (6%); on the day of the survey there was a conference at the auditorium.

Those within the "other" category, approximately 6% of all responses, primarily consisted of visitors to BMC or the McCormack Towers, while a small number of the responses were the result of patrons unwilling to disclose their origin. Only 5% of the responses were associated with the gym (South End Fitness Center); however, it should be noted that a higher response rate from the gym may have been obtained if the survey period were extended past 6 p.m. **Figure 7** illustrates the hourly distribution of garage users exiting the garage by user type.

Figure 7. Hourly Distribution by User Type

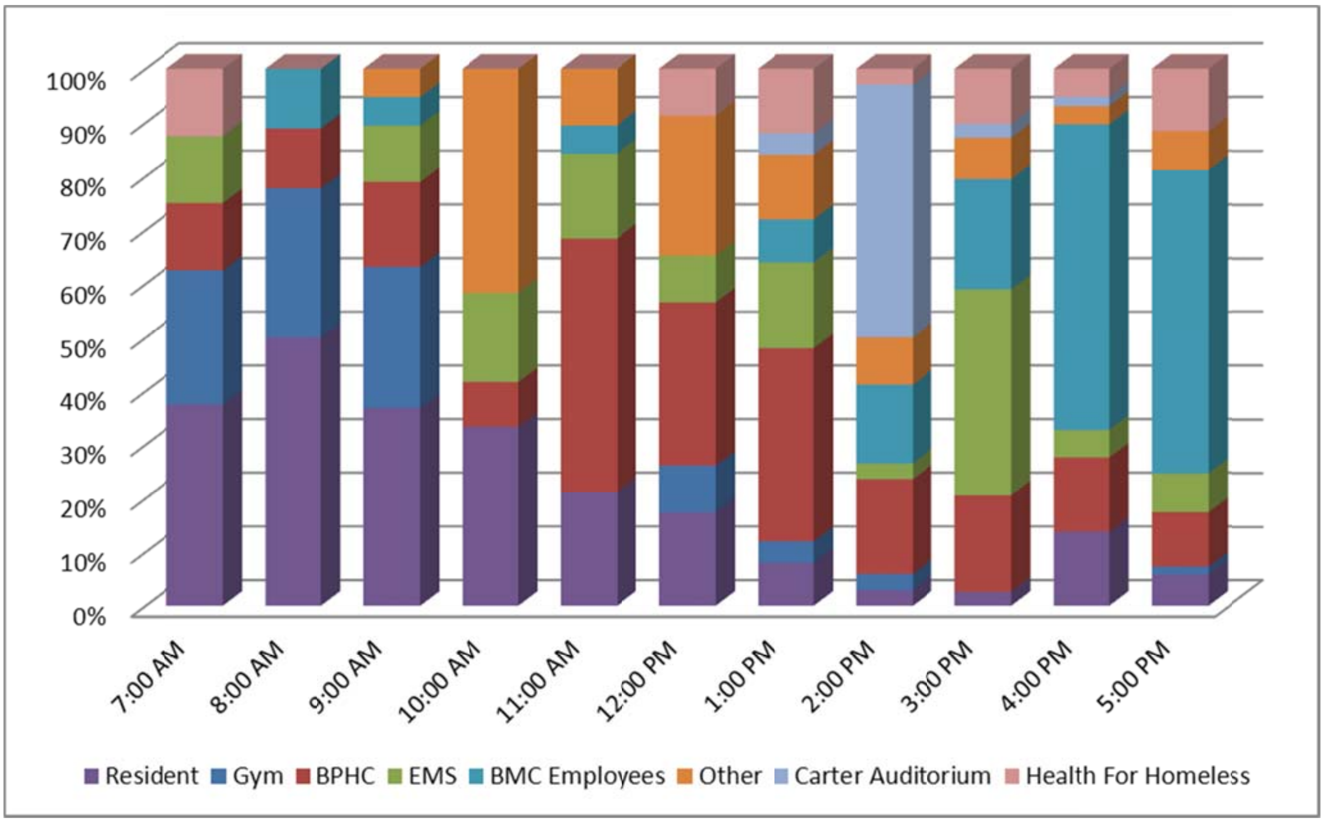


Figure 7, shows the complementary nature of the shared garage facility between the various users. For example, peak exiting activity during the morning hours generally consists of McCormack Tower residents leaving for work or gym users likely working out before the start of the work day, while exiting activity associated with the BPHC (primarily an office use) is generally low during the same time period. It is also notable that a large number of responses were obtained from patrons exiting the Cater Auditorium at approximately 2:00 p.m., likely following the end of the conference. Similarly, a majority of the responses after 3 p.m. were associated with BMC employees leaving work.

Summary of Existing Garage Conditions

HSH observed parking operations and demand at the 35 Northampton Street Garage and conducted a survey to identify who is currently using the facility. HSH notes the following key observations:

- The existing garage currently has 539 striped spaces and serves both transient users (i.e., hourly) and monthly card holders.
- The garage experienced peak weekday demand during the mid-day period (approximately 2 p.m.) with 439 vehicles (approximately 81% occupied) – 100 vehicles fewer than the striped capacity. 90% occupancy is typically considered the effective capacity of large public parking garages, which corresponds to an effective capacity of only 486 spaces.
- Level 2 (ground level) and Level 3 are heavily utilized during the peak mid-day period (each approximately 95% occupied); however, Level 1 is underutilized with only 54% of spaces occupied during the mid-day peak period.
- Overnight parking demand was approximately 140 to 170 vehicles (approximately 25% to 30% occupied) – this demand is likely attributed to the residential users at the McCormack Towers as well as night shift personnel at BMC.
- A total of 686 vehicles entered the garage and 659 vehicles exited the garage on a typical weekday. This corresponds to a parking space turnover rate of approximately 1.27 vehicles per space per day.
- There are currently approximately 663 outstanding monthly cards for the various users of the garage (1.2 monthly cards per space), including 252 cards (38%) for public parkers, 200 cards (30%) for BPHC employees, 103 cards (15%) for McCormack Tower Residents, 102 cards for contracted parkers (15%) and 6 cards for contractors and the TB clinic (<2%).
- The 103 monthly cards for residents of McCormack Towers corresponds to approximately 0.29 monthly cards per residential unit (103 cards/(234+112 units) = 0.30).
- Transient activity generally accounts for only 20% of garage use, while monthly card holders account for 80% of use, on average, during a typical week (Sunday through Saturday).
- A majority of the garage users are BPHC employees (31%), BMC employees (28%), and McCormack Tower residents (14%). Other users include the Boston Health Care for the Homeless (7%) located at 780 Albany Street, and the Carter Auditorium (6%) – on the day of the survey there was a conference at the auditorium – visitors of the McCormack Towers and BMC (6%), and the South End Fitness Center (5%).

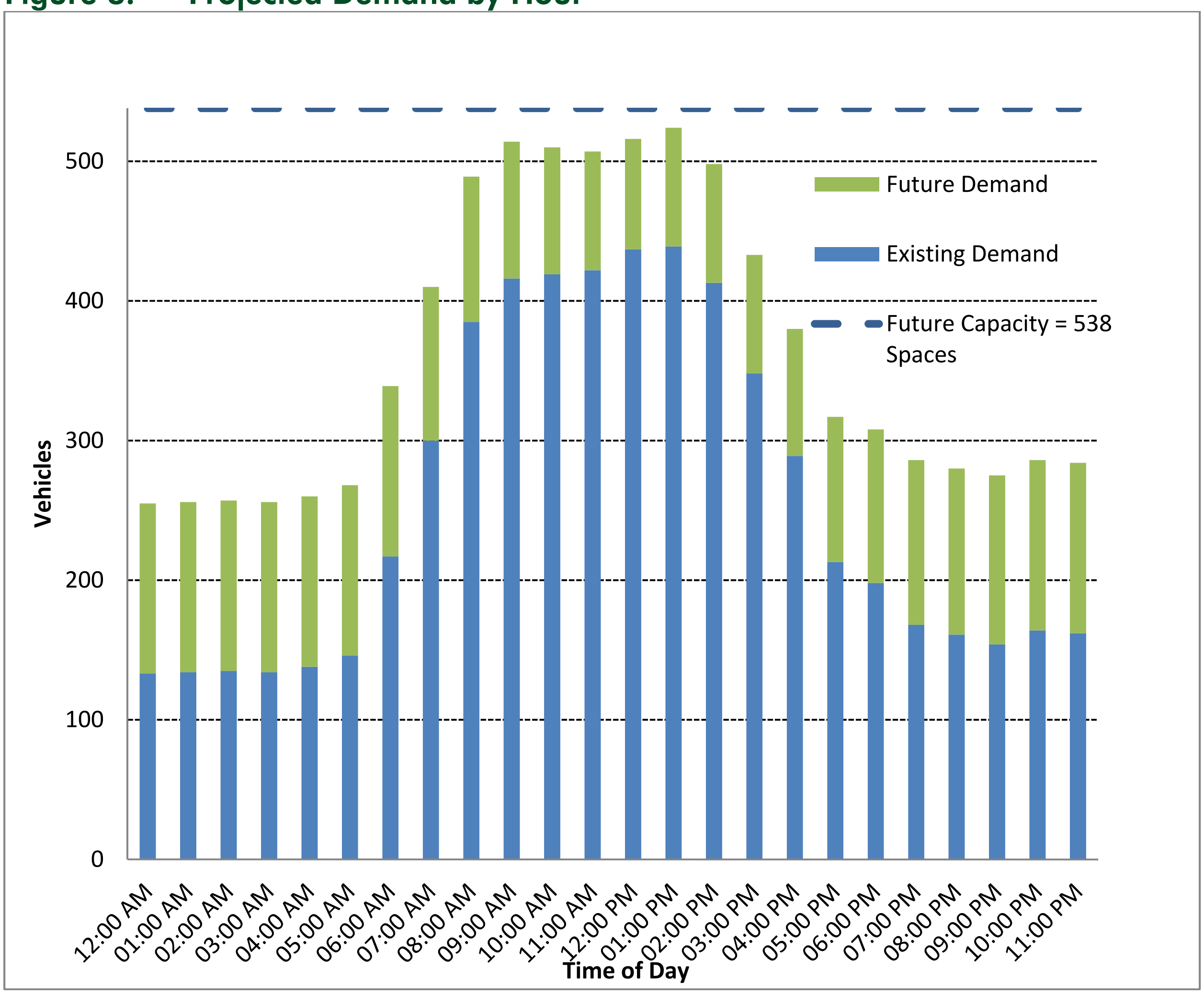
Future Parking Supply and Demand

The proposed project will result in a net increase of 247 residential units, including 236 market rate units (62 studio, 111 one-bedroom, and 63 two-bedroom) within the proposed new tower on Northampton Street and the creation of 11 new handicapped-accessible units (8 studio and 3 one-bedroom) within the existing 35 Northampton Street tower. Parking for the new units will be accommodated within the existing garage, which is currently only approximately 81% occupied (or approximately 100 unused spaces) during the weekday mid-day period and only about 31% occupied (approximately 370 unused spaces) overnight (see **Figure 2**). In order to create additional handicap accessible parking spaces within the garage, and to provide an elevator linking all three levels of the garage with the new entry lobby shared by 860 Harrison and 35 Northampton Street, parking spaces within the garage will be reconfigured, reducing the total supply to 538 spaces.

Current residents of McCormack Towers (35 Northampton Street and 860 Harrison Avenue), which are fully occupied, however, account for only 103 monthly cards for 346 units, corresponding to a ratio of approximately 0.30 monthly cards per residential unit (103 cards/(234+112 units) = 0.30). This ratio is affected by the unit mix; 300 existing units (87%) are efficiency apartments. The unit mix for the new units is more heavily weighted to 1-bedroom (114 units or 46%) and 2-bedroom (63 units or 26%) units than the existing mix, thereby suggesting a slightly higher parking ratio. According to parking survey data collected by HSH throughout the City, parking demand at similar market rate units is approximately 0.50 spaces per unit, which is consistent with the Boston Transportation Department (BTD) residential guidelines for this area of the City (Boston Medical Center) of a maximum of 0.5 to 1.0 spaces per unit. Thus, it is anticipated that the new units would yield a parking demand ranging between 75 spaces (assuming current demand ratio of 0.30 spaces per unit) and 122 spaces (assuming current market demand of 0.50 spaces per unit for the 236 market rate units and 0.30 spaces per unit for the 11 new accessible units at the existing 35 Northampton Street Tower).

According to the Urban Land Institute's publication *Shared Parking, Second Edition*, residential parking demand is typically highest overnight, roughly between 6 p.m. and 7 a.m. (when the garage is the least occupied) and is the lowest during the day (when the garage reaches its peak occupancy). Using time of day demand factors for residential uses, HSH calculated the weekday parking demand by hour for the new residential units assuming 0.5 spaces per unit. The resulting weekday parking demand by hour is illustrated in Figure 8.

Figure 8. Projected Demand by Hour



As shown in Figure 8, parking demand for the 247 new residential units can be effectively accommodated within the existing garage without any impact to current monthly lease agreements or transient activity. It is expected that parking demand associated with the new residential units could yield as much as about $146,000 in new annual revenue for the garage assuming current monthly rates for McCormack Tower residents (i.e., [236 units x 0.5 spaces/market rate unit x $100 per month + 11 units x 0.3 spaces/unit x $100 per month] x 12 months =$145,560 per year).

Conclusion

The existing 539-space Northampton Garage is currently underutilized throughout the week, with an average occupancy of only approximately 80% during the weekday peak periods and is typically less than 30% occupied during the weekday evening and throughout the day on Saturday and Sunday. Consequently, the parking demand for proposed 247 new residential units can be effectively accommodated within the existing garage without any impact to current monthly lease agreements or transient activity.

It is expected that parking demand associated with the new residential units could yield up to as much as nearly $146,000 in new annual revenue for the garage assuming current monthly rates for the McCormack Tower residents.

Northampton Tower

Detailed Trip Generation Estimation

Howard/Stein-Hudson Associates
August 14, 2013

Land Use Code (LUC)	Size	Category	Directional Split	Trip Rates (Trips/ksf or unit)	Unadjusted Vehicle Trips	Capture Rate	Less capture trips	Assumed national vehicle occupancy rate[1]	**Converted to Person trips**	Transit Share[2]	**Transit Trips**	Walk/Bike/ Other Share[2]	**Walk/ Bike/ Other Trips**	Vehicle Share[2]	**Vehicle Person Trips**	Assumed local vehicle occupancy rate[3]	**Total Adjusted Vehicle Trips**
Daily																	
Residential - Apartments[4]	218	Total		6.65	1450		1450	1.2	**1,740**		**296**		**452**		**992**	1.2	**828**
	Units	In	0.5	3.33	725		725	1.2	**870**	17%	**148**	26%	**226**	57%	**496**	1.2	**414**
		Out	0.5	3.33	725		725	1.2	**870**	17%	**148**	26%	**226**	57%	**496**	1.2	**414**
AM Peak Hour																	
Residential - Apartments[4]	218	Total		0.51	111		111	1.2	**134**		**36**		**36**		**61**	1.2	**51**
	Units	In	0.2	0.10	22		22	1.2	**27**	19%	**5**	27%	**7**	54%	**14**	1.2	**12**
		Out	0.8	0.41	89		89	1.2	**107**	29%	**31**	27%	**29**	44%	**47**	1.2	**39**
PM Peak Hour																	
Residential - Apartments[4]	218	Total		0.62	135		135	1.2	**162**		**42**		**44**		**77**	1.2	**65**
	Units	In	0.65	0.40	88		88	1.2	**105**	29%	**31**	27%	**28**	44%	**46**	1.2	**39**
		Out	0.35	0.22	47		47	1.2	**57**	19%	**11**	27%	**15**	54%	**31**	1.2	**26**

Notes:

1. 2001 National vehicle occupancy rates - 1.2: Home to work; 1.6
2. Mode shares based on BTD Data for Area 15.
3. Local vehicle occupancy rates based on 2000 Census data and 2001 National VOR.
4. ITE Trip Generation Equation, 9th Edition, LUC 220 (Apartment) - Average rates

Northampton Tower - Alternative 2

Detailed Trip Generation Estimation

Howard/Stein-Hudson Associates

September 17, 2013

Land Use Code (LUC)	Size	Category	Directional Split	Trip Rates (Trips/ksf or unit)	Unadjusted Vehicle Trips	Capture Rate	Less capture trips	Assumed national vehicle occupancy rate[1]	**Converted to Person trips**	Transit Share[2]	**Transit Trips**	Walk/Bike/ Other Share[2]	**Walk/ Bike/ Other Trips**	Vehicle Share[2]	**Vehicle Person Trips**	Assumed local vehicle occupancy rate[3]	**Total Adjusted Vehicle Trips**
Daily																	
Residential - Apartments[4]	190	Total		6.65	1264		1264	1.2	**1,516**		**258**		**394**		**864**	1.2	**722**
	Units	In	0.5	3.33	632		632	1.2	**758**	17%	**129**	26%	**197**	57%	**432**	1.2	**361**
		Out	0.5	3.33	632		632	1.2	**758**	17%	**129**	26%	**197**	57%	**432**	1.2	**361**
Office - General Office Building[5]	40	Total		11.03	441		441	1.2	**529**		**127**		**95**		307	1.2	**256**
	KSF	In	0.5	5.52	221		221	1.2	**265**	24%	**64**	18%	**48**	58%	154	1.2	**128**
		Out	0.5	5.52	221		221	1.2	**265**	24%	**64**	18%	**48**	58%	154	1.2	**128**
Total		Total			1705				**2046**		**385**		**489**				**978**
		In			852				**1023**		**192**		**245**				**489**
		Out			852				**1023**		**192**		**245**				**489**
AM Peak Hour																	
Residential - Apartments[4]	190	Total		0.51	97		97	1.2	**117**		**32**		**32**		**53**	1.2	**44**
	Units	In	0.2	0.10	19		19	1.2	**23**	19%	**4**	27%	**6**	54%	**13**	1.2	**10**
		Out	0.8	0.41	78		78	1.2	**94**	29%	**27**	27%	**25**	44%	**41**	1.2	**34**
Office - General Office Building[5]	40	Total		1.56	62		62	1.2	**75**		**21**		**13**		40	1.2	**34**
	KSF	In	0.88	1.37	55		55	1.2	**66**	27%	**18**	18%	**12**	55%	36	1.2	**30**
		Out	0.12	0.19	7		7	1.2	**9**	40%	**4**	17%	**2**	43%	4	1.2	**3**
Total		Total			159				**192**		**53**		**45**				**78**
		In			74				**89**		**22**		**18**				**40**
		Out			85				**103**		**30**		**27**				**38**
PM Peak Hour																	
Residential - Apartments[4]	190	Total		0.62	118		118	1.2	**141**		**37**		**38**		**67**	1.2	**56**
	Units	In	0.65	0.40	77		77	1.2	**92**	29%	**27**	27%	**25**	44%	**40**	1.2	**34**
		Out	0.35	0.22	41		41	1.2	**49**	19%	**9**	27%	**13**	54%	**27**	1.2	**22**
Office - General Office Building[5]	40	Total		1.49	60		60	1.2	**72**		**20**		**12**		38	1.2	**32**
	KSF	In	0.17	0.25	10		10	1.2	**12**	40%	**5**	17%	**2**	43%	5	1.2	**4**
		Out	0.83	1.24	49		49	1.2	**59**	27%	16	18%	**11**	55%	33	1.2	**27**
Total		Total			177				**213**		57		**57**				**88**
		In			87				**104**		32		**27**				**39**
		Out			91				**109**		26		**25**				**49**

Notes:

1. 2001 National vehicle occupancy rates - 1.2: Home to work; 1.6
2. Mode shares based on BTD Data for Area 15.
3. Local vehicle occupancy rates based on 2000 Census data and 2001 National VOR.
4. ITE Trip Generation Equation, 9th Edition, LUC 220 (Apartment) - Average rates

Appendix 2

WIND STUDY

University of Guelph Research Park
150 Research Lane, Suite 105
Guelph, ON, N1G 4T2
226.706.8080 | www.novusenv.com

Date: September 24, 2013

To: Richard Jabba, Senior Planner
Fort Point Associates, Inc.

Re: **Pedestrian Wind Study**
Northampton Square
Northampton Street Tower
Boston, MA
Novus Project # 13-0122

Novus Team:

Air Quality Scientist	Jenny Vesely, B.Eng., EIT
Senior Specialist:	Bill F. Waechter, C.E.T.
Partner, Specialist	R.L. Scott Penton, P.Eng.

1.0 INTRODUCTION

Novus Environmental Inc. (Novus) was retained by Fort Point Associates, Inc. to conduct a quantitative Pedestrian Wind Study for the proposed Northampton Square development located at 35 Northampton Street in Boston, MA. The assessment is in support of the Planned Development Area (PDA) review for the Boston Redevelopment Authority (BRA).

1.1 Nature of the Existing Subject Lands

The subject property is located at the corner of Northampton Street and Albany Street, south of the existing Community Health and Education Center. The site is currently a landscaped lawn and a portion of the existing Miranda Creamer building on Albany Street. The new building will be located directly adjacent to and above the existing buildings of Northampton Square. An aerial view to locate the project site is provided in **Figure 1**.

1.2 Proposed Development

The proposed development is a 24-storey residential tower, including underground parking and a fitness center. Development highlights include:

- Outdoor amenity space at grade-level;
- Landscape terrace at level 3, on the existing parking garage rooftop; and,
- Three main entryways.

The site plan, which also illustrates the landscape terrace above the existing parking garage, is shown in **Figure 2**.

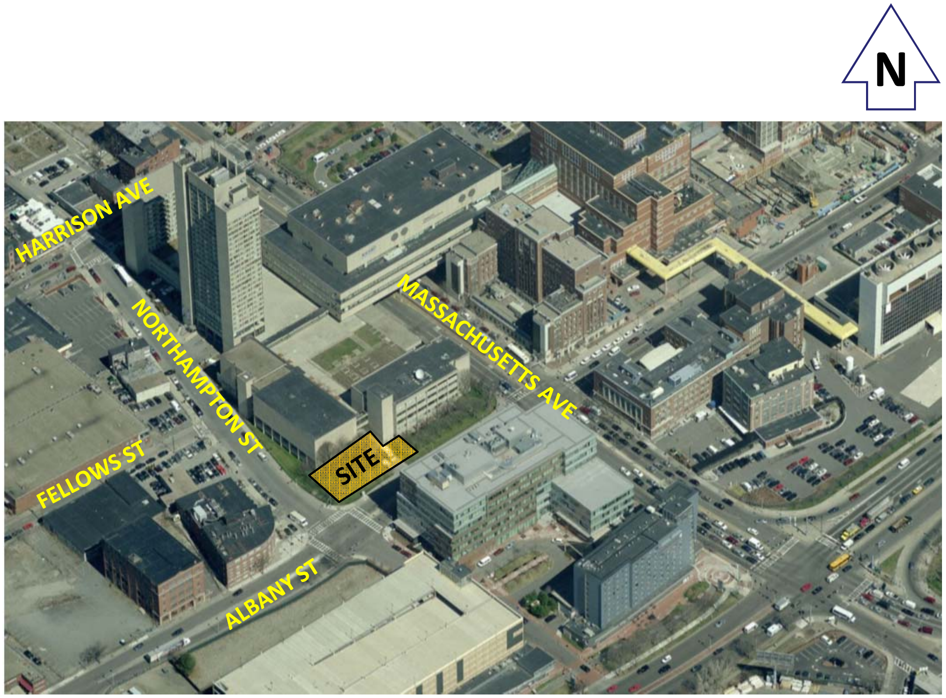


Figure 1: Context Plan Showing Development Site
Aerial Image from Bing Maps

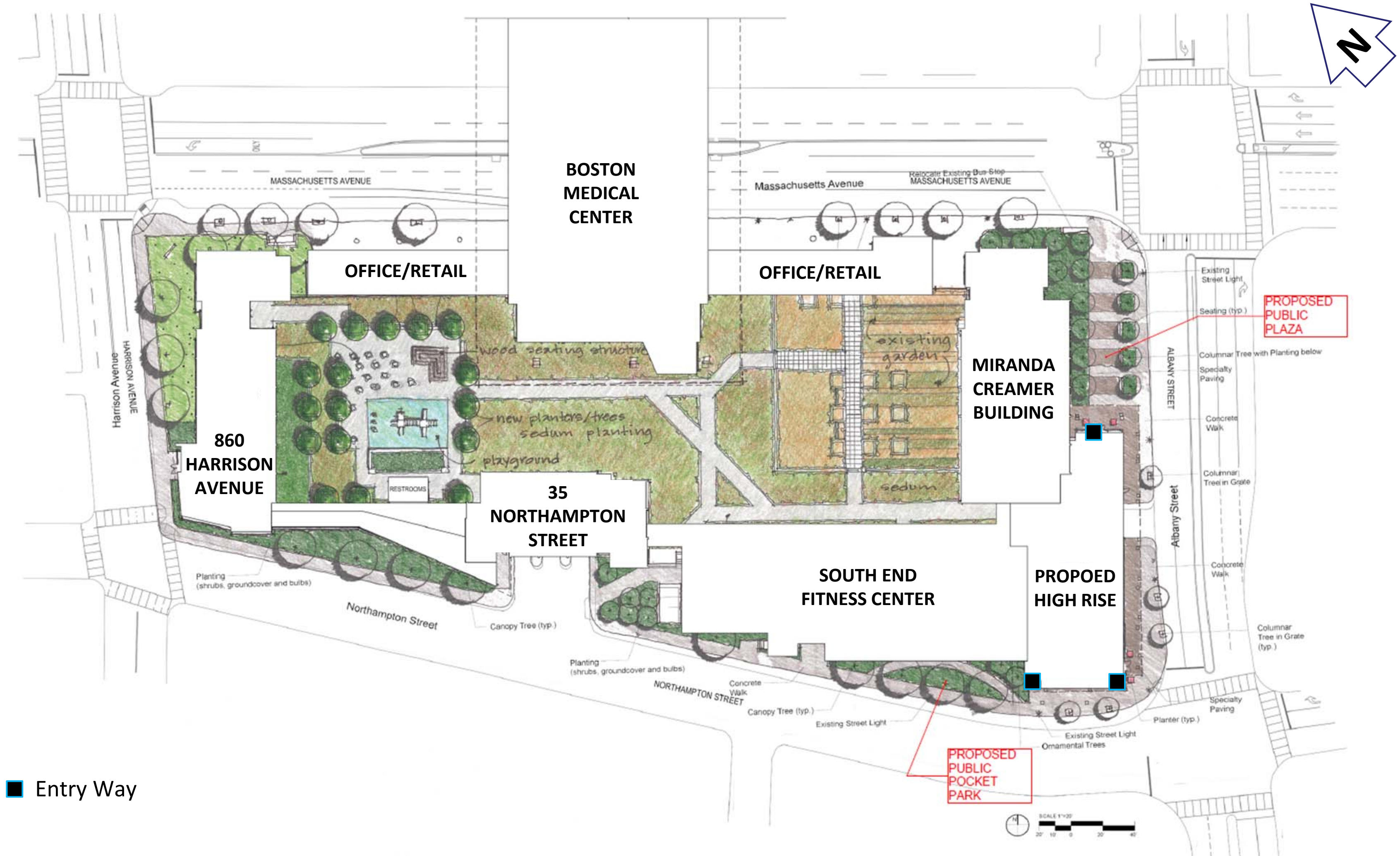


Figure 2: Site Plan of the Proposed Development
(From July 31, 2013 Schematic Site Plan)

1.3 Nature of the Surroundings

The subject property is located at the corner of Northampton Street and Albany Street, at the landscaped lawn south of the existing Community Health and Education Center. An aerial view of the development site and surroundings is shown in **Figure 3**, and includes a circular overlay showing the limits of the wind tunnel model area.

The proposed tower is surrounded by medical and other institutional, as well as commercial sites. There are some existing taller towers in the area, including the tower at 35 Northampton Street.

There are a number of newly approved and proposed developments that were also included in the model, as per the guidance of the BRA. The following developments were included, and are located in **Figure 3**:

1) Madison Tropical Parcel 10.
2) Melnea Hotel and Residences.
3) BUMC New Ambulatory Care Centre.
4) BUMC IMP and Energy Facility.
5) BioSquare 1 – NPC – Master Plan Amendment.
6) 10 George St.
7) Albany Fellows.

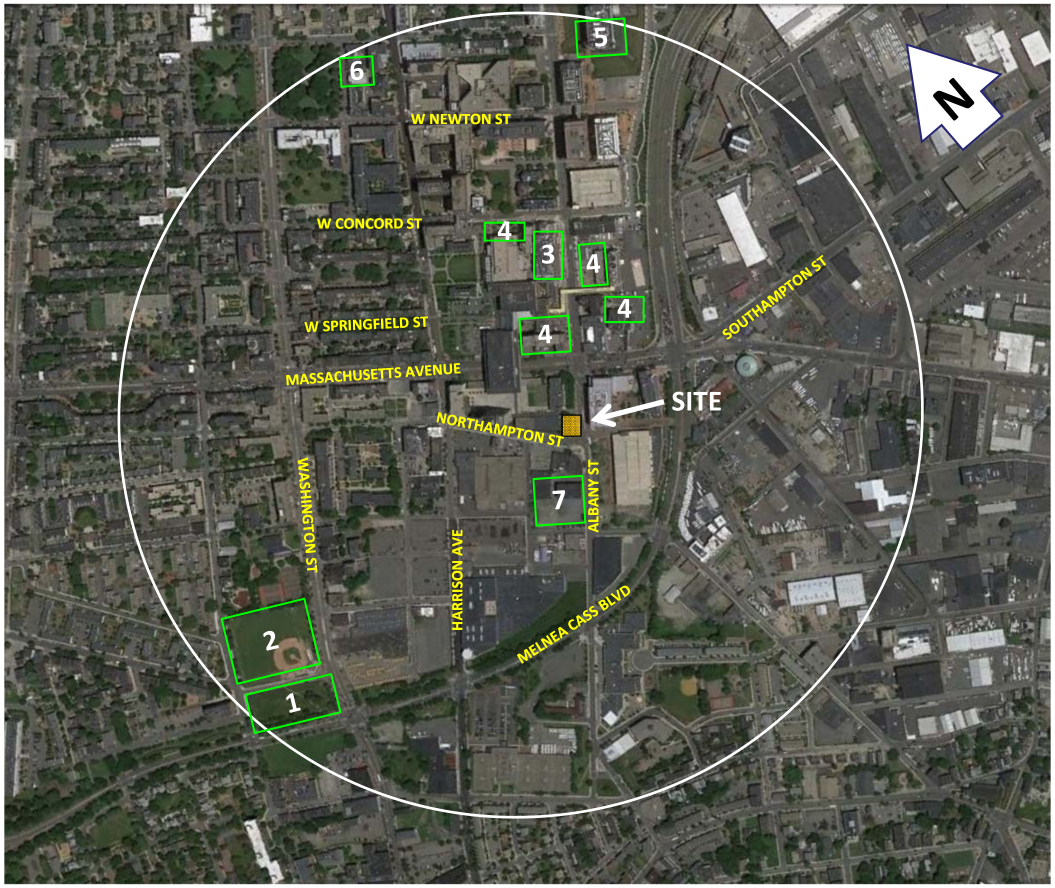


Figure 3: Development Site Area
Aerial Image from Bing Maps

1.4 Areas of Interest for Pedestrian Wind Comfort

In addition to public sidewalks, locations of interest for the assessment of pedestrian wind comfort are shown in **Figure 4** and include:

1. Main entrances.
2. Outdoor Amenity Space.
3. Public transit stops along Massachusetts Avenue and Albany Street.
4. Parks.

The entrances to the proposed development are located on the northeast side of the building, and at the southwest and southeast corners of the building, as shown in **Figures 2 and 5**. Bus stops are located on both sides of Massachusetts Avenue near Harrison Avenue and Albany Street as well as on Albany Street at Northampton Street, and north of Massachusetts Avenue. Two outdoor amenity spaces at grade are associated with the development, northeast of the proposed building and along Northampton Street, west of the proposed building. A rooftop amenity terrace at Level-3, above the existing parking garage, is shown in **Figure 2 and 5**.

Figure 4: Development Site Area
Aerial Image from Google Earth

2.0 APPROACH

A 1:400 scale model of the Northampton site and surroundings was constructed based on:

- Drawing information received from the project team on August 2, 2013;
- Guidance and drawings received from the BRA for new surrounding developments; and,
- Referral to aerial images (Google Earth and Bing Maps).

Two scenarios were tested: No-Build (existing conditions) and Build (addition of the Northampton proposed development). Both scenarios included the newly approved and proposed developments, identified in **Section 1.3**. The modeling followed the requirements outlined in Appendix 5 (Protocol for Quantitative Pedestrian Level Wind Impact Analysis) of the 2006 BRA Development Review Guidelines.

The proximity model of the surrounding area was built in block form for a radius of approximately 2000 feet from the site center. The structures surrounding the site will influence wind characteristics and therefore existing buildings, those under construction and planned developments were included in the model. Grade differences in the study area were found to be minor, thus the site was modeled as flat. Existing and proposed landscaping on and around the development property were not modeled, in order to identify local wind conditions attributed to the built form alone. In general, good landscaping coverage will improve wind comfort levels predicted during seasons when foliage is present, and also in the winter should coniferous trees be present or proposed.

Photographs of the wind tunnel model showing the extent of the modelled area for the proposed site configurations are shown in **Figures 5** and **6**.

2.2 Wind Tunnel

Wind tunnel tests were conducted in the Alan G. Davenport Wind Engineering Group Boundary-Layer Wind Tunnel Laboratory at the University of Western Ontario, London, Ontario. The upstream test section of the wind tunnel included generic roughness blocks and turbulence-generating spires to modify the wind flow approaching the model. These features develop characteristics of the wind flow that are similar to the actual site. The test model was rotated on a turn-table to simulate different wind directions with the upstream terrain being changed as appropriate to reflect the various upwind conditions encountered around the site.

The test model was equipped with 99 omni-directional probes to record wind speed at the pedestrian-level (5 ft). The orientation of the model was adjusted in 10˚ intervals on the turn-table to permit measurement of wind speed at each probe location for 36 wind angles. The wind tunnel data were then combined with the wind climate model for this region to predict the occurrence of wind speeds in the pedestrian realm and to compare against wind criteria for comfort and safety. The wind tunnel testing was conducted in accordance with the guidelines outlined in Appendix 5 (Protocol for Quantitative Pedestrian Level Wind Impact Analysis) of the 2006 BRA Development Review Guidelines.

Figures 7 and **8** show the sensor probe locations tested and follow the sensor layout reviewed and approved by the BRA. The same probe locations were tested for the No-Build and Build scenarios.

Figure 5: Wind Tunnel Model – View from East

Figure 6: Wind Tunnel Model – View from Northeast

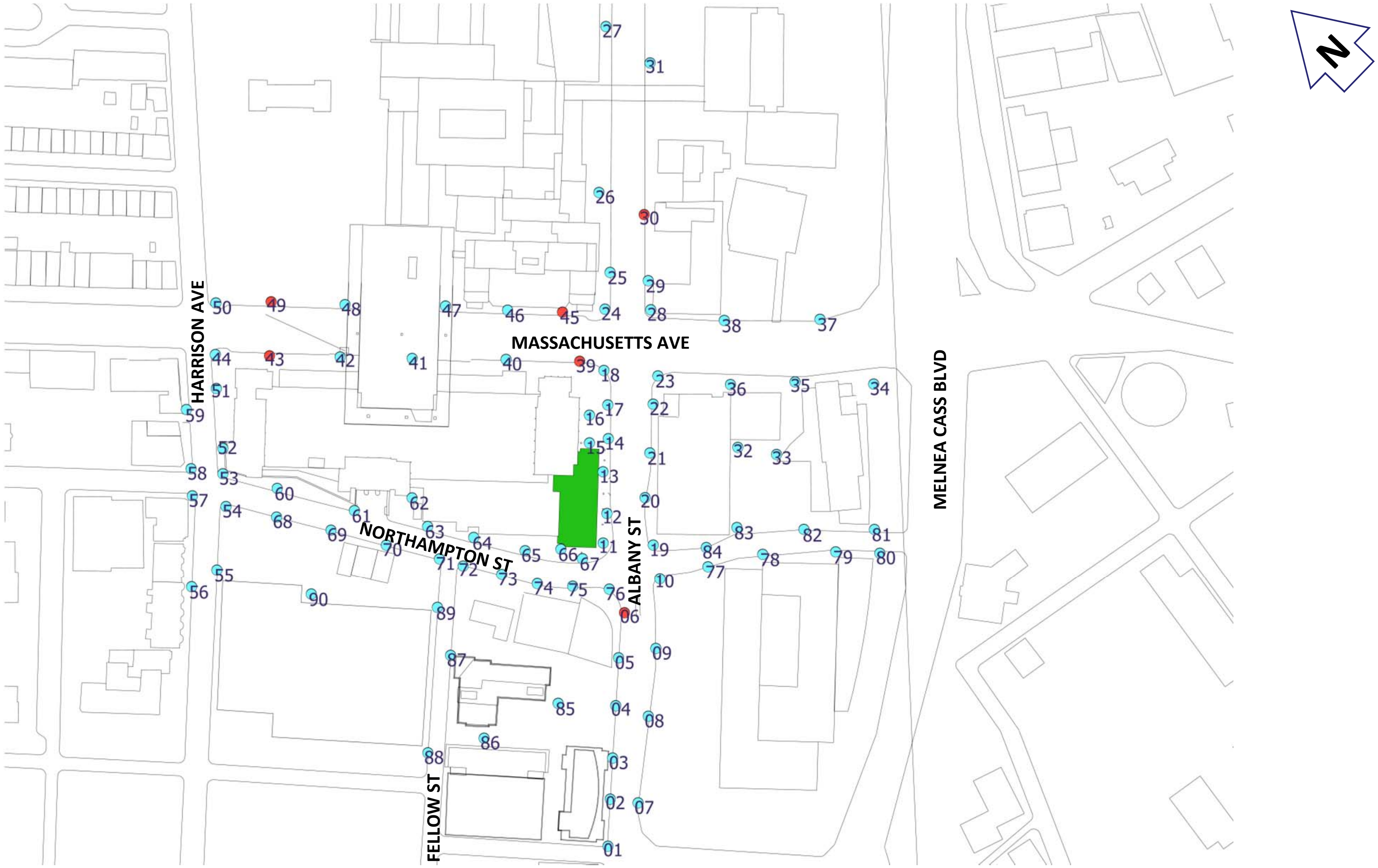


Figure 7: Wind Sensor Locations (90) at Ground-Level

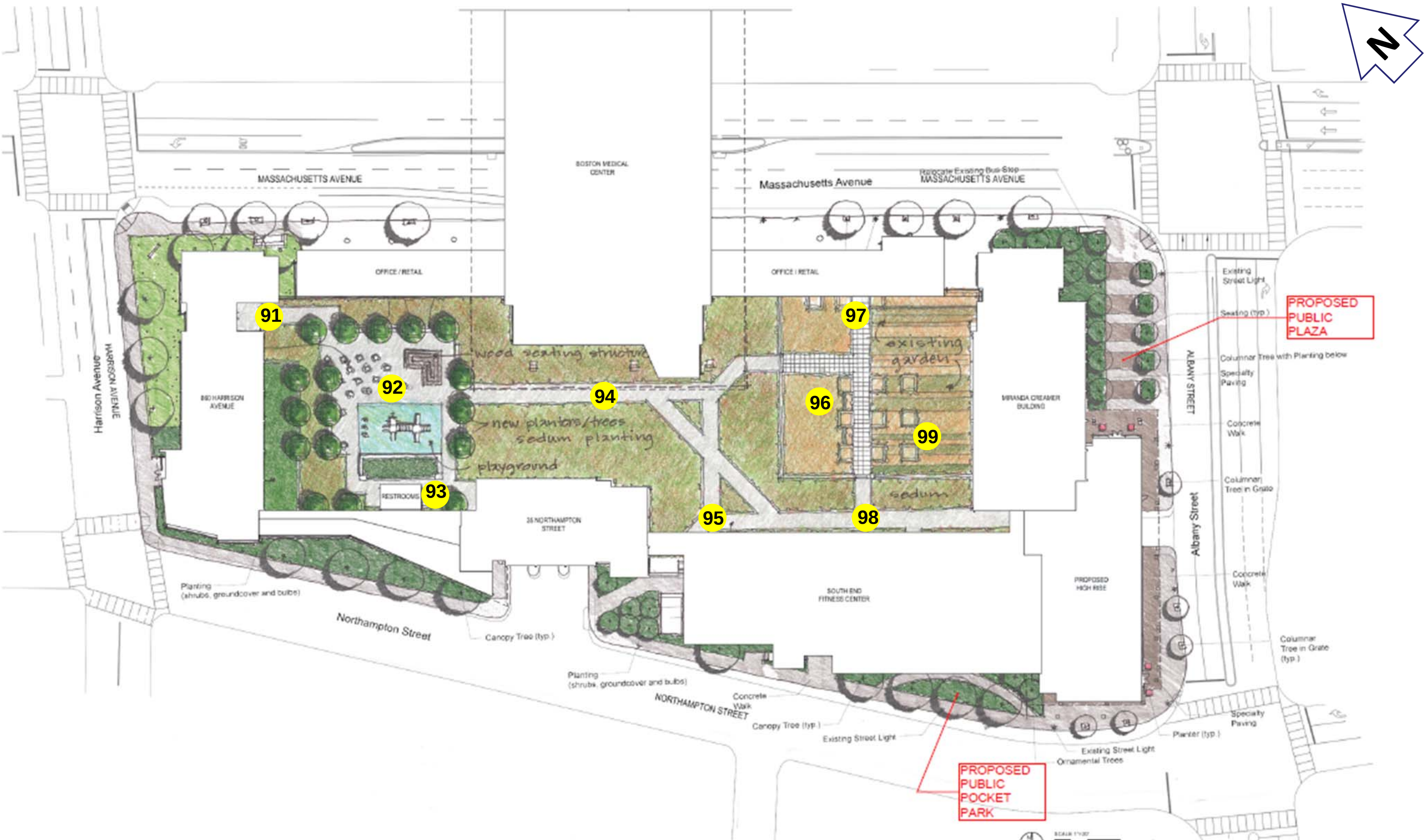


Figure 8: Wind Sensor Locations (9) on Level-3 Roof Terrace

3.0 PEDESTRIAN WIND CRITERIA

The wind comfort conditions are discussed in terms of being acceptable for certain pedestrian activities and are based on wind force. Pedestrian activity, wind chill, clothing, humidity and exposure to direct sun, for example, all affect pedestrian (thermal) comfort; however, these influences are not considered in the Melbourne (BRA) wind force criteria.

The criteria for wind comfort and safety used in this assessment are based on those adopted by the BRA for assessing pedestrian level winds. This criteria are based on the work of Melbourne. Information regarding the criteria is contained in the references.

The wind comfort criteria, which are based on predicted hourly mean wind speeds being exceeded 1% of the time, are summarized in the upper table on the right.

A second method adopted by the BRA for evaluating wind comfort is a guideline based on the effective gust wind speed. The effective gust velocity (defined as the mean hourly wind speed + 1.5 times the root mean square variation about the mean wind speed) of 31 mph should not be exceeded more than 1% of the time (approximately 18 hours per year). The BRA Effective Gust Guideline is shown in the lower table on the right.

Melbourne Criteria Wind Category	**Activity**	**Comfort Ranges for BRA Mean Wind Speed Criteria Exceeded 1% of the Time**	
1	Comfortable for Sitting	≤ 12 mph	≤ 5 m/s
2	Comfortable for Standing	12 and ≤ 15 mph	>5 and ≤ 7 m/s
3	Comfortable for Walking	15 and ≤ 19 mph	7 and ≤ 8.5 m/s
4	Uncomfortable for Walking	19 and ≤ 27 mph	8.5 and ≤ 12 m/s
5	Unacceptable - Dangerous	> 27 mph	> 12 m/s

Acceptability	**BRA Effective Gust Guideline Exceeded 1% of the Time *(Mean Wind Speed + 1.5 Times Root Mean Square)***	
Meets Guideline	≤ 31 mph	≤ 13.9 m/s

Notes: Mean wind speed criteria based on Melbourne criteria.

4.0 WIND CLIMATE

Wind data recorded at Boston Logan Airport for the 30 year period of 1981 – 2011 were obtained and analysed to create a wind climate model for the four seasons. Annual and seasonal wind distribution diagrams (“wind roses”) are shown in **Figures 9** and **10**. These diagrams illustrate the percentage of time wind blows from the 16 main compass directions. Of main interest are the longest peaks that identify the most frequently occurring wind directions. The annual wind rose in **Figure 9** indicates that wind approaching from the west-northwest, southwest and northwest directions are most prevalent. The four seasonal wind roses readily show how prevailing winds shift direction during the year.

The directions from which stronger winds (e.g., > 30 mph) approach are also of interest as they have a higher potential of creating problematic wind conditions, depending upon site exposure and building configurations. The wind roses in **Figure 9** also identify the directional frequency of these stronger winds, as indicated in the figure’s legend colour key. On an annual basis, strong winds occur most frequently from the west-northwest and northwest directions. All wind speeds and directions were included in the wind climate model.

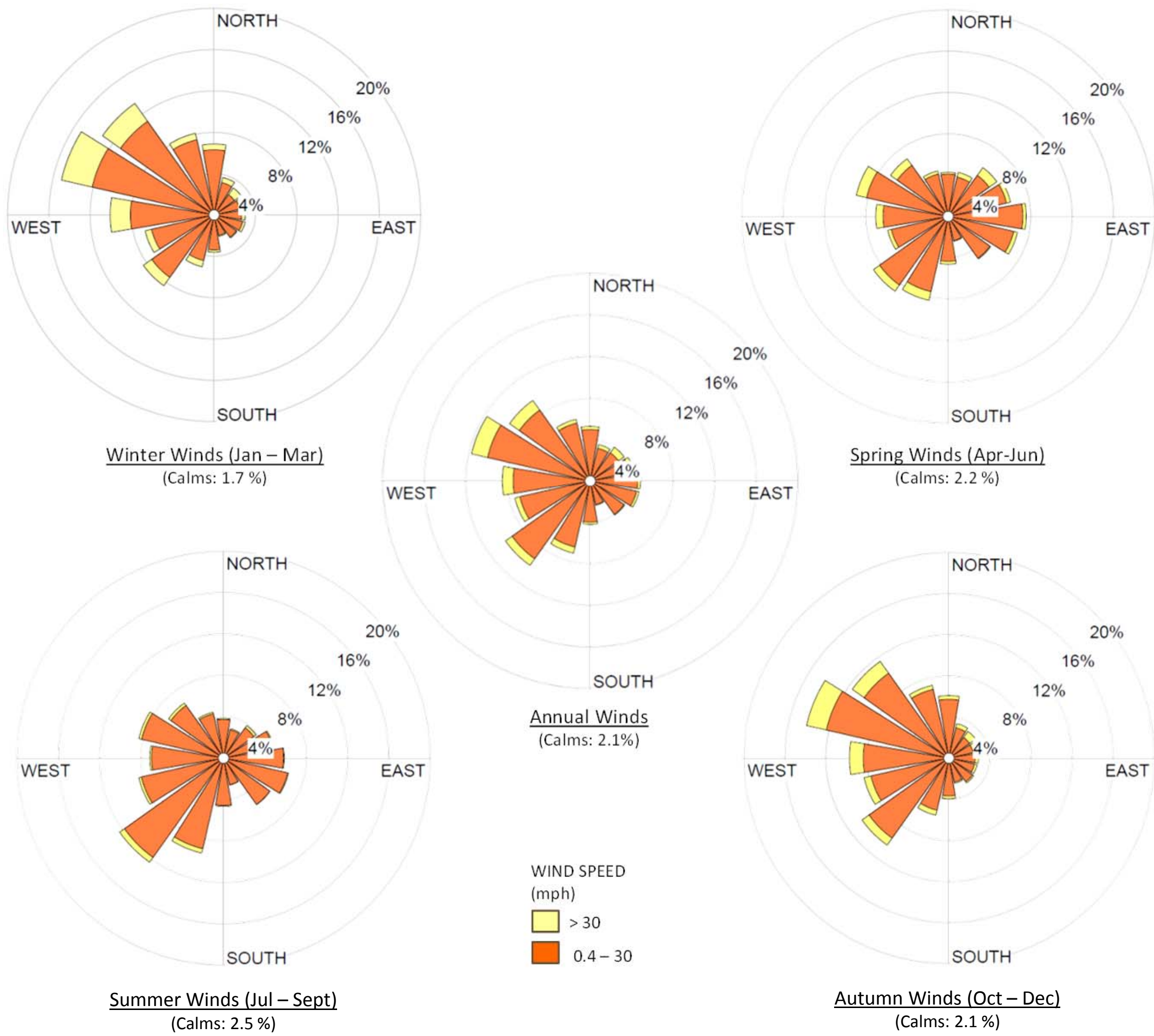


Figure 9: Wind Rose for Boston Logan Airport (1981 – 2011)

WIND CLIMATE (continued)

The same 30 year period of wind data recorded at Boston Logan Airport were also analysed to generate wind roses that illustrate directionality associated with the BRA 1% wind criteria.

The mean wind speed that occurs 1% of the time was determined for each season and on an annual basis, and the directional distribution plotted in the wind roses shown in **Figure 10**.

The annual wind rose indicates that for wind speeds above the 1% threshold of 17 mph, wind approaches most frequently from the west-northwest and northeast. In the springtime the 1% wind speed threshold is 16 mph and the dominant direction is northeast. In the summer the 1% threshold wind speed is 13 mph and southwest winds prevail. The autumn 1% wind speed threshold is 17 mph and the most frequently occurring direction is west-northwest. The winter season 1% threshold speed is highest and is 18 mph. During the winter the west-northwest and northeast winds occur most often.

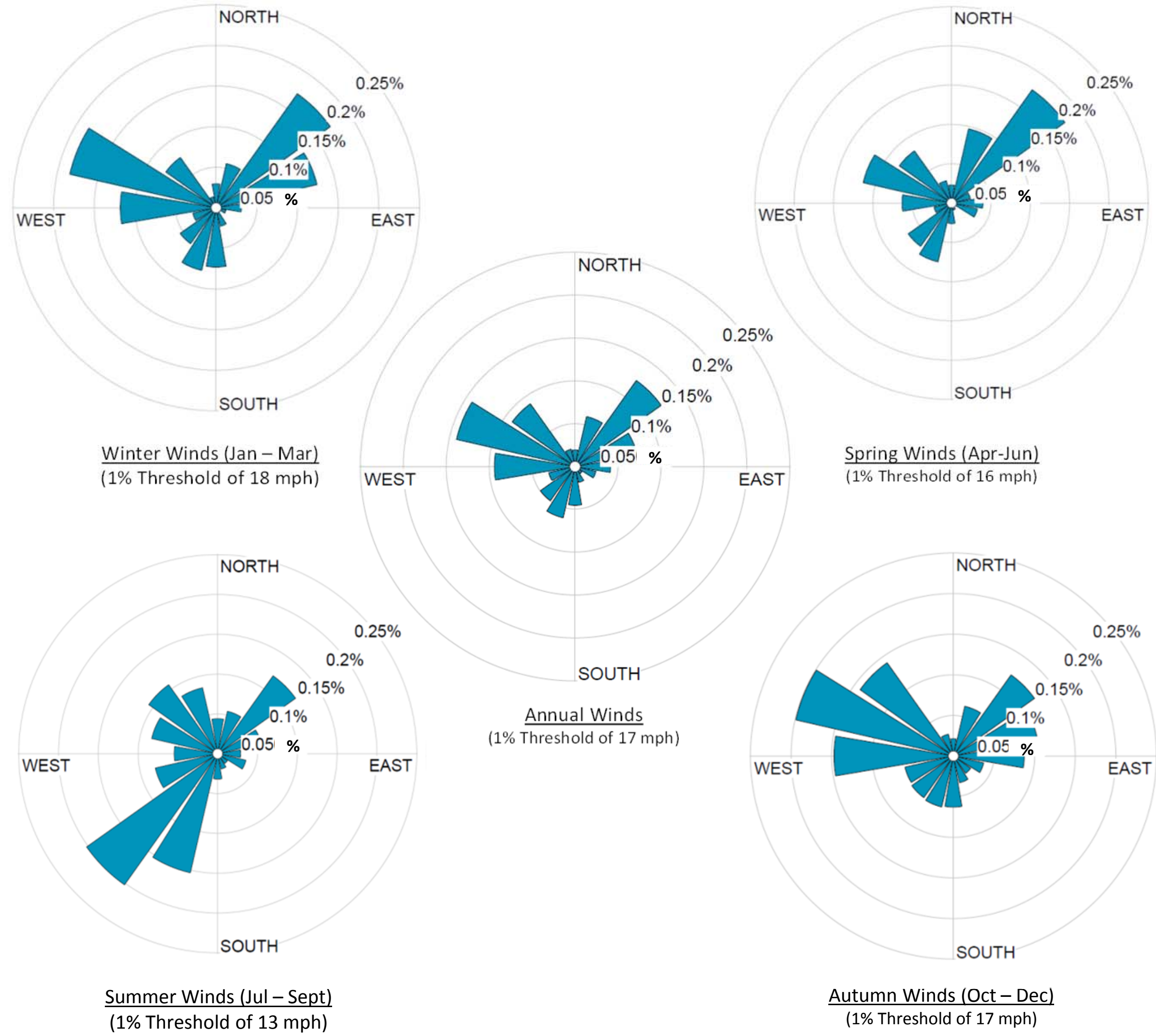


Figure 10: Wind Roses for Boston Logan Airport (1981 – 2011)
Winds Exceeded 1% of the Time

5.0 RESULTS

5.1 Presentation of Results

The analysis of wind comfort was undertaken for all four seasons in this study, as well as annually for both the No-Build and Build scenarios. The annual results are the focus of discussion within this report and are displayed on plans and in graph form, as per the examples below. Full detailed results for all four seasons and the annual conditions at each measured sensor location are tabulated and presented in **Appendix A**.

The vertical bars represent the predicted wind speed for the No-Build and Build schemes at each location. The dashed horizontal lines represent wind speed thresholds for the Melbourne wind comfort criteria (**Figure 11**) and the BRA Effective Gust Guideline (**Figure 12**). At the right side of each graph are white bars that represent ambient wind conditions for typical suburban and rural areas of this region. The example graph for wind comfort and effective gust shows that ambient wind conditions in rural areas already exceed the Melbourne Criterion 3 - Walking (**Figure 11**) and the BRA Effective Gust Guideline (**Figure 12**). Therefore, the addition of mid-rise and high-rise buildings may be inherently challenged in meeting the desired mean speed and effective gust thresholds.

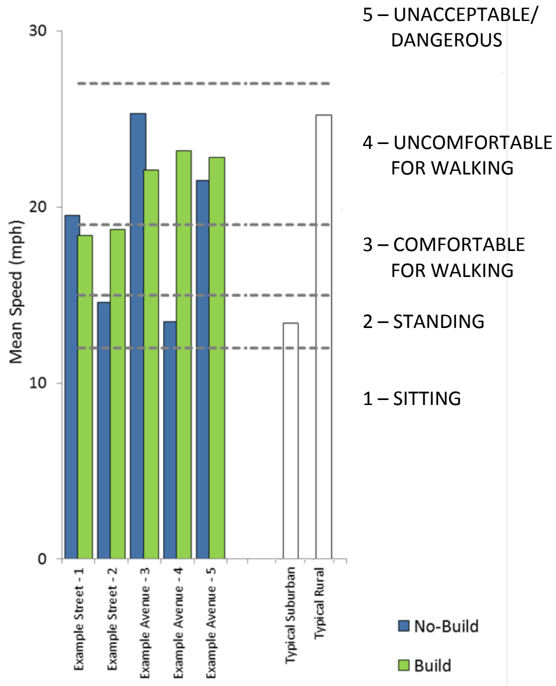


Figure 11: Example Results - Melbourne Wind Comfort Criteria (Annual 1% Mean Wind Speeds)

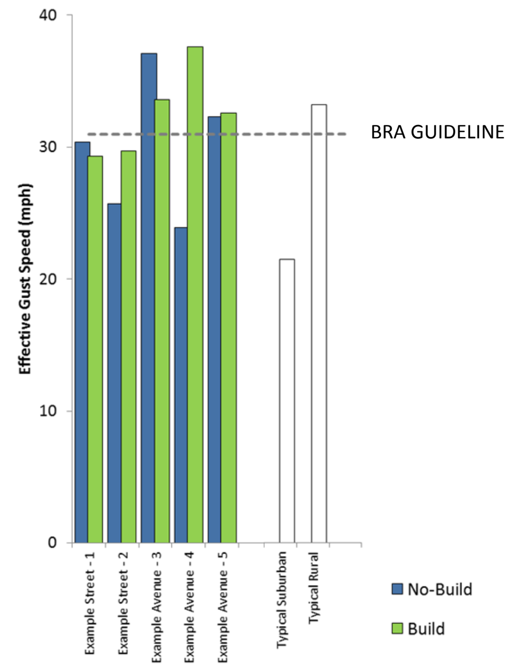


Figure 12: Example Results - BRA Effective Gust Guideline (Annual 1% Effective Gust Wind Speeds)

5.2 Discussion of Results

There are generally accepted wind comfort levels that are desired for various pedestrian uses. For example, for public sidewalks, wind comfort suitable for Melbourne Category 3 (walking) would be desirable year-round. For main entrances and transit stops, winds rated as Category 2 (standing) would be preferred throughout the year, but can be difficult to achieve in regions where winter winds are inherently harsh. For amenity spaces, wind conditions suitable for Category 1 or 2 (sitting or standing) are generally desirable during summer months. The more stringent criterion of Category 1 (sitting) is most appropriate in the summer for amenity spaces such as cafes and pocket parks.

5.2.1 Albany Street (Locations 1 – 31)

Albany Street runs along the southeast side of the proposed development. Two bus stops, a main entrance to the proposed building and a proposed outdoor amenity space are along this street (See **Figure 4**).

Figure 13 shows the predicted comfort conditions on Albany Street for the No-Build and Build configurations. **Figures 14** and **15** show the predicted mean and effective gust wind speeds, respectively, at each sensor location for the No-Build and Build configurations.

Main entrances to the proposed building are near Locations 11 and 15. At Location 11, Category 4 wind conditions improved to Category 3 for the Build scenario. At Location 15, Category 1 winds were predicted for both test scenarios, noting a reduction in wind speeds for the Build scenario. These comfort conditions are satisfactory.

At the proposed outdoor amenity space (Location 16), annual conditions were rated Category 3 in the Build configuration. The inclusion of canopy trees, such as those that exist, would improve conditions, especially during the warmer months.

Wind conditions on Albany Street south of Northampton Street were in most locations similar for the No-Build and Build scenarios. Wind Category 2 or 3 were typically predicted. Exceptions were at the intersection at Location 6 (bus stop) and Location 10. Winds at the Location 6 increased from Category 2 to 3 in the Build configuration, while annual winds at Location 10 were marginally in Category 4 and were Category 5 in the winter. The BRA Effective Gust Guideline was not met at Location 10. If improved wind comfort is desired for these locations, Marcescent species trees could be considered in the area.

Between Northampton Street and Massachusetts Avenue on Albany Street, conditions were mainly predicted to be Category 3 or 4. Wind speeds typically increased for the Build configuration in this area due to east, and west winds. Dense foliage trees (ideally Marcescent species) planted along the Albany street property edge may provide some improvement. On Albany Street, north of Massachusetts Avenue, Category 1 conditions were typically predicted, except at the corner of this intersection where Category 3 or 4 were predicted.

For the No-Build configuration, the BRA Effective Gust Guideline was met at all locations annually, except at Location 29 on Albany Street. The guideline was also exceeded at this location for the Build scenario.

For the Build scenario, the BRA Effective Gust Guideline was exceeded at the southeast corner of Northampton Street (Location 10), at Albany Street and Massachusetts Avenue (Locations 17, 18, 23 and 24) and across the street from the proposed development on Albany Street (Location 20). The west-northwest, north and east-southeast winds were, on average, most active at these locations. We anticipate that the existing deciduous trees north of the proposed tower will partially improve wind conditions at the four locations near the Albany and Massachusetts intersection, although coniferous or Marcescent species would be needed to provide wintertime improvement. The east side of Albany, near Location 20, is mainly a pedestrian thoroughfare and there are no doors in that area.

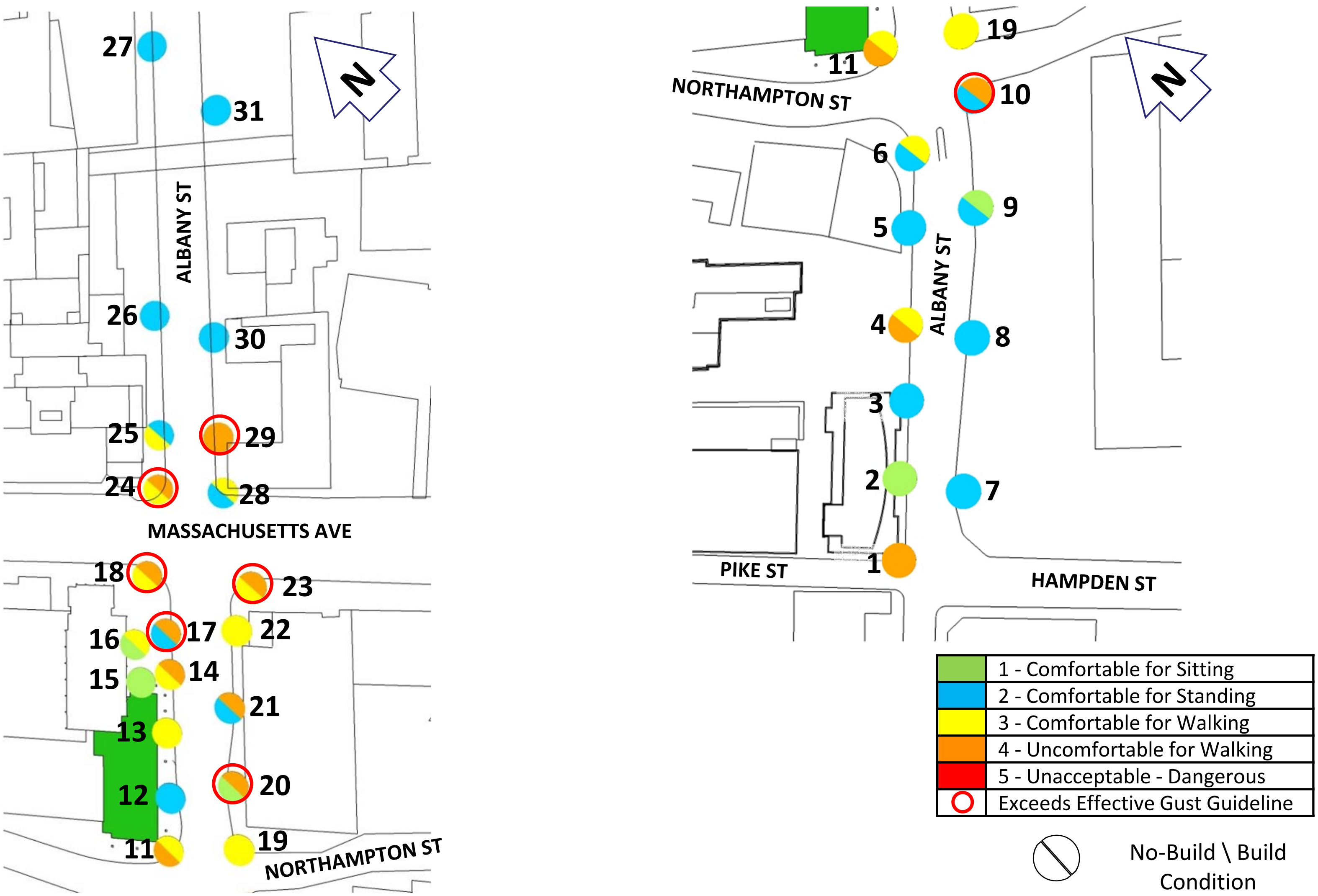


Figure 13: Predicted Results for Annual No-Build and Build Conditions on Albany Street

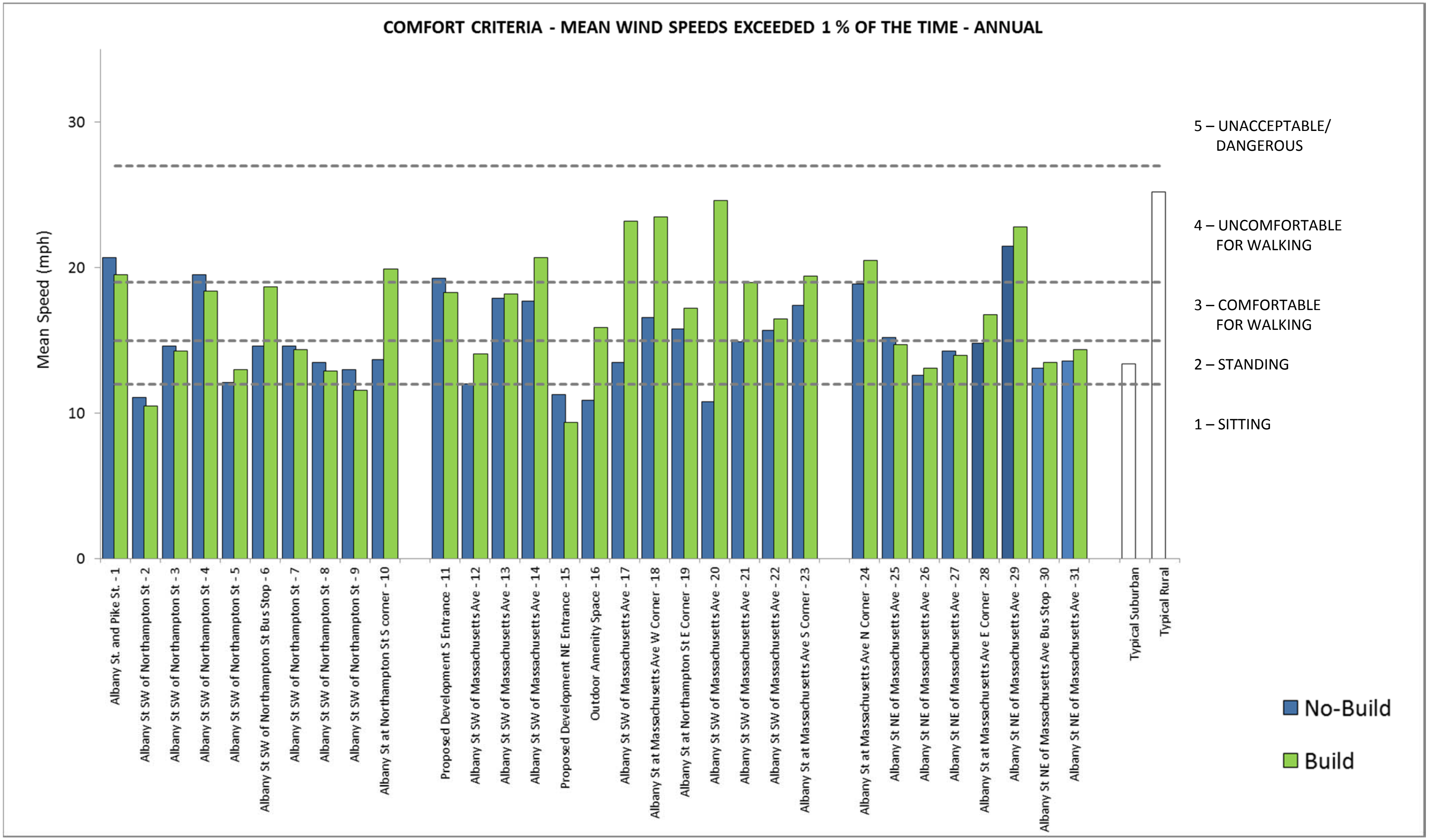


Figure 14: Wind Comfort Results for Albany Street - Annual

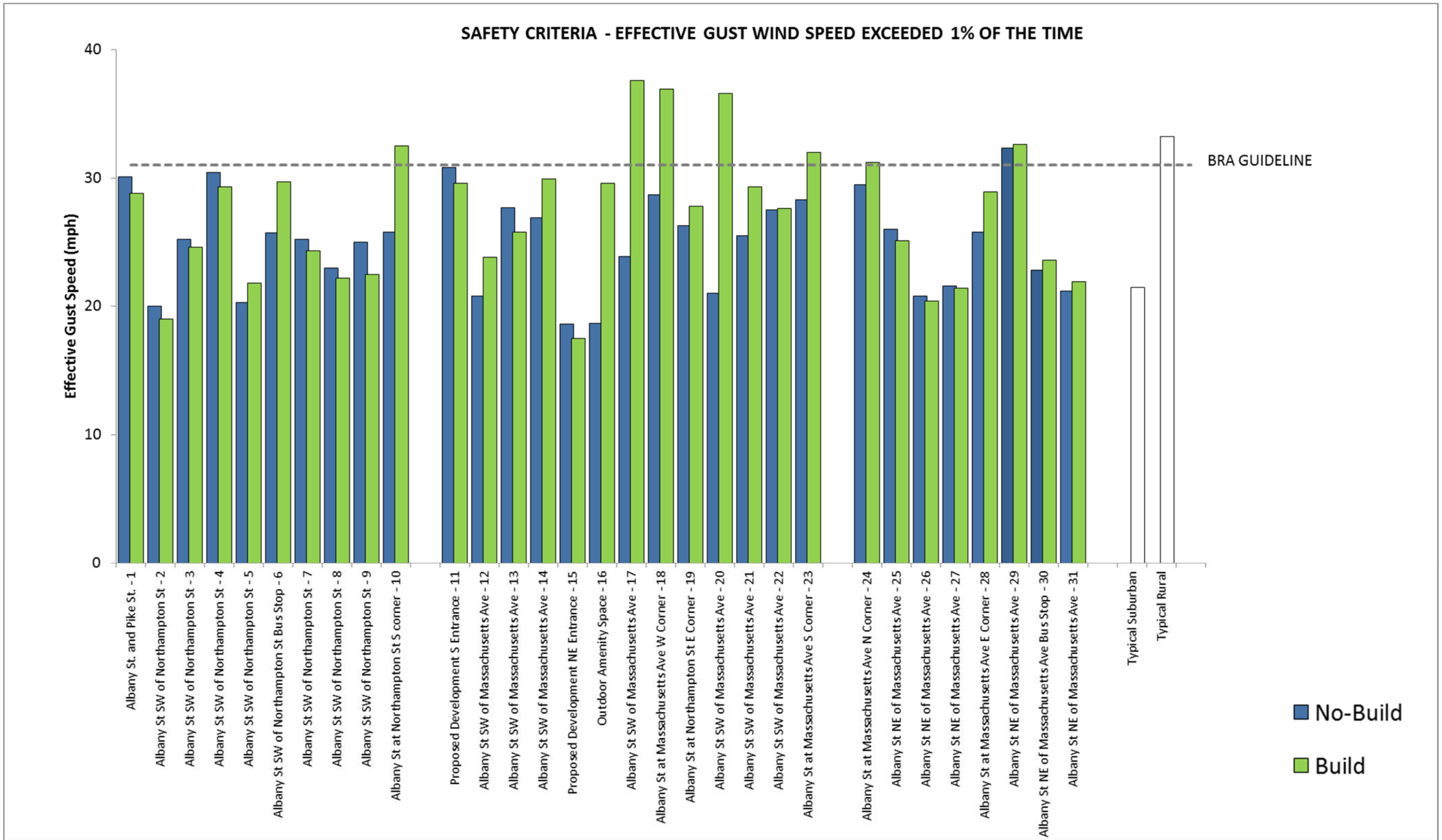


Figure 15: BRA Effective Gust Guideline Results for Albany Street - Annual

5.2.2 Northampton Street and Fellows Street (Locations 53, 54, 57, 58 and 60 - 90)

Northampton Street runs along the southwest side of the proposed development. One main entrance and an outdoor amenity space are proposed along this street. **Figure 16** shows the predicted conditions on Northampton Street and Fellows Street for the No-Build and Build scenarios. **Figures 17** and **18** show predicted mean and effective gust wind speeds, respectively, at each location for No-Build and Build conditions. The results for Locations 10, 11 and 19 were reviewed in Section 5.2.1, Albany Street.

Existing (No-Build) wind comfort on Northampton Street between Harrison Avenue and west of the proposed tower, was in most cases unchanged or improved under Build conditions. This was common to both sides of this section of Northampton Street. On average the annual wind conditions were Category 3 or 4. The BRA Guideline was exceeded at several locations in this same area (Locations 63, 65, 71, 72, 73 and 74) for the No-Build scenario. The Build configuration typically improved conditions such that effective gust wind speeds at these locations were predicted to be marginally above or below the BRA Guideline. Wind comfort at the proposed outdoor amenity space (Location 65) was improved to Category 3 under the Build scenario, but measures, such as landscaping, planters, etc., should be considered to improve wind comfort at this location.

Near the proposed tower on Northampton Street (Locations 66, 67, 75 and 76), existing (No-Build) winds were Category 4 at all but Location 76, which was Category 3. Under the Build configuration, wind activity increased to Category 5 at Locations 66 and 67 and to Category 4 at Locations 75 and 76). A main entrance is proposed near Location 66. Wind gusts typically from the southeast and west affect Location 66, whereas strong gusts from the east-southeast and east directions typically influenced Locations 67, 75 and 76.

The east winds would tend to flow down the Albany St façade of the proposed tower. Wind control measures with a horizontal component, such as canopies, trees, etc. are recommended along several bays of the Albany Street façade, nearer to Northampton Street. The use of Marcescent trees would be a more effective choice for on-site and off-site locations and also for harsh winter winds. The BRA Guideline was not met for three of these four locations under No-Build and at all four locations under the Build scenario.

On Northampton Street, between Albany Street and Melnea Cass Boulevard (Locations 77 – 84), wind comfort levels were on average Category 2 or 3 under both the No-Build and Build configurations. The BRA Effective Gust Guideline was met at all locations for both test scenarios.

Overall, the proposed development had a neutral to slightly positive influence on wind comfort conditions on and near Fellows Street (Locations 85 – 90). Under No-Build: Category 4 winds were predicted at Locations 85, 86 and 87; Category 5 at Location 88; and, Category 3 at Location 89. These conditions generally remained under the Build scenario, noting that pedestrians would not perceive the category change at Location 85. Wind speeds were more noticeably reduced at Location 88, but conditions remained in Category 5. The strongest gusts affecting Location 88 were typically from the south and east-southeast directions. Location 90 is near a retail business main entrance. Winds at this location were rated as Category 1 for both the No-Build and Build site conditions. Locations 86, 87 and 88 were above the BRA Guideline for both test configurations.

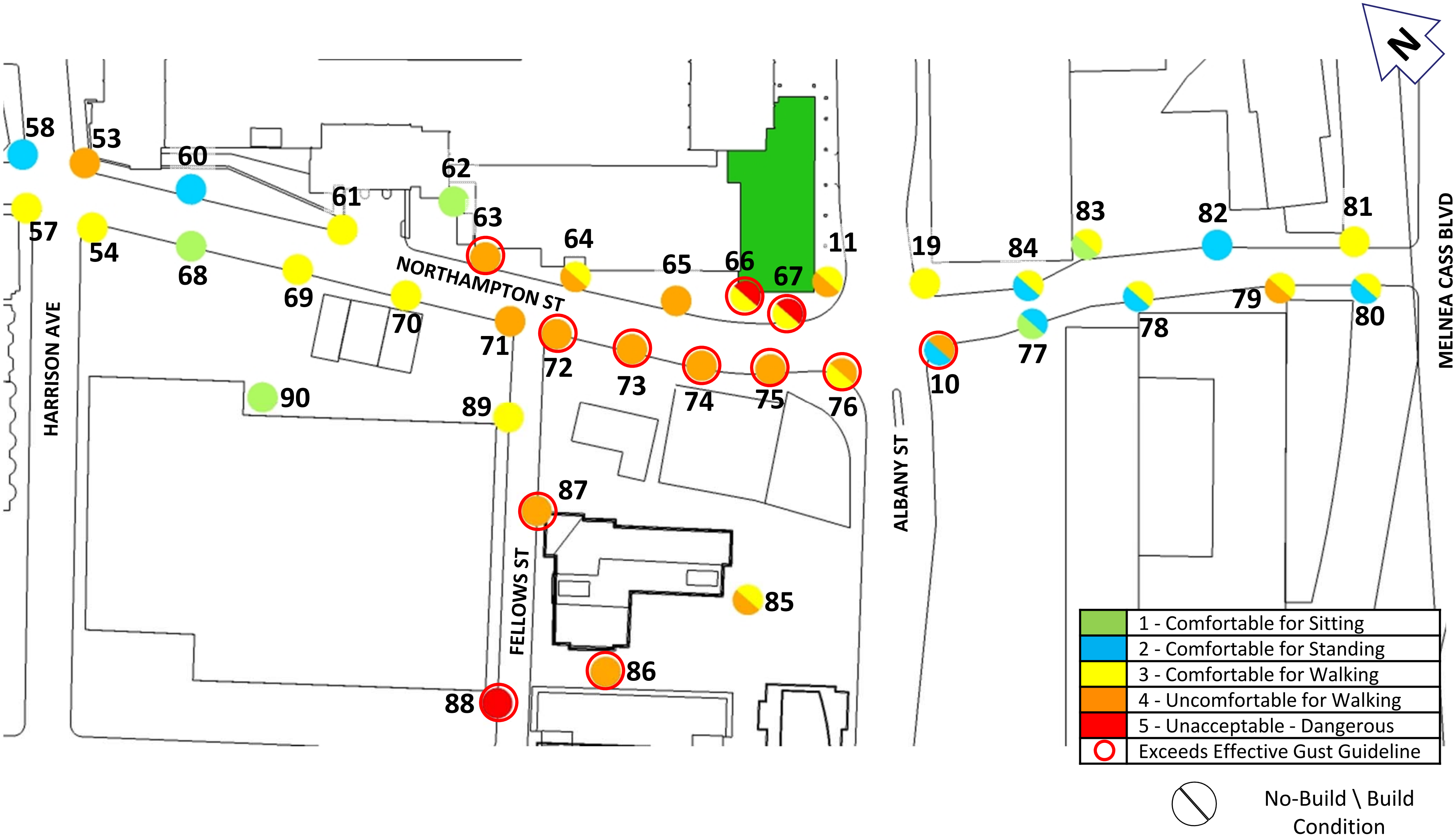


Figure 16: Predicted Results for Annual No-Build and Build Conditions on Northampton Street and Fellows Street

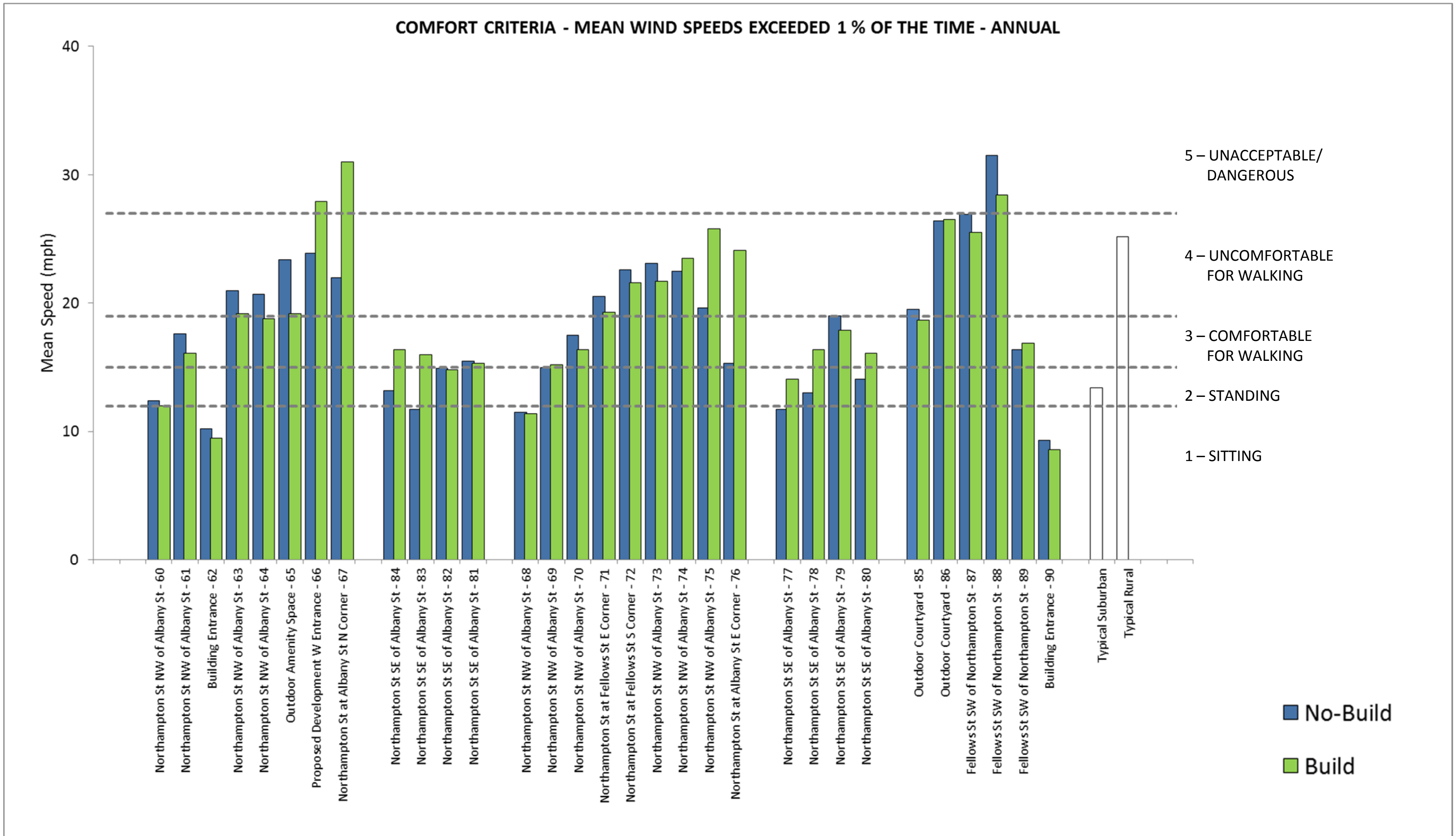


Figure 17: Wind Comfort Results for Northampton Street and Fellows Street – Annual

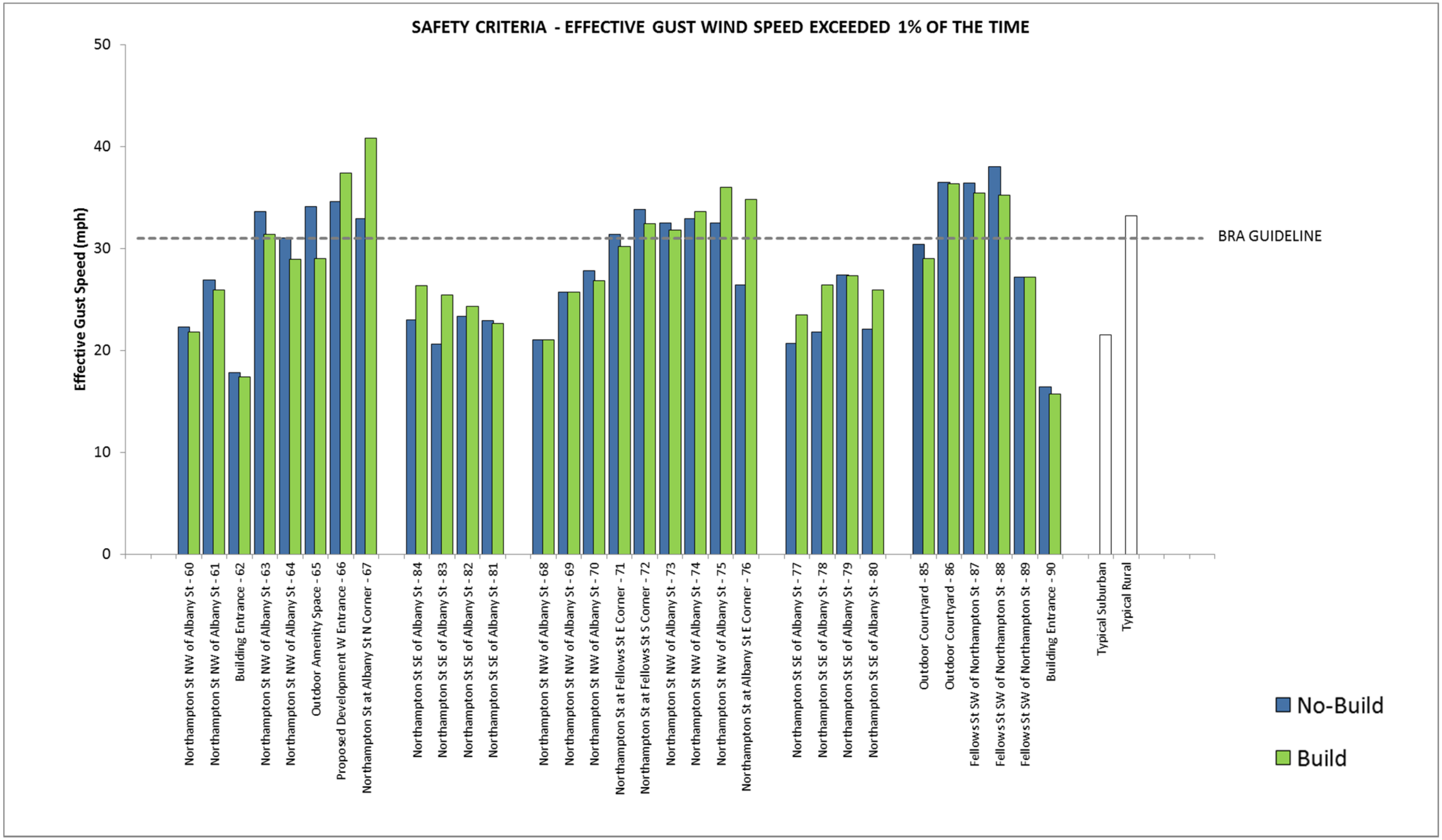


Figure 18: BRA Effective Gust Guideline Results for Northampton Street and Fellows Street - Annual

5.2.3 Massachusetts Avenue (Locations 32 – 50)

A summary of the predicted conditions on Massachusetts Avenue are shown in **Figure 19** for the No-Build and Build configurations. **Figures 20** and **21** present the predicted mean and effective gust wind speeds at each sensor location for the No-Build and Build configurations.

Wind conditions on or near Massachusetts Avenue, between Albany Street and Melnea Cass Boulevard (Locations 32 – 38) ranged from Category 1 through 3 for both the No-Build and Build configurations. Location 36 changed from Category 1 (No-Build) to the upper limit of Category 2 for the Build scenario. No-Build wind categories at other locations did not change under the Build site conditions. All locations in this area of Massachusetts Avenue met the BRA Guidelines for both test configurations.

No-Build winds on Massachusetts Avenue, between Albany Street and Harrison Avenue, (Locations 39 - 50), generally varied between Category 2 and 3, with two locations rated Category 1 (Locations 46 and 49) and two rated Category 4 (Locations 44 and 47). With the Build configuration, wind conditions at the bus stop near Location 39 increased from Category 3 to 4 and exceeded the BRA Guideline. A glazed transit shelter exists in this area and will provide bus patrons with the necessary shelter on windy days. In addition, canopy trees similar to those that exist on-site around Massachusetts Avenue and Albany Street will help reduce some of the wind activity associated with the east and southeast winds that influence the bus stop area. Moving along this same side of Massachusetts Avenue towards Harrison Ave (Locations 40 -44), wind conditions under Build conditions either remained similar to No-Build or were improved. Winds at the bus stop near Location 43 were improved under Build conditions from Category 3 to 1. Wind conditions at Location 44 were marginally above the BRA Effective Gust Guideline for the No-Build and Build scenarios.

On the opposite side of Massachusetts Avenue, from Location 45 to Location 50, the No-Build wind conditions were typically between Category 1 and 3, with the exception of Location 47 which was rated as Category 4. Increased wind activity under a Build scenario was noted at several locations, but overall Category 3 winds will generally prevail in the area. The transit stop at Location 49 remained as Category 1. The Build configuration reduced wind speeds at Location 47, but the area remained in Category 4.

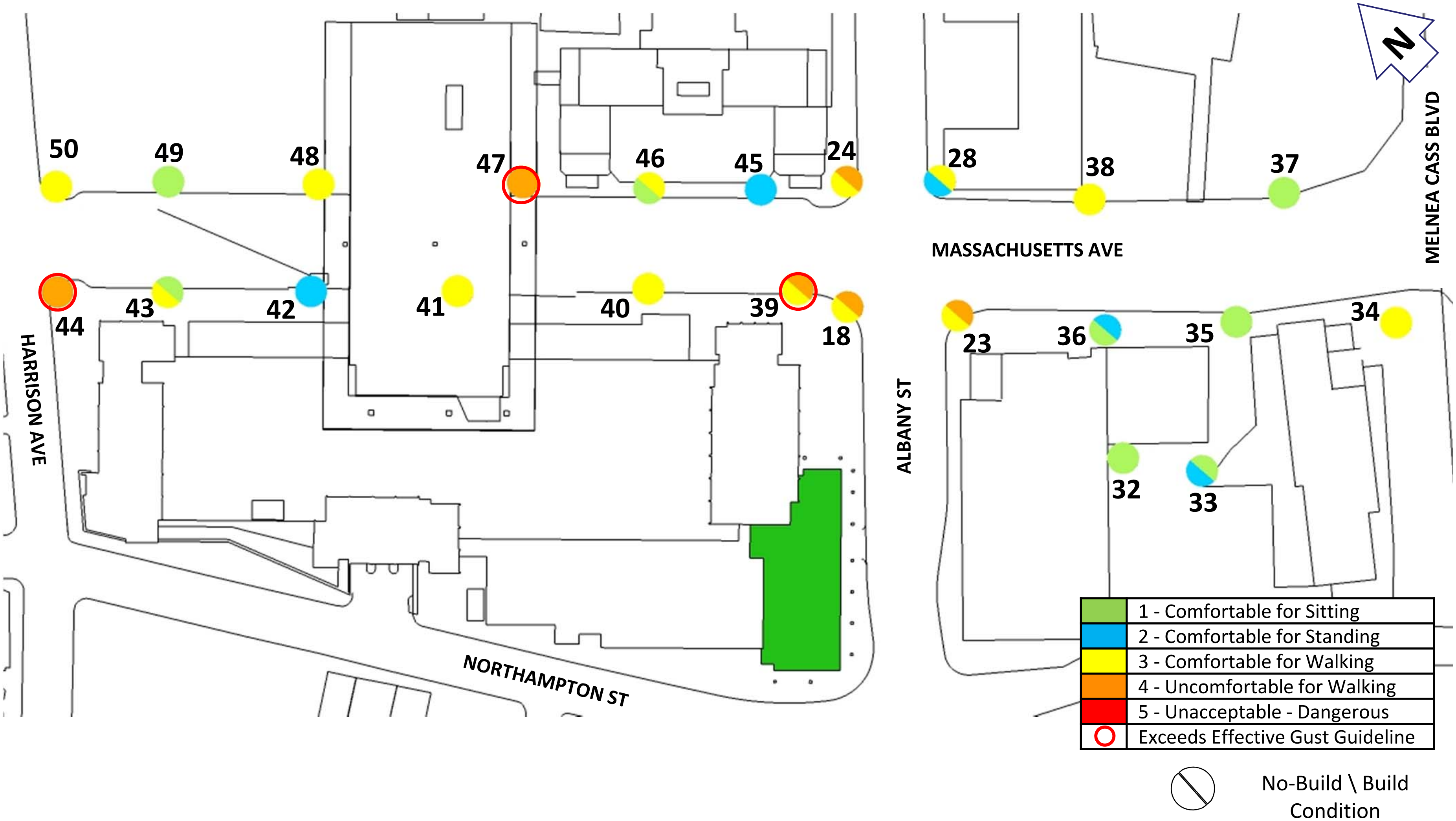


Figure 19: Predicted Results for Annual No-Build and Build Conditions on Massachusetts Avenue

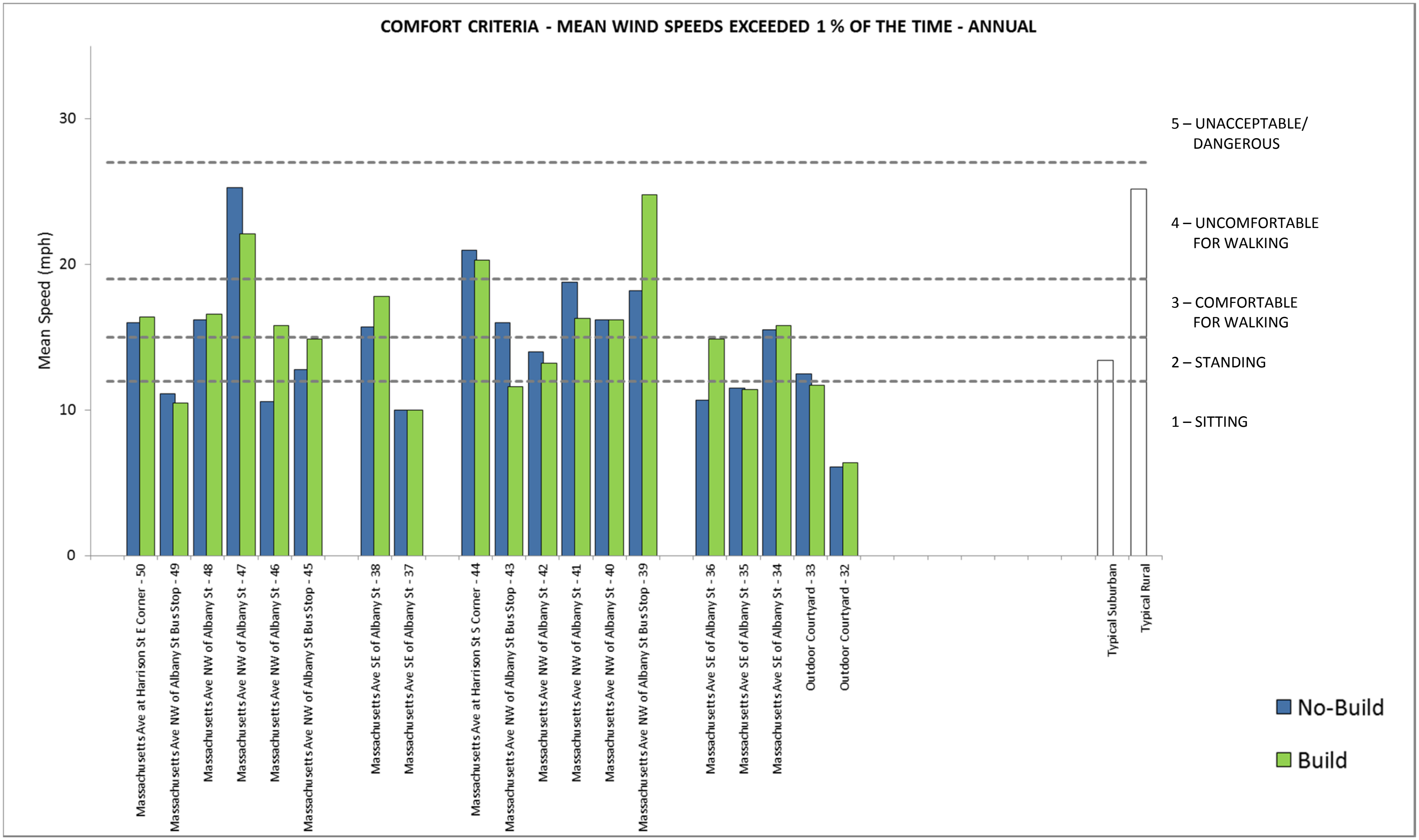


Figure 20: Wind Comfort Results for Massachusetts Avenue - Annual

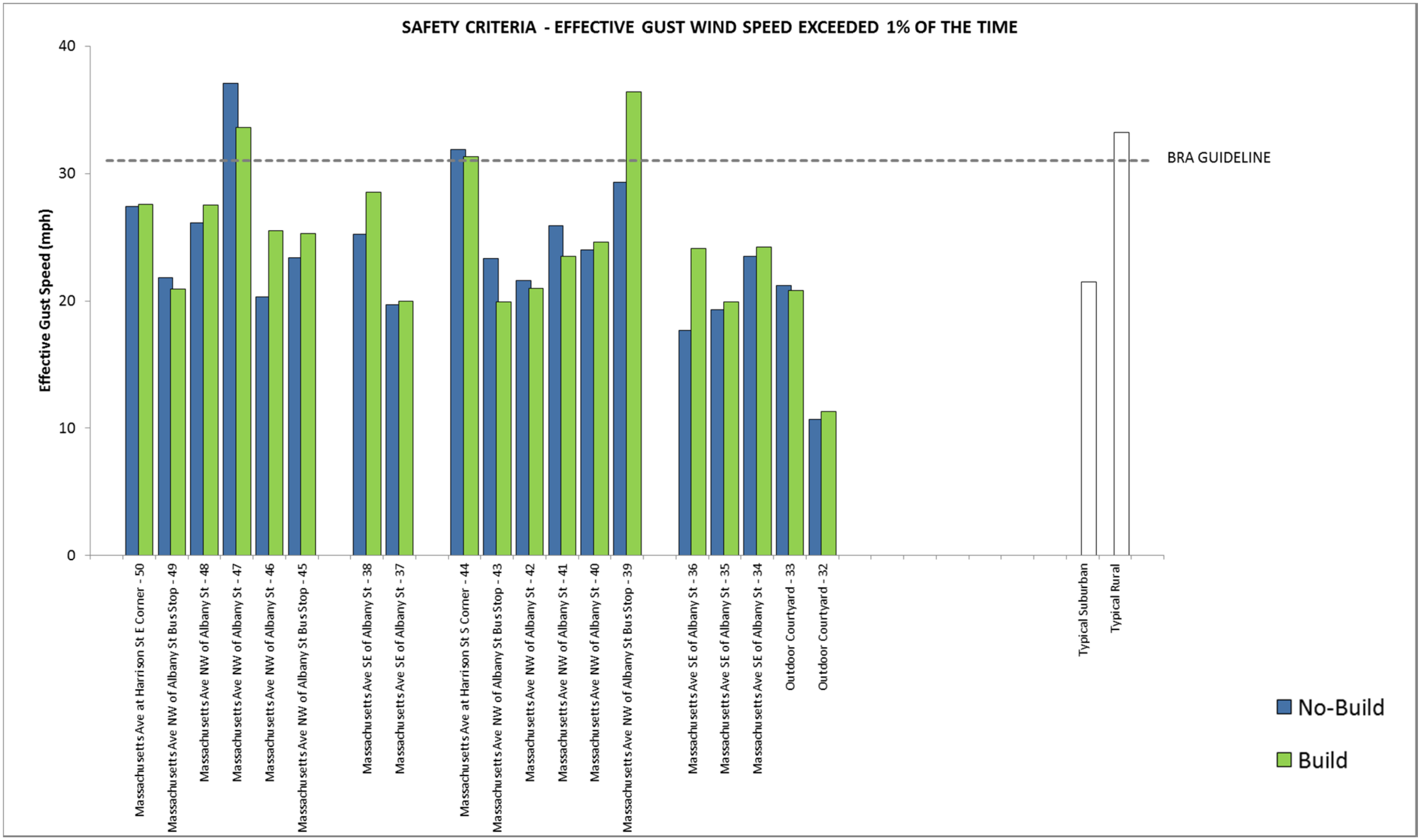


Figure 21: BRA Effective Gust Guideline Results for Massachusetts Avenue - Annual

5.2.4 Harrison Avenue (Locations 51 - 59)

A visual summary of the annual wind conditions predicted on Harrison Avenue are presented in **Figure 22** for the No-Build and Build test configurations. **Figures 24** and **25** show the predicted mean and effective gust wind speeds at each sensor location for both test configurations. Results for Locations 44 and 50 are provided for reference, but were discussed in Section 5.2.3, Massachusetts Avenue.

Wind conditions at the majority of the locations along Harrison Avenue were predicted to remain the same for the No-Build and Build scenarios. Winds were rated as Category 1, 2 or 3 at all locations, except Location 53, which was rated as Category 4 for the No-Build and Build configurations.

All these locations along Harrison Avenue were predicted to meet the BRA Effective Gust Guideline for the No-Build and Build configurations.

5.2.5 Level-3 Roof Terrace (Locations 91 – 99)

A private roof terrace is proposed on the third level, above the existing parking garage and will connect to an existing roof terrace for the residential building at 860 Harrison Avenue.

Figure 23 provides a summary of the predicted annual wind conditions on the terrace for the No-Build and Build configurations. The predicted mean and effective gust wind speeds at each sensor location for the two test configurations are presented in the graphs of **Figures 24** and **25**.

On the roof terrace of 860 Harrison Avenue (Locations 91 - 94), wind comfort for the No-Build conditions were unchanged by the proposed development. Minor wind speed reductions were generally predicted; however, existing wind comfort levels were unaffected. Winds at Locations 90 and 91 were Category 3 and 2, respectively, and were Category 4 at Locations 93 and 94. The presence of landscaping (trees, planters, trellis features, etc.), will improve upon conditions.

Wind conditions on the roof terrace of 35 Northampton (Locations 95 – 99) varied between increases and decreases relative to the No-Build configuration. Ultimately, under the Build configuration the average wind conditions will hover between the threshold of Categories 3 and 4. These conditions are higher than is desired for an outdoor terrace where Category 1 or 2 winds would be ideal. As the roof terrace plan is in an early design stage, strategic planning of the roof space and use of wind control features such as landscaping, wind screens, trellis elements, etc. are recommended to enhance occupant comfort for seasonal use.

The effective gust criterion was predicted to be exceeded at Locations 93 and 94 (860 Harrison Ave terrace) for both test configurations. Locations 97 and 99 marginally exceeded the BRA guideline under the Build scenario. Implementation of wind control features, as described previously, can be investigated to help mitigate these conditions.

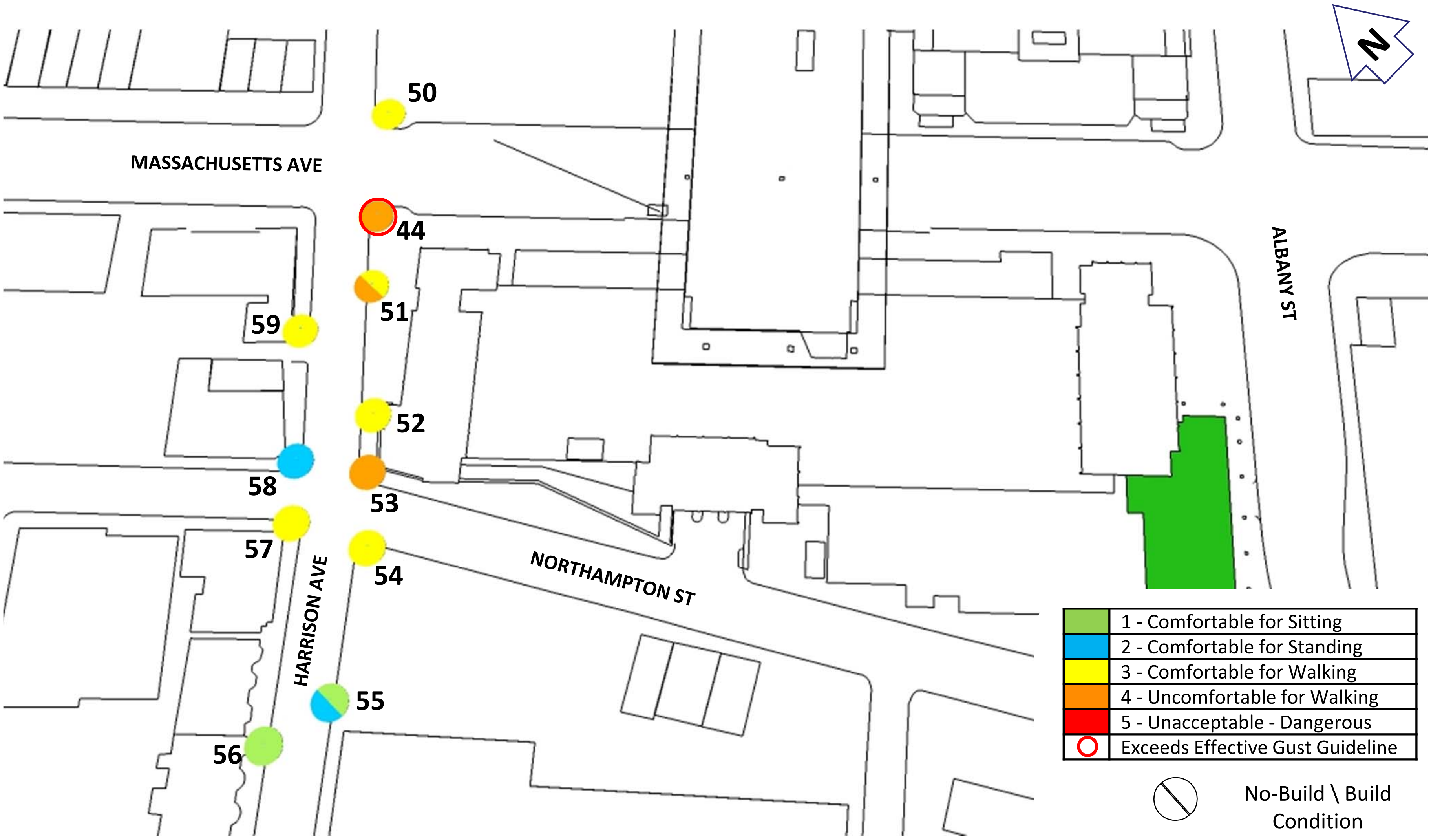


Figure 22: Predicted Results for Annual No-Build and Build Conditions on Harrison Avenue

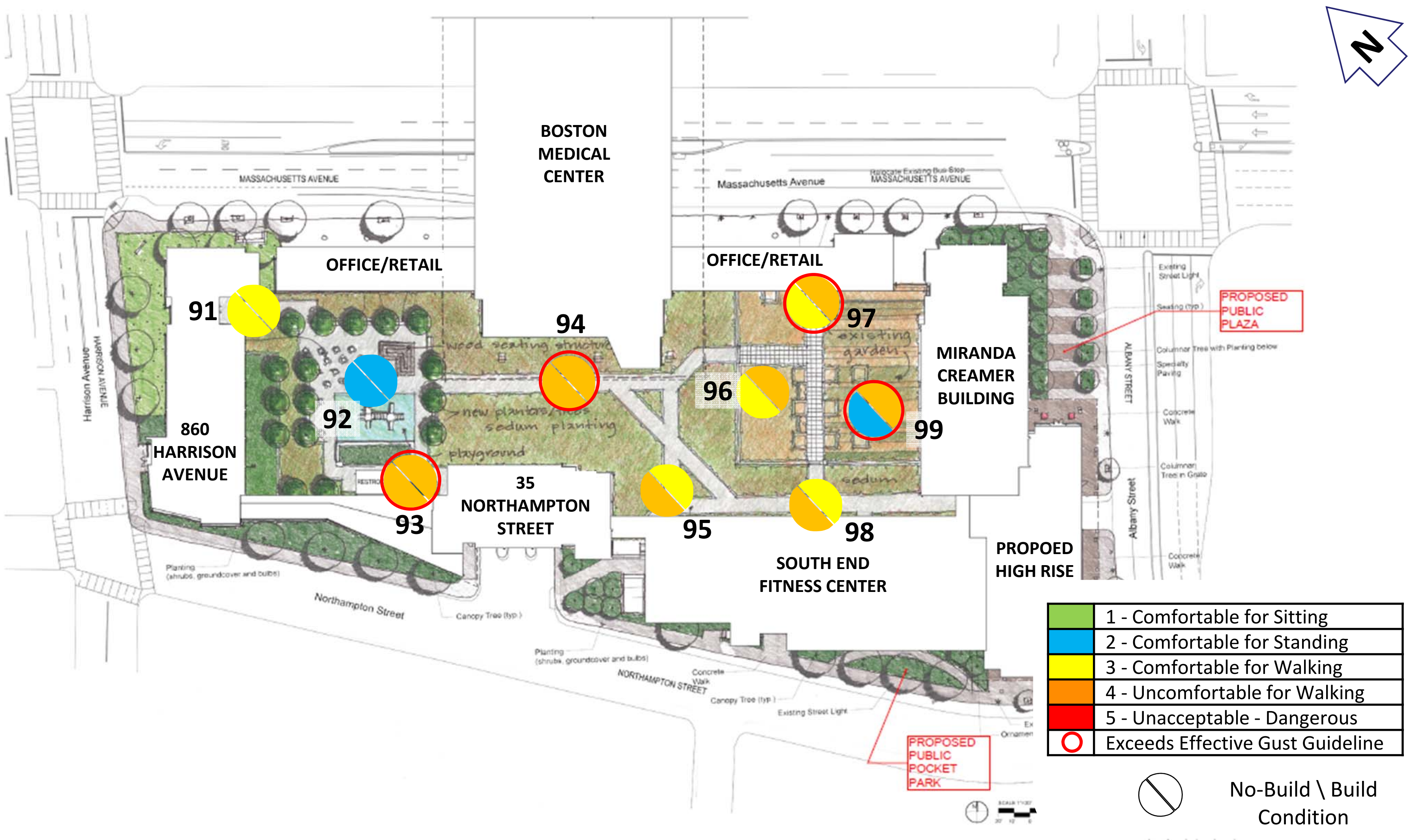


Figure 23: Predicted Results for Annual No-Build and Build Conditions on Level-3 Roof Terrace

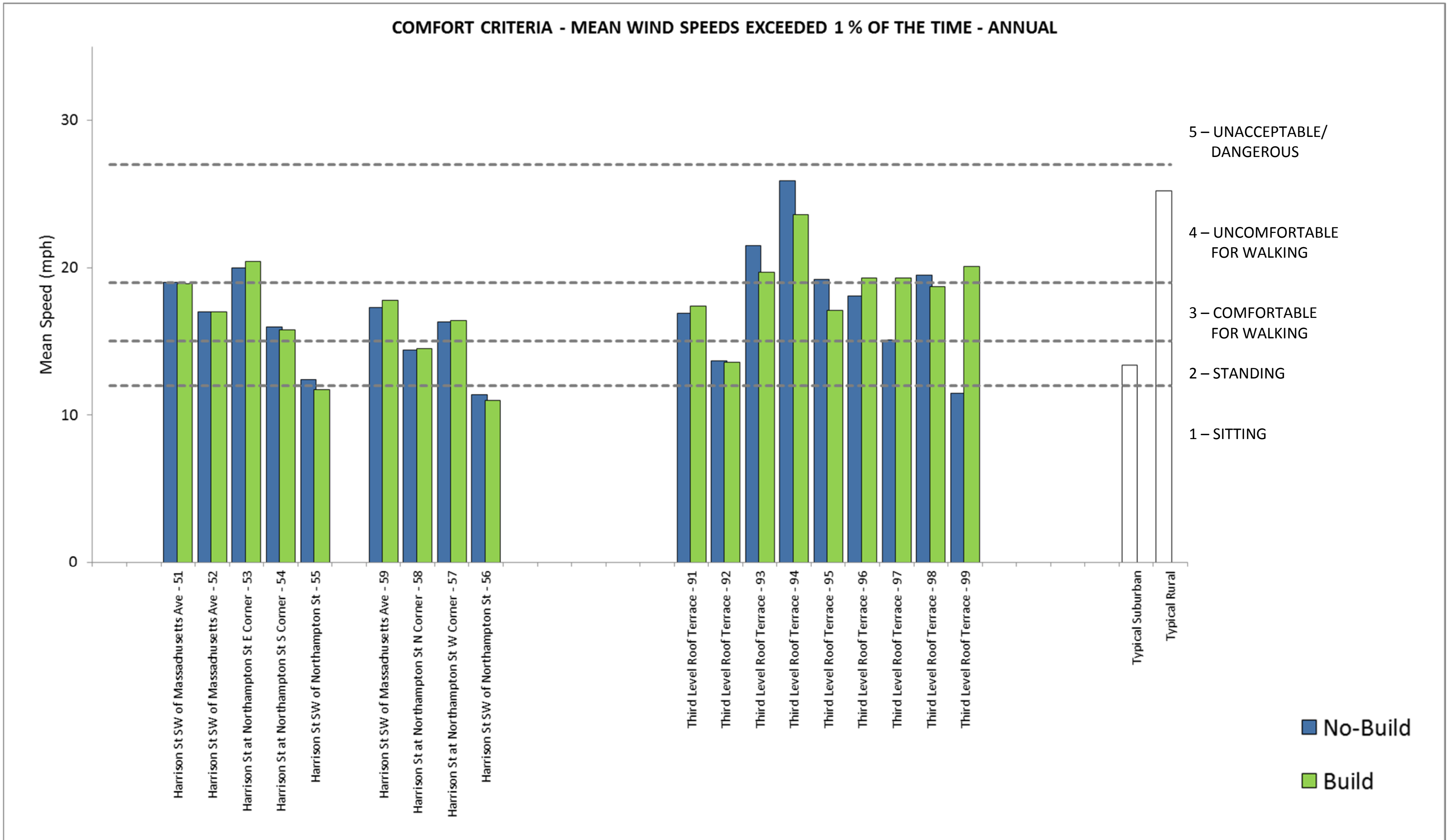


Figure 24: Wind Comfort Results for Harrison Avenue - Annual

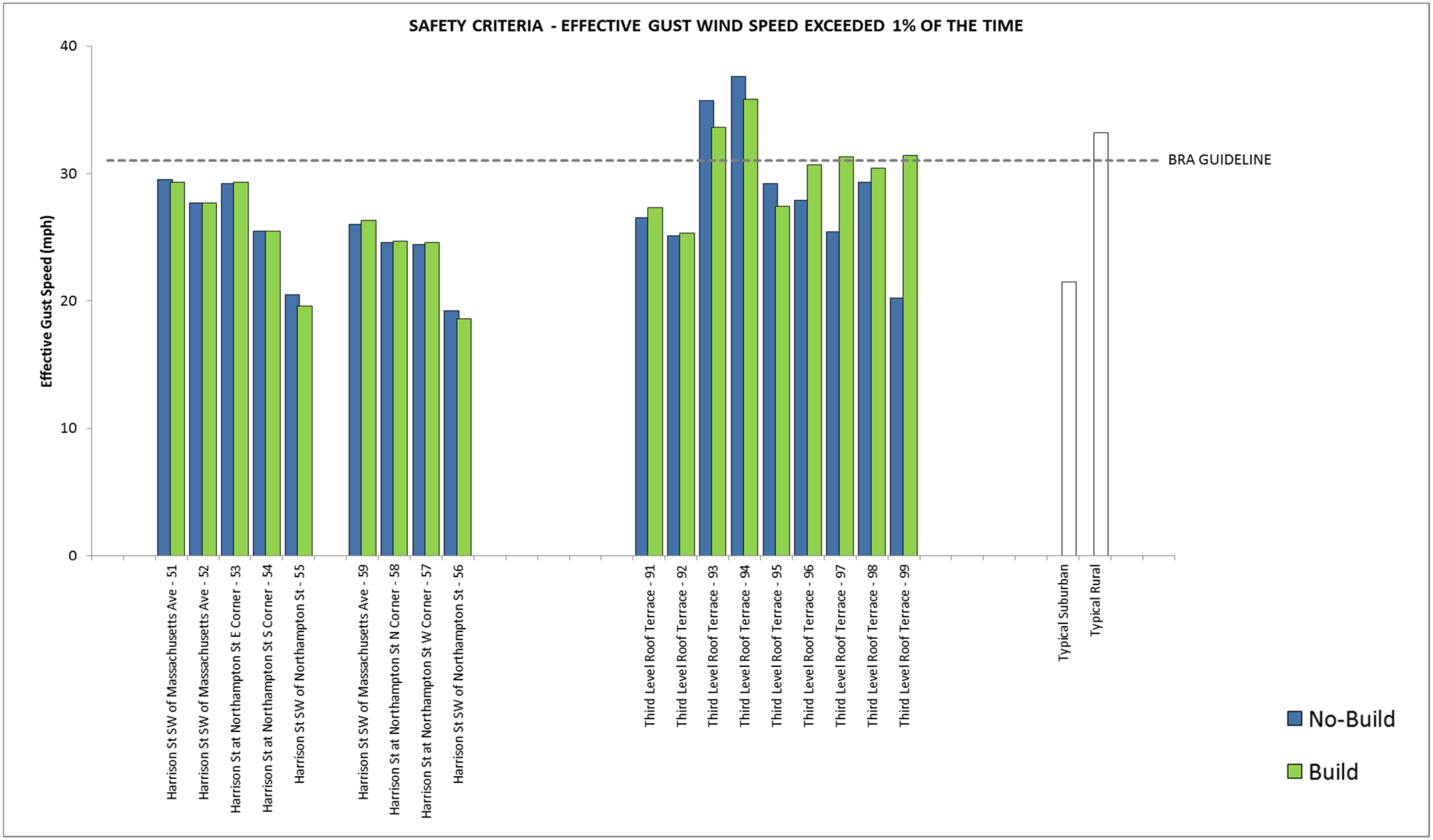


Figure 25: BRA Effective Gust Guideline Results for Harrison Avenue - Annual

6.0 CONCLUSIONS AND RECOMMENDATIONS

Pedestrian wind conditions for the proposed 35 Northampton Avenue development were quantitatively assessed through wind tunnel tests for the No-Build and Build site conditions. The assessment is in support of the Planned Development Area (PDA) review for the Boston Redevelopment Authority (BRA). Based on the results of our assessment, the following conclusions and recommendations have been reached:

- The No-Build wind conditions along Albany Street generally remained or increased by one Melbourne Wind Category under the Build scenario. For the Build scenario, Category 4 winds were noted at five additional locations and seven locations exceeded the BRA Effective Gust Guideline. Three locations were marginally above the threshold wind speed. Investigation of mitigation (e.g., landscaping) is recommended.

- Existing (No-Build) wind comfort on Northampton Street from Harrison Avenue to west of the proposed tower, was in most cases unchanged or improved under Build conditions. Wind conditions on Northampton Avenue, between Albany Street and Melnea Cass Boulevard, were satisfactory (Category 2 or 3) for both test configurations.

- Existing wind conditions (mean and effective gust wind speeds) along Harrison Avenue were unaffected by the proposed development.

- Wind activity on Northampton Avenue adjacent the proposed tower (includes a proposed main entrance), increased from Category 4 to 5 under Build conditions. Investigation of wind control measures (e.g., landscaping) is recommended. For both test scenarios, Category 4 winds and exceedance of the BRA Effective Gust Guideline commonly occurred across Northampton Avenue from the proposed tower.

- The No-Build wind conditions along and near Fellows Street typically remained as they exist or were improved under Build conditions. Several locations remained above the BRA Guideline.

- With a few exceptions, wind conditions along Massachusetts Avenue were generally Category 1, 2 or 3 for both site conditions. Two locations were Category 4 under No-Build with one additional location for the Build scenario. Wind at these same three locations also exceeded the BRA Guideline. The Build scenario, however, improved wind conditions at the two locations that were above the guideline under No-Build.

- The proposed development had a positive effect on the No-Build wind conditions on the neighboring terrace of 860 Harrison Avenue. Overall, wind conditions were higher than desired for a terrace. The strategic placement and design of outdoor use areas and landscaping elements should be investigated as the landscape plan evolves.

Should you have any questions or concerns, please do not hesitate to contact the undersigned.

Sincerely,
Novus Environmental Inc.

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Senior Specialist – Microclimate

R.L. Scott Penton, P.Eng.
Principal, Specialist

LICENSED PROFESSIONAL ENGINEER
R.L.S. PENTON
13/09/17
PROVINCE OF ONTARIO

Jenny Vesely, B.Eng. EIT
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Appendix A

Detailed Annual and Seasonal Results
Mean Wind Speed and Effective Gust Speed
Exceeded 1% of the Time

NOTE: Percent change is only shown for changes greater than 10%

Comfort Category						
Sensor	**Season**	**No-Build**	**Build**	**% Change**	**No-Build Category**	**Build Category**
1	Annual	20.7	19.5		Uncomfortable	Uncomfortable
	Spring	21.1	19.9		Uncomfortable	Uncomfortable
	Summer	17.4	16.4		Walking	Walking
	Autumn	20	18.9		Uncomfortable	Walking
	Winter	31.6	29.6		Dangerous	Dangerous
2	Annual	11.1	10.5		Sitting	Sitting
	Spring	11.5	10.8		Sitting	Sitting
	Summer	9.6	9.1		Sitting	Sitting
	Autumn	10.9	10.3		Sitting	Sitting
	Winter	15.5	14.8		Walking	Standing
3	Annual	14.6	14.3		Standing	Standing
	Spring	14.9	14.6		Standing	Standing
	Summer	12.4	12.1		Standing	Standing
	Autumn	14.4	14		Standing	Standing
	Winter	21.5	20.9		Uncomfortable	Uncomfortable
4	Annual	19.5	18.4		Uncomfortable	Walking
	Spring	20.9	19.7		Uncomfortable	Uncomfortable
	Summer	18	16.6		Walking	Walking
	Autumn	18.9	17.9		Walking	Walking
	Winter	26.2	25.2		Uncomfortable	Uncomfortable
5	Annual	12.1	13		Standing	Standing
	Spring	12.3	13.9	16%	Standing	Standing
	Summer	9.7	11.1	14%	Sitting	Sitting
	Autumn	11.6	12.3		Sitting	Standing
	Winter	18.4	17.8		Walking	Walking
6	Annual	14.6	18.7	41%	Standing	Walking
	Spring	14.9	18.9	40%	Standing	Walking
	Summer	11.6	14.9	33%	Sitting	Standing
	Autumn	13.9	17.7	38%	Standing	Walking
	Winter	21.3	27.5	62%	Uncomfortable	Dangerous
7	Annual	14.6	14.4		Standing	Standing
	Spring	15	14.7		Walking	Standing
	Summer	12.8	12.6		Standing	Standing
	Autumn	14.3	14.1		Standing	Standing
	Winter	21.2	20.7		Uncomfortable	Uncomfortable
8	Annual	13.5	12.9		Standing	Standing
	Spring	14.1	13.6		Standing	Standing
	Summer	11.2	10.9		Sitting	Sitting
	Autumn	13	12.5		Standing	Standing
	Winter	19	18.1		Uncomfortable	Walking

Effective Gust						
Sensor	**Season**	**No-Build**	**Build**	**% Change**	**No-Build Category**	**Build Category**
1	Annual	30.1	28.8		Acceptable	Acceptable
	Spring	30.7	29.3		Acceptable	Acceptable
	Summer	25.1	24		Acceptable	Acceptable
	Autumn	29.1	27.9		Acceptable	Acceptable
	Winter	45.6	43.3		Unacceptable	Unacceptable
2	Annual	20	19		Acceptable	Acceptable
	Spring	20.9	19.7		Acceptable	Acceptable
	Summer	17.2	16.5		Acceptable	Acceptable
	Autumn	19.5	18.7		Acceptable	Acceptable
	Winter	27.9	26.8		Acceptable	Acceptable
3	Annual	25.2	24.6		Acceptable	Acceptable
	Spring	25.9	25.4		Acceptable	Acceptable
	Summer	21.2	20.7		Acceptable	Acceptable
	Autumn	24.6	24.1		Acceptable	Acceptable
	Winter	36.9	35.9		Unacceptable	Unacceptable
4	Annual	30.4	29.3		Acceptable	Acceptable
	Spring	32.5	31.2		Unacceptable	Unacceptable
	Summer	27.6	25.9		Acceptable	Acceptable
	Autumn	29.4	28.4		Acceptable	Acceptable
	Winter	41.1	40.3		Unacceptable	Unacceptable
5	Annual	20.3	21.8		Acceptable	Acceptable
	Spring	20.7	22.8	21%	Acceptable	Acceptable
	Summer	16.3	18	17%	Acceptable	Acceptable
	Autumn	19.4	20.8		Acceptable	Acceptable
	Winter	29.9	30.9		Acceptable	Acceptable
6	Annual	25.7	29.7	40%	Acceptable	Acceptable
	Spring	26.1	30	39%	Acceptable	Acceptable
	Summer	19.9	23.1	32%	Acceptable	Acceptable
	Autumn	24.3	28.1	38%	Acceptable	Acceptable
	Winter	37.2	42.6	54%	Unacceptable	Unacceptable
7	Annual	25.2	24.3		Acceptable	Acceptable
	Spring	25.8	24.9		Acceptable	Acceptable
	Summer	21.3	20.8		Acceptable	Acceptable
	Autumn	24.5	23.8		Acceptable	Acceptable
	Winter	36.4	35		Unacceptable	Unacceptable
8	Annual	23	22.2		Acceptable	Acceptable
	Spring	24	23.2		Acceptable	Acceptable
	Summer	19	18.3		Acceptable	Acceptable
	Autumn	22.2	21.5		Acceptable	Acceptable
	Winter	32.5	31.1		Unacceptable	Unacceptable

			Comfort Category			
Sensor	Season	No-Build	Build	% Change	No-Build Category	Build Category
9	Annual	13	11.6	-14%	Standing	Sitting
	Spring	13.7	12.2	-15%	Standing	Standing
	Summer	11.7	10.2	-15%	Sitting	Sitting
	Autumn	12.7	11.3	-14%	Standing	Sitting
	Winter	18.6	16.5	-21%	Walking	Walking
10	Annual	13.7	19.9	62%	Standing	Uncomfortable
	Spring	14	20.1	61%	Standing	Uncomfortable
	Summer	10.9	15.4	45%	Sitting	Walking
	Autumn	13.1	18.7	56%	Standing	Walking
	Winter	20	29.2	92%	Uncomfortable	Dangerous
11	Annual	19.3	18.3		Uncomfortable	Walking
	Spring	19.7	18.8		Uncomfortable	Walking
	Summer	15.1	14.7		Walking	Standing
	Autumn	18.1	17.3		Walking	Walking
	Winter	29.4	26.3	-31%	Dangerous	Uncomfortable
12	Annual	12	14.1	21%	Standing	Standing
	Spring	12.5	14.5	20%	Standing	Standing
	Summer	10.1	11.9	18%	Sitting	Sitting
	Autumn	11.6	13.5	19%	Sitting	Standing
	Winter	16.5	21.1	46%	Walking	Uncomfortable
13	Annual	17.9	18.2		Walking	Walking
	Spring	18.2	19.6		Walking	Uncomfortable
	Summer	13.8	17.1	33%	Standing	Walking
	Autumn	16.9	17.6		Walking	Walking
	Winter	26.1	25.1		Uncomfortable	Uncomfortable
14	Annual	17.7	20.7	30%	Walking	Uncomfortable
	Spring	17.9	22	41%	Walking	Uncomfortable
	Summer	13.6	19.1	55%	Standing	Uncomfortable
	Autumn	16.7	20.1	34%	Walking	Uncomfortable
	Winter	25.8	28.9	31%	Uncomfortable	Dangerous
15	Annual	11.3	9.4	-19%	Sitting	Sitting
	Spring	11.6	9.7	-19%	Sitting	Sitting
	Summer	9.2	7.5	-17%	Sitting	Sitting
	Autumn	10.9	9.1	-18%	Sitting	Sitting
	Winter	15.5	13.4	-21%	Walking	Standing
16	Annual	10.9	15.9	50%	Sitting	Walking
	Spring	11.5	16.5	50%	Sitting	Walking
	Summer	9.3	13.4	41%	Sitting	Standing
	Autumn	10.3	15.3	50%	Sitting	Walking
	Winter	14.6	23	84%	Standing	Uncomfortable

NOTE: Percent change is only shown for changes greater than 10%

			Effective Gust			
Sensor	Season	No-Build	Build	% Change	No-Build Category	Build Category
9	Annual	25	22.5		Acceptable	Acceptable
	Spring	26.4	23.7	-27%	Acceptable	Acceptable
	Summer	22.6	20	-26%	Acceptable	Acceptable
	Autumn	24.3	21.9		Acceptable	Acceptable
	Winter	34.5	31.2		Unacceptable	Unacceptable
10	Annual	25.8	32.5	67%	Acceptable	Unacceptable
	Spring	26.3	33	67%	Acceptable	Unacceptable
	Summer	19.9	25	51%	Acceptable	Acceptable
	Autumn	24.5	30.6	61%	Acceptable	Acceptable
	Winter	37.8	47.8	100%	Unacceptable	Unacceptable
11	Annual	30.8	29.6		Acceptable	Acceptable
	Spring	31.4	30.1		Unacceptable	Acceptable
	Summer	24.2	22.8		Acceptable	Acceptable
	Autumn	29	27.9		Acceptable	Acceptable
	Winter	46.5	43.6		Unacceptable	Unacceptable
12	Annual	20.8	23.8	30%	Acceptable	Acceptable
	Spring	21.2	24.4	32%	Acceptable	Acceptable
	Summer	16.3	19.1	28%	Acceptable	Acceptable
	Autumn	19.9	22.6	27%	Acceptable	Acceptable
	Winter	29.4	35.1	57%	Acceptable	Unacceptable
13	Annual	27.7	25.8		Acceptable	Acceptable
	Spring	28.1	27.4		Acceptable	Acceptable
	Summer	21.3	23.4		Acceptable	Acceptable
	Autumn	26.1	25		Acceptable	Acceptable
	Winter	40.4	35.9	-45%	Unacceptable	Unacceptable
14	Annual	26.9	29.9	30%	Acceptable	Acceptable
	Spring	27.3	31.1	38%	Acceptable	Unacceptable
	Summer	20.7	25.8	51%	Acceptable	Acceptable
	Autumn	25.5	28.9	34%	Acceptable	Acceptable
	Winter	39.3	42.2		Unacceptable	Unacceptable
15	Annual	18.6	17.5		Acceptable	Acceptable
	Spring	19	17.8		Acceptable	Acceptable
	Summer	15.1	13.3	-18%	Acceptable	Acceptable
	Autumn	18.1	16.8		Acceptable	Acceptable
	Winter	26	25		Acceptable	Acceptable
16	Annual	18.7	29.6	109%	Acceptable	Acceptable
	Spring	19.3	30.3	110%	Acceptable	Acceptable
	Summer	15.3	23.7	84%	Acceptable	Acceptable
	Autumn	17.8	28.2	104%	Acceptable	Acceptable
	Winter	26	43.9	179%	Acceptable	Unacceptable

NOTE: Percent change is only shown for changes greater than 10%

Sensor	Season	Comfort Category No-Build	Build	% Change	No-Build Category	Build Category
17	Annual	13.5	23.2	97%	Standing	Uncomfortable
	Spring	13.7	23.7	100%	Standing	Uncomfortable
	Summer	10.7	18.6	79%	Sitting	Walking
	Autumn	12.9	22.2	93%	Standing	Uncomfortable
	Winter	19.4	33.9	145%	Uncomfortable	Dangerous
18	Annual	16.6	23.5	69%	Walking	Uncomfortable
	Spring	16.6	23.8	72%	Walking	Uncomfortable
	Summer	15.1	18.7	36%	Walking	Walking
	Autumn	16.3	22.3	60%	Walking	Uncomfortable
	Winter	24.8	35.2	104%	Uncomfortable	Dangerous
19	Annual	15.8	17.2		Walking	Walking
	Spring	16.3	17.6		Walking	Walking
	Summer	12.8	13.8		Standing	Standing
	Autumn	15	16.4		Walking	Walking
	Winter	22.9	24.7		Uncomfortable	Uncomfortable
20	Annual	10.8	24.6	138%	Sitting	Uncomfortable
	Spring	11	25.1	141%	Sitting	Uncomfortable
	Summer	8.3	19.5	112%	Sitting	Uncomfortable
	Autumn	10.2	23.1	129%	Sitting	Uncomfortable
	Winter	15.8	38.1	223%	Walking	Dangerous
21	Annual	14.9	19	41%	Standing	Uncomfortable
	Spring	15.1	19.2	41%	Walking	Uncomfortable
	Summer	11.5	14.9	34%	Sitting	Standing
	Autumn	13.9	18	41%	Standing	Walking
	Winter	22	27.6	56%	Uncomfortable	Dangerous
22	Annual	15.7	16.5		Walking	Walking
	Spring	15.9	16.8		Walking	Walking
	Summer	12.1	13		Standing	Standing
	Autumn	14.7	15.8		Standing	Walking
	Winter	23.2	24.2		Uncomfortable	Uncomfortable
23	Annual	17.4	19.4	20%	Walking	Uncomfortable
	Spring	17.7	19.6	19%	Walking	Uncomfortable
	Summer	13.5	14.9	14%	Standing	Standing
	Autumn	16.4	18.2	18%	Walking	Walking
	Winter	25.8	29	32%	Uncomfortable	Dangerous
24	Annual	18.9	20.5		Walking	Uncomfortable
	Spring	19.3	20.8		Uncomfortable	Uncomfortable
	Summer	15.6	16.4		Walking	Walking
	Autumn	18.2	19.5		Walking	Uncomfortable
	Winter	27.9	30.4		Dangerous	Dangerous

Sensor	Season	Effective Gust No-Build	Build	% Change	No-Build Category	Build Category
17	Annual	23.9	37.6	137%	Acceptable	Unacceptable
	Spring	24.2	38.1	139%	Acceptable	Unacceptable
	Summer	18.5	29	105%	Acceptable	Acceptable
	Autumn	22.8	35.8	130%	Acceptable	Unacceptable
	Winter	34.5	55.6	211%	Unacceptable	Unacceptable
18	Annual	28.7	36.9	82%	Acceptable	Unacceptable
	Spring	28.9	37.4	85%	Acceptable	Unacceptable
	Summer	25.3	29.5	42%	Acceptable	Acceptable
	Autumn	28	35.1	71%	Acceptable	Unacceptable
	Winter	42.8	55.1	123%	Unacceptable	Unacceptable
19	Annual	26.3	27.8		Acceptable	Acceptable
	Spring	27.1	28.3		Acceptable	Acceptable
	Summer	20.9	21.7		Acceptable	Acceptable
	Autumn	24.9	26.4		Acceptable	Acceptable
	Winter	38.8	39.9		Unacceptable	Unacceptable
20	Annual	21	36.6	156%	Acceptable	Unacceptable
	Spring	21.3	37.2	159%	Acceptable	Unacceptable
	Summer	16.1	28.7	126%	Acceptable	Acceptable
	Autumn	19.7	34.1	144%	Acceptable	Unacceptable
	Winter	31	55.5	245%	Unacceptable	Unacceptable
21	Annual	25.5	29.3	38%	Acceptable	Acceptable
	Spring	25.8	29.6	38%	Acceptable	Acceptable
	Summer	19.5	22.7	32%	Acceptable	Acceptable
	Autumn	23.8	27.6	38%	Acceptable	Acceptable
	Winter	37.6	42.6	50%	Unacceptable	Unacceptable
22	Annual	27.5	27.6		Acceptable	Acceptable
	Spring	28	27.9		Acceptable	Acceptable
	Summer	21.3	21.3		Acceptable	Acceptable
	Autumn	25.8	26.2		Acceptable	Acceptable
	Winter	40.8	40.2		Unacceptable	Unacceptable
23	Annual	28.3	32	37%	Acceptable	Unacceptable
	Spring	28.8	32.5	37%	Acceptable	Unacceptable
	Summer	21.9	24.5	26%	Acceptable	Acceptable
	Autumn	26.7	30.1	34%	Acceptable	Acceptable
	Winter	41.8	48	62%	Unacceptable	Unacceptable
24	Annual	29.5	31.2		Acceptable	Unacceptable
	Spring	30.1	31.7		Acceptable	Unacceptable
	Summer	24.4	25.2		Acceptable	Acceptable
	Autumn	28.5	29.9		Acceptable	Acceptable
	Winter	43.2	46.3		Unacceptable	Unacceptable

Comfort Category						
Sensor	Season	No-Build	Build	% Change	No-Build Category	Build Category
25	Annual	15.2	14.7		Walking	Standing
	Spring	15	15.3		Walking	Walking
	Summer	14.5	13.7		Standing	Standing
	Autumn	15.3	14.6		Walking	Standing
	Winter	22.8	21.4		Uncomfortable	Uncomfortable
26	Annual	12.6	13.1		Standing	Standing
	Spring	13.3	14		Standing	Standing
	Summer	11.2	11.9		Sitting	Sitting
	Autumn	12.5	13		Standing	Standing
	Winter	18.1	18.4		Walking	Walking
27	Annual	14.3	14		Standing	Standing
	Spring	15.6	15.3		Walking	Walking
	Summer	13.2	12.9		Standing	Standing
	Autumn	13.4	13.1		Standing	Standing
	Winter	18.2	17.9		Walking	Walking
28	Annual	14.8	16.8	20%	Standing	Walking
	Spring	14.9	17	21%	Standing	Walking
	Summer	12.2	13.9	17%	Standing	Standing
	Autumn	14.1	16	19%	Standing	Walking
	Winter	22.3	25	27%	Uncomfortable	Uncomfortable
29	Annual	21.5	22.8		Uncomfortable	Uncomfortable
	Spring	21.8	23.1		Uncomfortable	Uncomfortable
	Summer	16.8	17.8		Walking	Walking
	Autumn	20.2	21.4		Uncomfortable	Uncomfortable
	Winter	32.8	34.6		Dangerous	Dangerous
30	Annual	13.1	13.5		Standing	Standing
	Spring	13.5	13.7		Standing	Standing
	Summer	11.4	11.7		Sitting	Sitting
	Autumn	13	13.4		Standing	Standing
	Winter	19.3	19.7		Uncomfortable	Uncomfortable
31	Annual	13.6	14.4		Standing	Standing
	Spring	14.5	15.3		Standing	Walking
	Summer	12.4	13.3		Standing	Standing
	Autumn	13.4	14		Standing	Standing
	Winter	19.1	19.9		Uncomfortable	Uncomfortable
32	Annual	6.1	6.4		Sitting	Sitting
	Spring	6.6	6.9		Sitting	Sitting
	Summer	5.6	5.9		Sitting	Sitting
	Autumn	5.8	6		Sitting	Sitting
	Winter	7.7	8.4		Sitting	Sitting

NOTE: Percent change is only shown for changes greater than 10%

Effective Gust						
Sensor	Season	No-Build	Build	% Change	No-Build Category	Build Category
25	Annual	26	25.1		Acceptable	Acceptable
	Spring	25.8	25.6		Acceptable	Acceptable
	Summer	24.4	23		Acceptable	Acceptable
	Autumn	26.1	25.1		Acceptable	Acceptable
	Winter	38.8	37.3		Unacceptable	Unacceptable
26	Annual	20.8	20.4		Acceptable	Acceptable
	Spring	21.8	21.6		Acceptable	Acceptable
	Summer	18.6	18.3		Acceptable	Acceptable
	Autumn	20.6	20.1		Acceptable	Acceptable
	Winter	29.8	28.6		Acceptable	Acceptable
27	Annual	21.6	21.4		Acceptable	Acceptable
	Spring	23.3	23.1		Acceptable	Acceptable
	Summer	19.5	19.4		Acceptable	Acceptable
	Autumn	20.4	20.2		Acceptable	Acceptable
	Winter	28.3	28		Acceptable	Acceptable
28	Annual	25.8	28.9	31%	Acceptable	Acceptable
	Spring	26.2	29.3	31%	Acceptable	Acceptable
	Summer	21.4	23.9	25%	Acceptable	Acceptable
	Autumn	24.7	27.7	30%	Acceptable	Acceptable
	Winter	38.6	43.4	48%	Unacceptable	Unacceptable
29	Annual	32.3	32.6		Unacceptable	Unacceptable
	Spring	32.8	33.1		Unacceptable	Unacceptable
	Summer	25.3	25.7		Acceptable	Acceptable
	Autumn	30.5	30.8		Acceptable	Acceptable
	Winter	48.7	48.9		Unacceptable	Unacceptable
30	Annual	22.8	23.6		Acceptable	Acceptable
	Spring	23.3	23.9		Acceptable	Acceptable
	Summer	19.6	20		Acceptable	Acceptable
	Autumn	22.4	23		Acceptable	Acceptable
	Winter	33.1	34.8		Unacceptable	Unacceptable
31	Annual	21.2	21.9		Acceptable	Acceptable
	Spring	22.3	23.1		Acceptable	Acceptable
	Summer	18.4	19.3		Acceptable	Acceptable
	Autumn	20.7	21.3		Acceptable	Acceptable
	Winter	29.8	30.4		Acceptable	Acceptable
32	Annual	10.7	11.3		Acceptable	Acceptable
	Spring	11.2	11.6		Acceptable	Acceptable
	Summer	9	9.3		Acceptable	Acceptable
	Autumn	10.4	10.9		Acceptable	Acceptable
	Winter	14.6	15.9		Acceptable	Acceptable

			Comfort Category			
Sensor	Season	No-Build	Build	% Change	No-Build Category	Build Category
33	Annual	12.5	11.7		Standing	Sitting
	Spring	13.3	12.4		Standing	Standing
	Summer	11.5	10.6		Sitting	Sitting
	Autumn	12.1	11.4		Standing	Sitting
	Winter	16.5	16.4		Walking	Walking
34	Annual	15.5	15.8		Walking	Walking
	Spring	16.5	16.9		Walking	Walking
	Summer	13.9	14.3		Standing	Standing
	Autumn	15.1	15.5		Walking	Walking
	Winter	21.5	21.9		Uncomfortable	Uncomfortable
35	Annual	11.5	11.4		Sitting	Sitting
	Spring	12	11.8		Standing	Sitting
	Summer	9.6	9.3		Sitting	Sitting
	Autumn	10.9	10.9		Sitting	Sitting
	Winter	15.5	15.8		Walking	Walking
36	Annual	10.7	14.9	42%	Sitting	Standing
	Spring	11.3	15	37%	Sitting	Walking
	Summer	9.2	11.4	22%	Sitting	Sitting
	Autumn	10.2	14	38%	Sitting	Standing
	Winter	14.6	22.2	76%	Standing	Uncomfortable
37	Annual	10	10		Sitting	Sitting
	Spring	10.3	10.2		Sitting	Sitting
	Summer	8	7.9		Sitting	Sitting
	Autumn	9.6	9.6		Sitting	Sitting
	Winter	14.5	14.6		Standing	Standing
38	Annual	15.7	17.8	21%	Walking	Walking
	Spring	16	18	20%	Walking	Walking
	Summer	12.3	13.6	13%	Standing	Standing
	Autumn	14.8	16.7	19%	Standing	Walking
	Winter	23.8	27.1	33%	Uncomfortable	Dangerous
39	Annual	18.2	24.8	66%	Walking	Uncomfortable
	Spring	18.3	25	67%	Walking	Uncomfortable
	Summer	16.3	19.6	33%	Walking	Uncomfortable
	Autumn	17.9	23.6	57%	Walking	Uncomfortable
	Winter	27.2	36	88%	Dangerous	Dangerous
40	Annual	16.2	16.2		Walking	Walking
	Spring	16.9	16.4		Walking	Walking
	Summer	13.9	13.5		Standing	Standing
	Autumn	15.6	15.6		Walking	Walking
	Winter	23.4	23.6		Uncomfortable	Uncomfortable

NOTE: Percent change is only shown for changes greater than 10%

			Effective Gust			
Sensor	Season	No-Build	Build	% Change	No-Build Category	Build Category
33	Annual	21.2	20.8		Acceptable	Acceptable
	Spring	22.5	21.9		Acceptable	Acceptable
	Summer	19.2	18.6		Acceptable	Acceptable
	Autumn	20.6	20.2		Acceptable	Acceptable
	Winter	28.4	29.4		Acceptable	Acceptable
34	Annual	23.5	24.2		Acceptable	Acceptable
	Spring	24.9	25.5		Acceptable	Acceptable
	Summer	20.4	20.9		Acceptable	Acceptable
	Autumn	23	23.7		Acceptable	Acceptable
	Winter	32.6	33.5		Unacceptable	Unacceptable
35	Annual	19.3	19.9		Acceptable	Acceptable
	Spring	20	20.4		Acceptable	Acceptable
	Summer	15.6	15.6		Acceptable	Acceptable
	Autumn	18.5	19		Acceptable	Acceptable
	Winter	26.4	27.9		Acceptable	Acceptable
36	Annual	17.7	24.1	64%	Acceptable	Acceptable
	Spring	18.6	24.3	57%	Acceptable	Acceptable
	Summer	14.6	18.4	38%	Acceptable	Acceptable
	Autumn	16.9	22.6	57%	Acceptable	Acceptable
	Winter	24	35.6	116%	Acceptable	Unacceptable
37	Annual	19.7	20		Acceptable	Acceptable
	Spring	19.9	20.2		Acceptable	Acceptable
	Summer	15	15.2		Acceptable	Acceptable
	Autumn	18.8	19.1		Acceptable	Acceptable
	Winter	28.6	29.3		Acceptable	Acceptable
38	Annual	25.2	28.5	33%	Acceptable	Acceptable
	Spring	25.6	29	34%	Acceptable	Acceptable
	Summer	19.6	21.9	23%	Acceptable	Acceptable
	Autumn	23.8	26.8	30%	Acceptable	Acceptable
	Winter	38	43.2	52%	Unacceptable	Unacceptable
39	Annual	29.3	36.4	71%	Acceptable	Unacceptable
	Spring	29.7	36.9	72%	Acceptable	Unacceptable
	Summer	25.3	28.9	36%	Acceptable	Acceptable
	Autumn	28.4	34.7	63%	Acceptable	Unacceptable
	Winter	43.5	53.6	101%	Unacceptable	Unacceptable
40	Annual	24	24.6		Acceptable	Acceptable
	Spring	25	25		Acceptable	Acceptable
	Summer	20.9	21.1		Acceptable	Acceptable
	Autumn	23.4	24.1		Acceptable	Acceptable
	Winter	33.9	35.3		Unacceptable	Unacceptable

Sensor	Season	No-Build	Build	% Change	No-Build Category	Build Category
		Comfort Category				
41	Annual	18.8	16.3	-25%	Walking	Walking
	Spring	20.1	17.3	-28%	Uncomfortable	Walking
	Summer	17.4	14.6	-28%	Walking	Standing
	Autumn	18.4	16.1	-23%	Walking	Walking
	Winter	26.1	23.7		Uncomfortable	Uncomfortable
42	Annual	14	13.2		Standing	Standing
	Spring	15.1	14.3		Walking	Standing
	Summer	13.1	12.3		Standing	Standing
	Autumn	13.7	13.2		Standing	Standing
	Winter	19	19.3		Uncomfortable	Uncomfortable
43	Annual	16	11.6	-44%	Walking	Sitting
	Spring	17	12.3	-47%	Walking	Standing
	Summer	14.6	10	-46%	Standing	Sitting
	Autumn	15.4	11.4	-40%	Walking	Sitting
	Winter	21.2	16.8	-44%	Uncomfortable	Walking
44	Annual	21	20.3		Uncomfortable	Uncomfortable
	Spring	21.2	20.6		Uncomfortable	Uncomfortable
	Summer	16.2	15.8		Walking	Walking
	Autumn	19.7	19.1		Uncomfortable	Uncomfortable
	Winter	31.1	30.3		Dangerous	Dangerous
45	Annual	12.8	14.9	21%	Standing	Standing
	Spring	13	15.2	22%	Standing	Walking
	Summer	10.6	12	14%	Sitting	Standing
	Autumn	12.2	14.3	21%	Standing	Standing
	Winter	19.5	21.9	24%	Uncomfortable	Uncomfortable
46	Annual	10.6	15.8	52%	Sitting	Walking
	Spring	11.2	17.1	59%	Sitting	Walking
	Summer	9.6	15.3	57%	Sitting	Walking
	Autumn	10.4	15.3	49%	Sitting	Walking
	Winter	14.7	21	63%	Standing	Uncomfortable
47	Annual	25.3	22.1	-32%	Uncomfortable	Uncomfortable
	Spring	26.4	22.8	-36%	Uncomfortable	Uncomfortable
	Summer	21	18.3	-27%	Uncomfortable	Walking
	Autumn	24.2	21.3	-29%	Uncomfortable	Uncomfortable
	Winter	38.4	32.8	-56%	Dangerous	Dangerous
48	Annual	16.2	16.6		Walking	Walking
	Spring	16.7	17.1		Walking	Walking
	Summer	13.2	13.1		Standing	Standing
	Autumn	15.5	15.7		Walking	Walking
	Winter	24.8	25.4		Uncomfortable	Uncomfortable

NOTE: Percent change is only shown for changes greater than 10%

Sensor	Season	No-Build	Build	% Change	No-Build Category	Build Category
		Effective Gust				
41	Annual	25.9	23.5		Acceptable	Acceptable
	Spring	27.6	24.9		Acceptable	Acceptable
	Summer	23.8	21	-28%	Acceptable	Acceptable
	Autumn	25.2	23.1		Acceptable	Acceptable
	Winter	35.6	33.5		Unacceptable	Unacceptable
42	Annual	21.6	21		Acceptable	Acceptable
	Spring	22.9	22		Acceptable	Acceptable
	Summer	19.3	18.2		Acceptable	Acceptable
	Autumn	21	20.5		Acceptable	Acceptable
	Winter	29.9	30.1		Acceptable	Acceptable
43	Annual	23.3	19.9	-34%	Acceptable	Acceptable
	Spring	24.8	20.8	-40%	Acceptable	Acceptable
	Summer	20.9	16.6	-43%	Acceptable	Acceptable
	Autumn	22.5	19.3	-32%	Acceptable	Acceptable
	Winter	31.6	28.3	-33%	Unacceptable	Acceptable
44	Annual	31.9	31.3		Unacceptable	Unacceptable
	Spring	32.4	31.8		Unacceptable	Unacceptable
	Summer	24.6	24.2		Acceptable	Acceptable
	Autumn	30	29.4		Acceptable	Acceptable
	Winter	47.1	46.3		Unacceptable	Unacceptable
45	Annual	23.4	25.3		Acceptable	Acceptable
	Spring	23.8	25.8		Acceptable	Acceptable
	Summer	19.3	20.8		Acceptable	Acceptable
	Autumn	22.4	24.4		Acceptable	Acceptable
	Winter	35.1	36.8		Unacceptable	Unacceptable
46	Annual	20.3	25.5	52%	Acceptable	Acceptable
	Spring	21.2	27.4	62%	Acceptable	Acceptable
	Summer	18	24.3	63%	Acceptable	Acceptable
	Autumn	19.9	24.7	48%	Acceptable	Acceptable
	Winter	28.7	33.9	52%	Acceptable	Unacceptable
47	Annual	37.1	33.6		Unacceptable	Unacceptable
	Spring	38.4	34.4	-40%	Unacceptable	Unacceptable
	Summer	30.3	27.3		Acceptable	Acceptable
	Autumn	35.4	32.1		Unacceptable	Unacceptable
	Winter	55.6	49.6	-60%	Unacceptable	Unacceptable
48	Annual	26.1	27.5		Acceptable	Acceptable
	Spring	26.8	28.2		Acceptable	Acceptable
	Summer	21	21.6		Acceptable	Acceptable
	Autumn	24.8	25.9		Acceptable	Acceptable
	Winter	39.5	41.9		Unacceptable	Unacceptable

NOTE: Percent change is only shown for changes greater than 10%

		Comfort Category				
Sensor	**Season**	**No-Build**	**Build**	**% Change**	**No-Build Category**	**Build Category**
49	Annual	11.1	10.5		Sitting	Sitting
	Spring	11.4	10.8		Sitting	Sitting
	Summer	8.7	8.3		Sitting	Sitting
	Autumn	10.5	10		Sitting	Sitting
	Winter	16.5	15.5		Walking	Walking
50	Annual	16	16.4		Walking	Walking
	Spring	16.3	16.7		Walking	Walking
	Summer	12.5	12.8		Standing	Standing
	Autumn	15.1	15.4		Walking	Walking
	Winter	24.3	25		Uncomfortable	Uncomfortable
51	Annual	19	18.9		Uncomfortable	Walking
	Spring	19.3	19.3		Uncomfortable	Uncomfortable
	Summer	14.8	14.8		Standing	Standing
	Autumn	18	17.9		Walking	Walking
	Winter	28.1	28		Dangerous	Dangerous
52	Annual	17	17		Walking	Walking
	Spring	17.8	17.6		Walking	Walking
	Summer	15	15		Walking	Walking
	Autumn	16.4	16.4		Walking	Walking
	Winter	25.1	24.9		Uncomfortable	Uncomfortable
53	Annual	20	20.4		Uncomfortable	Uncomfortable
	Spring	20.9	21.2		Uncomfortable	Uncomfortable
	Summer	18.1	18.4		Walking	Walking
	Autumn	19.5	19.9		Uncomfortable	Uncomfortable
	Winter	28.2	28.7		Dangerous	Dangerous
54	Annual	16	15.8		Walking	Walking
	Spring	16.5	16.4		Walking	Walking
	Summer	12.7	12.7		Standing	Standing
	Autumn	15.3	15.1		Walking	Walking
	Winter	24	23.2		Uncomfortable	Uncomfortable
55	Annual	12.4	11.7		Standing	Sitting
	Spring	12.7	11.9		Standing	Sitting
	Summer	9.7	9.1		Sitting	Sitting
	Autumn	11.7	11		Sitting	Sitting
	Winter	18.9	17.9		Walking	Walking
56	Annual	11.4	11		Sitting	Sitting
	Spring	11.9	11.5		Sitting	Sitting
	Summer	9.6	9.4		Sitting	Sitting
	Autumn	10.9	10.5		Sitting	Sitting
	Winter	16.8	16.1		Walking	Walking

		Effective Gust				
Sensor	**Season**	**No-Build**	**Build**	**% Change**	**No-Build Category**	**Build Category**
49	Annual	21.8	20.9		Acceptable	Acceptable
	Spring	22.3	21.4		Acceptable	Acceptable
	Summer	17	16.5		Acceptable	Acceptable
	Autumn	20.6	19.9		Acceptable	Acceptable
	Winter	32	30.8		Unacceptable	Acceptable
50	Annual	27.4	27.6		Acceptable	Acceptable
	Spring	27.7	28		Acceptable	Acceptable
	Summer	21.2	21.4		Acceptable	Acceptable
	Autumn	25.7	25.9		Acceptable	Acceptable
	Winter	41.4	41.8		Unacceptable	Unacceptable
51	Annual	29.5	29.3		Acceptable	Acceptable
	Spring	30	30		Acceptable	Acceptable
	Summer	22.8	22.9		Acceptable	Acceptable
	Autumn	27.8	27.7		Acceptable	Acceptable
	Winter	42.9	42.7		Unacceptable	Unacceptable
52	Annual	27.7	27.7		Acceptable	Acceptable
	Spring	29.1	28.9		Acceptable	Acceptable
	Summer	24.7	24.8		Acceptable	Acceptable
	Autumn	26.8	26.8		Acceptable	Acceptable
	Winter	39.3	39.3		Unacceptable	Unacceptable
53	Annual	29.2	29.3		Acceptable	Acceptable
	Spring	30.4	30.4		Acceptable	Acceptable
	Summer	25.9	26		Acceptable	Acceptable
	Autumn	28.4	28.6		Acceptable	Acceptable
	Winter	41.4	41.6		Unacceptable	Unacceptable
54	Annual	25.5	25.5		Acceptable	Acceptable
	Spring	26.2	26.2		Acceptable	Acceptable
	Summer	20.2	20.4		Acceptable	Acceptable
	Autumn	24.3	24.3		Acceptable	Acceptable
	Winter	37.1	36.9		Unacceptable	Unacceptable
55	Annual	20.5	19.6		Acceptable	Acceptable
	Spring	21	20.1		Acceptable	Acceptable
	Summer	15.9	15.2		Acceptable	Acceptable
	Autumn	19.3	18.4		Acceptable	Acceptable
	Winter	30.6	29.1		Acceptable	Acceptable
56	Annual	19.2	18.6		Acceptable	Acceptable
	Spring	19.9	19.4		Acceptable	Acceptable
	Summer	15.9	15.7		Acceptable	Acceptable
	Autumn	18.4	17.9		Acceptable	Acceptable
	Winter	27.5	26.6		Acceptable	Acceptable

			Comfort Category			
Sensor	Season	No-Build	Build	% Change	No-Build Category	Build Category
57	Annual	16.3	16.4		Walking	Walking
	Spring	17.2	17.3		Walking	Walking
	Summer	13.7	14.1		Standing	Standing
	Autumn	15.8	15.9		Walking	Walking
	Winter	23.6	23.4		Uncomfortable	Uncomfortable
58	Annual	14.4	14.5		Standing	Standing
	Spring	14.9	15.1		Standing	Walking
	Summer	12.2	12.5		Standing	Standing
	Autumn	13.9	14.1		Standing	Standing
	Winter	21.2	21.2		Uncomfortable	Uncomfortable
59	Annual	17.3	17.8		Walking	Walking
	Spring	18	18.5		Walking	Walking
	Summer	14.6	15.2		Standing	Walking
	Autumn	16.7	17.2		Walking	Walking
	Winter	24.8	25.2		Uncomfortable	Uncomfortable
60	Annual	12.4	12		Standing	Standing
	Spring	12.6	12.2		Standing	Standing
	Summer	10	9.9		Sitting	Sitting
	Autumn	11.8	11.6		Sitting	Sitting
	Winter	17.6	17.1		Walking	Walking
61	Annual	17.6	16.1		Walking	Walking
	Spring	17.7	16.3		Walking	Walking
	Summer	14.3	13.3		Standing	Standing
	Autumn	16.7	15.5		Walking	Walking
	Winter	27.3	24.9		Dangerous	Uncomfortable
62	Annual	10.2	9.5		Sitting	Sitting
	Spring	10.8	10.1		Sitting	Sitting
	Summer	8	7.6		Sitting	Sitting
	Autumn	9.7	9.2		Sitting	Sitting
	Winter	14.4	13.1		Standing	Standing
63	Annual	21	19.2		Uncomfortable	Uncomfortable
	Spring	21.7	19.8		Uncomfortable	Uncomfortable
	Summer	16.9	15.4		Walking	Walking
	Autumn	19.9	18.3		Uncomfortable	Walking
	Winter	32.5	29.5		Dangerous	Dangerous
64	Annual	20.7	18.8		Uncomfortable	Walking
	Spring	21.1	19.7		Uncomfortable	Uncomfortable
	Summer	16.4	16.7		Walking	Walking
	Autumn	19.7	18.2		Uncomfortable	Walking
	Winter	31.2	27	-42%	Dangerous	Dangerous

NOTE: Percent change is only shown for changes greater than 10%

			Effective Gust			
Sensor	Season	No-Build	Build	% Change	No-Build Category	Build Category
57	Annual	24.4	24.6		Acceptable	Acceptable
	Spring	25.6	25.8		Acceptable	Acceptable
	Summer	20.1	20.4		Acceptable	Acceptable
	Autumn	23.6	23.7		Acceptable	Acceptable
	Winter	34.6	34.4		Unacceptable	Unacceptable
58	Annual	24.6	24.7		Acceptable	Acceptable
	Spring	25.3	25.4		Acceptable	Acceptable
	Summer	19.9	20		Acceptable	Acceptable
	Autumn	23.6	23.7		Acceptable	Acceptable
	Winter	35.5	35.5		Unacceptable	Unacceptable
59	Annual	26	26.3		Acceptable	Acceptable
	Spring	27	27.4		Acceptable	Acceptable
	Summer	21.1	21.5		Acceptable	Acceptable
	Autumn	24.9	25.2		Acceptable	Acceptable
	Winter	36.7	37.2		Unacceptable	Unacceptable
60	Annual	22.3	21.8		Acceptable	Acceptable
	Spring	22.7	22.2		Acceptable	Acceptable
	Summer	18.1	17.9		Acceptable	Acceptable
	Autumn	21.3	21		Acceptable	Acceptable
	Winter	31.7	31		Unacceptable	Unacceptable
61	Annual	26.9	25.9		Acceptable	Acceptable
	Spring	27.3	26.3		Acceptable	Acceptable
	Summer	22.5	21.9		Acceptable	Acceptable
	Autumn	25.8	25.1		Acceptable	Acceptable
	Winter	40.3	38.6		Unacceptable	Unacceptable
62	Annual	17.8	17.4		Acceptable	Acceptable
	Spring	18.7	18.2		Acceptable	Acceptable
	Summer	14.2	14.2		Acceptable	Acceptable
	Autumn	17	16.8		Acceptable	Acceptable
	Winter	24.8	23.9		Acceptable	Acceptable
63	Annual	33.6	31.4		Unacceptable	Unacceptable
	Spring	34.3	32.1		Unacceptable	Unacceptable
	Summer	26.8	24.9		Acceptable	Acceptable
	Autumn	31.7	29.7		Unacceptable	Acceptable
	Winter	51	47.5		Unacceptable	Unacceptable
64	Annual	31	28.9		Unacceptable	Acceptable
	Spring	31.7	30.2		Unacceptable	Acceptable
	Summer	25	25.2		Acceptable	Acceptable
	Autumn	29.7	28		Acceptable	Acceptable
	Winter	46.1	41.2	-49%	Unacceptable	Unacceptable

		Comfort Category				
Sensor	Season	No-Build	Build	% Change	No-Build Category	Sensor
65	Annual	23.4	19.2	-42%	Uncomfortable	Uncomfortable
	Spring	23.8	19.6	-42%	Uncomfortable	Uncomfortable
	Summer	18.9	16.1	-28%	Walking	Walking
	Autumn	22.3	18.7	-36%	Uncomfortable	Walking
	Winter	35.2	28.4	-68%	Dangerous	Dangerous
66	Annual	23.9	27.9	40%	Uncomfortable	Dangerous
	Spring	24.3	28.4	41%	Uncomfortable	Dangerous
	Summer	19	21.6	26%	Uncomfortable	Uncomfortable
	Autumn	22.5	26.3	38%	Uncomfortable	Uncomfortable
	Winter	35.9	41.9	60%	Dangerous	Dangerous
67	Annual	22	31	90%	Uncomfortable	Dangerous
	Spring	22.4	31.6	92%	Uncomfortable	Dangerous
	Summer	17.3	23.9	66%	Walking	Uncomfortable
	Autumn	20.8	29.2	84%	Uncomfortable	Dangerous
	Winter	33	46.3	133%	Dangerous	Dangerous
68	Annual	11.5	11.4		Sitting	Sitting
	Spring	11.7	11.8		Sitting	Sitting
	Summer	9.4	9.7		Sitting	Sitting
	Autumn	11	11.1		Sitting	Sitting
	Winter	16.3	16.1		Walking	Walking
69	Annual	15	15.2		Walking	Walking
	Spring	15.2	15.4		Walking	Walking
	Summer	13.6	13.8		Standing	Standing
	Autumn	14.8	15		Standing	Walking
	Winter	21.4	21.6		Uncomfortable	Uncomfortable
70	Annual	17.5	16.4		Walking	Walking
	Spring	17.7	16.6		Walking	Walking
	Summer	13.4	12.6		Standing	Standing
	Autumn	16.6	15.7		Walking	Walking
	Winter	27.6	25.8		Dangerous	Uncomfortable
71	Annual	20.5	19.3		Uncomfortable	Uncomfortable
	Spring	21	19.8		Uncomfortable	Uncomfortable
	Summer	16.6	15.8		Walking	Walking
	Autumn	19.6	18.5		Uncomfortable	Walking
	Winter	31.2	29.2		Dangerous	Dangerous
72	Annual	22.6	21.6		Uncomfortable	Uncomfortable
	Spring	23	22		Uncomfortable	Uncomfortable
	Summer	18.9	18.1		Walking	Walking
	Autumn	21.7	20.8		Uncomfortable	Uncomfortable
	Winter	33.6	31.7		Dangerous	Dangerous

NOTE: Percent change is only shown for changes greater than 10%

		Effective Gust				
Sensor	Season	No-Build	Build	% Change	No-Build Category	Build Category
65	Annual	34.1	29	-51%	Unacceptable	Acceptable
	Spring	34.6	29.5	-51%	Unacceptable	Acceptable
	Summer	27.8	24.7	-31%	Acceptable	Acceptable
	Autumn	32.5	28.4	-41%	Unacceptable	Acceptable
	Winter	51.1	42.5	-86%	Unacceptable	Unacceptable
66	Annual	34.6	37.4		Unacceptable	Unacceptable
	Spring	35.3	38		Unacceptable	Unacceptable
	Summer	27.9	29		Acceptable	Acceptable
	Autumn	32.9	35.3		Unacceptable	Unacceptable
	Winter	52.1	55.7		Unacceptable	Unacceptable
67	Annual	32.9	40.8	79%	Unacceptable	Unacceptable
	Spring	33.5	41.4	79%	Unacceptable	Unacceptable
	Summer	26.2	31.6	54%	Acceptable	Unacceptable
	Autumn	31.2	38.4	72%	Unacceptable	Unacceptable
	Winter	49.2	60.3	111%	Unacceptable	Unacceptable
68	Annual	21	21		Acceptable	Acceptable
	Spring	21.4	21.5		Acceptable	Acceptable
	Summer	17.1	17.4		Acceptable	Acceptable
	Autumn	20.1	20.3		Acceptable	Acceptable
	Winter	29.8	29.6		Acceptable	Acceptable
69	Annual	25.7	25.7		Acceptable	Acceptable
	Spring	26.1	26.1		Acceptable	Acceptable
	Summer	23.3	23.2		Acceptable	Acceptable
	Autumn	25.3	25.2		Acceptable	Acceptable
	Winter	36.8	36.7		Unacceptable	Unacceptable
70	Annual	27.8	26.8		Acceptable	Acceptable
	Spring	28.2	27.2		Acceptable	Acceptable
	Summer	21.3	20.7		Acceptable	Acceptable
	Autumn	26.5	25.6		Acceptable	Acceptable
	Winter	43.6	42		Unacceptable	Unacceptable
71	Annual	31.4	30.2		Unacceptable	Acceptable
	Spring	32.1	31.1		Unacceptable	Unacceptable
	Summer	25.4	24.6		Acceptable	Acceptable
	Autumn	30	28.9		Acceptable	Acceptable
	Winter	47.1	45		Unacceptable	Unacceptable
72	Annual	33.8	32.4		Unacceptable	Unacceptable
	Spring	34.4	33.1		Unacceptable	Unacceptable
	Summer	28.2	27.1		Acceptable	Acceptable
	Autumn	32.4	31.3		Unacceptable	Unacceptable
	Winter	50.1	47.6		Unacceptable	Unacceptable

NOTE: Percent change is only shown for changes greater than 10%

		Comfort Category				
Sensor	Season	No-Build	Build	% Change	No-Build Category	Sensor
73	Annual	23.1	21.7		Uncomfortable	Uncomfortable
	Spring	23.5	22.5		Uncomfortable	Uncomfortable
	Summer	18	17.9		Walking	Walking
	Autumn	21.8	20.9		Uncomfortable	Uncomfortable
	Winter	33.9	31.2		Dangerous	Dangerous
74	Annual	22.5	23.5		Uncomfortable	Uncomfortable
	Spring	22.8	24.4		Uncomfortable	Uncomfortable
	Summer	17.5	19.5	20%	Walking	Uncomfortable
	Autumn	21.2	22.6		Uncomfortable	Uncomfortable
	Winter	32.9	33.6		Dangerous	Dangerous
75	Annual	19.6	25.8	62%	Uncomfortable	Uncomfortable
	Spring	19.9	26.2	63%	Uncomfortable	Uncomfortable
	Summer	15.1	19.9	48%	Walking	Uncomfortable
	Autumn	18.5	24.4	59%	Walking	Uncomfortable
	Winter	28.8	37.9	91%	Dangerous	Dangerous
76	Annual	15.3	24.1	88%	Walking	Uncomfortable
	Spring	15.5	24.5	90%	Walking	Uncomfortable
	Summer	11.8	18.5	67%	Sitting	Walking
	Autumn	14.5	22.7	82%	Standing	Uncomfortable
	Winter	22.1	35.4	133%	Uncomfortable	Dangerous
77	Annual	11.7	14.1	24%	Sitting	Standing
	Spring	12	14.3	23%	Standing	Standing
	Summer	9.1	11	19%	Sitting	Sitting
	Autumn	11.1	13.4	23%	Sitting	Standing
	Winter	16.7	20.3	36%	Walking	Uncomfortable
78	Annual	13	16.4	34%	Standing	Walking
	Spring	13.3	16.5	32%	Standing	Walking
	Summer	10.4	12.9	25%	Sitting	Standing
	Autumn	12.3	15.4	31%	Standing	Walking
	Winter	18.9	24.5	56%	Walking	Uncomfortable
79	Annual	19	17.9		Uncomfortable	Walking
	Spring	20.1	18.8		Uncomfortable	Walking
	Summer	16.7	15.5		Walking	Walking
	Autumn	18.6	17.6		Walking	Walking
	Winter	26.3	24.9		Uncomfortable	Uncomfortable
80	Annual	14.1	16.1	20%	Standing	Walking
	Spring	14.6	16		Standing	Walking
	Summer	12.1	13.1		Standing	Standing
	Autumn	13.8	15.4	16%	Standing	Walking
	Winter	20	24.3	43%	Uncomfortable	Uncomfortable

		Effective Gust				
Sensor	Season	No-Build	Build	% Change	No-Build Category	Build Category
73	Annual	32.5	31.8		Unacceptable	Unacceptable
	Spring	33.2	33		Unacceptable	Unacceptable
	Summer	25.8	26.2		Acceptable	Acceptable
	Autumn	30.9	30.6		Acceptable	Acceptable
	Winter	47.1	45.1		Unacceptable	Unacceptable
74	Annual	32.9	33.6		Unacceptable	Unacceptable
	Spring	33.6	35.1		Unacceptable	Unacceptable
	Summer	25.8	27.8		Acceptable	Acceptable
	Autumn	31.2	32.3		Unacceptable	Unacceptable
	Winter	47.9	47.6		Unacceptable	Unacceptable
75	Annual	32.5	36	35%	Unacceptable	Unacceptable
	Spring	32.9	36.6	37%	Unacceptable	Unacceptable
	Summer	25	27.8	28%	Acceptable	Acceptable
	Autumn	30.5	34	35%	Acceptable	Unacceptable
	Winter	47.8	52.2		Unacceptable	Unacceptable
76	Annual	26.4	34.8	84%	Acceptable	Unacceptable
	Spring	26.8	35.3	85%	Acceptable	Unacceptable
	Summer	20.3	26.7	64%	Acceptable	Acceptable
	Autumn	25	32.8	78%	Acceptable	Unacceptable
	Winter	38.3	50.9	126%	Unacceptable	Unacceptable
77	Annual	20.7	23.5	28%	Acceptable	Acceptable
	Spring	21.2	23.8	26%	Acceptable	Acceptable
	Summer	15.9	18.1	22%	Acceptable	Acceptable
	Autumn	19.6	22.2	26%	Acceptable	Acceptable
	Winter	29.1	33.4	43%	Acceptable	Unacceptable
78	Annual	21.8	26.4	46%	Acceptable	Acceptable
	Spring	22.4	26.7	43%	Acceptable	Acceptable
	Summer	17.4	20.6	32%	Acceptable	Acceptable
	Autumn	20.7	24.9	42%	Acceptable	Acceptable
	Winter	31.3	38.9	76%	Unacceptable	Unacceptable
79	Annual	27.4	27.3		Acceptable	Acceptable
	Spring	28.9	28.4		Acceptable	Acceptable
	Summer	24	23.7		Acceptable	Acceptable
	Autumn	27.1	26.8		Acceptable	Acceptable
	Winter	38.4	38.2		Unacceptable	Unacceptable
80	Annual	22.1	25.9	38%	Acceptable	Acceptable
	Spring	22.9	26	31%	Acceptable	Acceptable
	Summer	18.8	21	22%	Acceptable	Acceptable
	Autumn	21.6	24.8	32%	Acceptable	Acceptable
	Winter	31.3	39.4	81%	Unacceptable	Unacceptable

			Comfort Category			
Sensor	Season	No-Build	Build	% Change	No-Build Category	Sensor
81	Annual	15.5	15.3		Walking	Walking
	Spring	16.2	15.9		Walking	Walking
	Summer	13.5	13.4		Standing	Standing
	Autumn	15.1	14.9		Walking	Standing
	Winter	21.7	21.6		Uncomfortable	Uncomfortable
82	Annual	14.9	14.8		Standing	Standing
	Spring	15.7	15.3		Walking	Walking
	Summer	13.3	13.1		Standing	Standing
	Autumn	14.7	14.6		Standing	Standing
	Winter	20.8	20.9		Uncomfortable	Uncomfortable
83	Annual	11.7	16	43%	Sitting	Walking
	Spring	12	16.2	42%	Standing	Walking
	Summer	9.3	12.4	31%	Sitting	Standing
	Autumn	11.2	15	38%	Sitting	Walking
	Winter	16.5	23.8	73%	Walking	Uncomfortable
84	Annual	13.2	16.4	32%	Standing	Walking
	Spring	13.6	16.7	31%	Standing	Walking
	Summer	10.2	12.6	24%	Sitting	Standing
	Autumn	12.5	15.4	29%	Standing	Walking
	Winter	18.8	24.4	56%	Walking	Uncomfortable
85	Annual	19.5	18.7		Uncomfortable	Walking
	Spring	20.9	20.2		Uncomfortable	Uncomfortable
	Summer	18.1	17.5		Walking	Walking
	Autumn	18.9	18.1		Walking	Walking
	Winter	26.4	24.9		Uncomfortable	Uncomfortable
86	Annual	26.4	26.5		Uncomfortable	Uncomfortable
	Spring	26.8	26.9		Uncomfortable	Uncomfortable
	Summer	20.6	20.8		Uncomfortable	Uncomfortable
	Autumn	24.8	24.9		Uncomfortable	Uncomfortable
	Winter	38.5	38.7		Dangerous	Dangerous
87	Annual	26.9	25.5		Uncomfortable	Uncomfortable
	Spring	27.3	26		Dangerous	Uncomfortable
	Summer	20.6	19.6		Uncomfortable	Uncomfortable
	Autumn	25.2	24		Uncomfortable	Uncomfortable
	Winter	39.4	37.9		Dangerous	Dangerous
88	Annual	31.5	28.4		Dangerous	Dangerous
	Spring	32.7	29.7		Dangerous	Dangerous
	Summer	26	24.1		Uncomfortable	Uncomfortable
	Autumn	30.3	27.5		Dangerous	Dangerous
	Winter	43.8	39.7		Dangerous	Dangerous

NOTE: Percent change is only shown for changes greater than 10%

			Effective Gust			
Sensor	Season	No-Build	Build	% Change	No-Build Category	Build Category
81	Annual	22.9	22.6		Acceptable	Acceptable
	Spring	23.7	23.3		Acceptable	Acceptable
	Summer	19.4	19.2		Acceptable	Acceptable
	Autumn	22.3	22.1		Acceptable	Acceptable
	Winter	31.8	31.7		Unacceptable	Unacceptable
82	Annual	23.3	24.3		Acceptable	Acceptable
	Spring	24.5	25		Acceptable	Acceptable
	Summer	20.5	20.6		Acceptable	Acceptable
	Autumn	22.9	23.7		Acceptable	Acceptable
	Winter	32.4	34		Unacceptable	Unacceptable
83	Annual	20.6	25.4	48%	Acceptable	Acceptable
	Spring	21.2	25.8	46%	Acceptable	Acceptable
	Summer	16.5	19.5	30%	Acceptable	Acceptable
	Autumn	19.9	23.9	40%	Acceptable	Acceptable
	Winter	29	37	80%	Acceptable	Unacceptable
84	Annual	23	26.3	33%	Acceptable	Acceptable
	Spring	23.7	26.9	32%	Acceptable	Acceptable
	Summer	18.1	20.3	22%	Acceptable	Acceptable
	Autumn	21.9	24.8	29%	Acceptable	Acceptable
	Winter	33.1	38.8	57%	Unacceptable	Unacceptable
85	Annual	30.4	29		Acceptable	Acceptable
	Spring	32.3	30.9		Unacceptable	Acceptable
	Summer	27.6	26.5		Acceptable	Acceptable
	Autumn	29.4	28.1		Acceptable	Acceptable
	Winter	42	39.4		Unacceptable	Unacceptable
86	Annual	36.5	36.3		Unacceptable	Unacceptable
	Spring	37.1	36.9		Unacceptable	Unacceptable
	Summer	28.5	28.5		Acceptable	Acceptable
	Autumn	34.3	34.2		Unacceptable	Unacceptable
	Winter	53.1	52.9		Unacceptable	Unacceptable
87	Annual	36.4	35.4		Unacceptable	Unacceptable
	Spring	37.1	36.1		Unacceptable	Unacceptable
	Summer	27.9	27.1		Acceptable	Acceptable
	Autumn	34.2	33.3		Unacceptable	Unacceptable
	Winter	52.9	51.8		Unacceptable	Unacceptable
88	Annual	38	35.2		Unacceptable	Unacceptable
	Spring	39.7	37		Unacceptable	Unacceptable
	Summer	32.1	30.5		Unacceptable	Acceptable
	Autumn	36.8	34.1		Unacceptable	Unacceptable
	Winter	52.4	48.4		Unacceptable	Unacceptable

NOTE: Percent change is only shown for changes greater than 10%

			Comfort Category			
Sensor	**Season**	**No-Build**	**Build**	**% Change**	**No-Build Category**	**Sensor**
89	Annual	16.4	16.9		Walking	Walking
	Spring	17.7	18.3		Walking	Walking
	Summer	13.2	14.5		Standing	Standing
	Autumn	15.5	16		Walking	Walking
	Winter	21.8	22.2		Uncomfortable	Uncomfortable
90	Annual	9.3	8.6		Sitting	Sitting
	Spring	9.6	9		Sitting	Sitting
	Summer	7.1	6.6		Sitting	Sitting
	Autumn	8.8	8.2		Sitting	Sitting
	Winter	14.6	13.5		Standing	Standing
91	Annual	16.9	17.4		Walking	Walking
	Spring	17.7	18.1		Walking	Walking
	Summer	15.3	15.7		Walking	Walking
	Autumn	16.5	17.1		Walking	Walking
	Winter	23.2	24.3		Uncomfortable	Uncomfortable
92	Annual	13.7	13.6		Standing	Standing
	Spring	14.4	14.4		Standing	Standing
	Summer	10.8	11.2		Sitting	Sitting
	Autumn	13	13.1		Standing	Standing
	Winter	19.1	18.6		Uncomfortable	Walking
93	Annual	21.5	19.7		Uncomfortable	Uncomfortable
	Spring	21.7	20		Uncomfortable	Uncomfortable
	Summer	16.5	15.1		Walking	Walking
	Autumn	20.1	18.5		Uncomfortable	Walking
	Winter	32.1	29.5		Dangerous	Dangerous
94	Annual	25.9	23.6		Uncomfortable	Uncomfortable
	Spring	26.3	24.3		Uncomfortable	Uncomfortable
	Summer	19.8	19.2		Uncomfortable	Uncomfortable
	Autumn	24.4	22.5		Uncomfortable	Uncomfortable
	Winter	38.8	34.7	-41%	Dangerous	Dangerous
95	Annual	19.2	17.1	-21%	Uncomfortable	Walking
	Spring	19.7	17.8		Uncomfortable	Walking
	Summer	15.1	13.4	-17%	Walking	Standing
	Autumn	18.1	16.1	-20%	Walking	Walking
	Winter	28.4	25.1	-33%	Dangerous	Uncomfortable
96	Annual	18.1	19.3		Walking	Uncomfortable
	Spring	19.2	20		Uncomfortable	Uncomfortable
	Summer	14.7	15.8		Standing	Walking
	Autumn	17.2	18.5		Walking	Walking
	Winter	26.4	27.3		Uncomfortable	Dangerous

			Effective Gust			
Sensor	**Season**	**No-Build**	**Build**	**% Change**	**No-Build Category**	**Build Category**
89	Annual	27.2	27.2		Acceptable	Acceptable
	Spring	29	29		Acceptable	Acceptable
	Summer	21.7	22.8		Acceptable	Acceptable
	Autumn	25.8	25.8		Acceptable	Acceptable
	Winter	37.1	37.1		Unacceptable	Unacceptable
90	Annual	16.4	15.7		Acceptable	Acceptable
	Spring	17.1	16.3		Acceptable	Acceptable
	Summer	12.7	12.2		Acceptable	Acceptable
	Autumn	15.6	15		Acceptable	Acceptable
	Winter	24.8	23.5		Acceptable	Acceptable
91	Annual	26.5	27.3		Acceptable	Acceptable
	Spring	27.7	28.4		Acceptable	Acceptable
	Summer	23.8	24.4		Acceptable	Acceptable
	Autumn	25.9	26.8		Acceptable	Acceptable
	Winter	36.6	38.1		Unacceptable	Unacceptable
92	Annual	25.1	25.3		Acceptable	Acceptable
	Spring	26.2	26.4		Acceptable	Acceptable
	Summer	20.3	21		Acceptable	Acceptable
	Autumn	24	24.4		Acceptable	Acceptable
	Winter	35.4	35		Unacceptable	Unacceptable
93	Annual	35.7	33.6		Unacceptable	Unacceptable
	Spring	36.2	34.2		Unacceptable	Unacceptable
	Summer	27.2	25.6		Acceptable	Acceptable
	Autumn	33.6	31.6		Unacceptable	Unacceptable
	Winter	52.9	49.8		Unacceptable	Unacceptable
94	Annual	37.6	35.8		Unacceptable	Unacceptable
	Spring	38.2	36.6		Unacceptable	Unacceptable
	Summer	28.8	28.2		Acceptable	Acceptable
	Autumn	35.4	34		Unacceptable	Unacceptable
	Winter	56	52.6		Unacceptable	Unacceptable
95	Annual	29.2	27.4		Acceptable	Acceptable
	Spring	30.1	28.6		Acceptable	Acceptable
	Summer	23.4	22		Acceptable	Acceptable
	Autumn	27.7	26		Acceptable	Acceptable
	Winter	42.1	39.1		Unacceptable	Unacceptable
96	Annual	27.9	30.7	28%	Acceptable	Acceptable
	Spring	29.7	31.9		Acceptable	Unacceptable
	Summer	23.2	25.4		Acceptable	Acceptable
	Autumn	26.7	29.6	29%	Acceptable	Acceptable
	Winter	39.7	43.3		Unacceptable	Unacceptable

			Comfort Category			
Sensor	Season	No-Build	Build	% Change	No-Build Category	Sensor
97	Annual	15.1	19.3	42%	Walking	Uncomfortable
	Spring	15	19.6	46%	Walking	Uncomfortable
	Summer	14.2	16.1	19%	Standing	Walking
	Autumn	15	18.6	36%	Walking	Walking
	Winter	22.2	28	58%	Uncomfortable	Dangerous
98	Annual	19.5	18.7		Uncomfortable	Walking
	Spring	20.7	19.6		Uncomfortable	Uncomfortable
	Summer	15.3	14.4		Walking	Standing
	Autumn	18.3	17.6		Walking	Walking
	Winter	28.9	27.3		Dangerous	Dangerous
99	Annual	11.5	20.1	86%	Sitting	Uncomfortable
	Spring	11.8	20.3	85%	Sitting	Uncomfortable
	Summer	9.3	15.3	60%	Sitting	Walking
	Autumn	10.8	18.9	81%	Sitting	Walking
	Winter	17.1	29.6	125%	Walking	Dangerous

NOTE: Percent change is only shown for changes greater than 10%

			Effective Gust			
Sensor	Season	No-Build	Build	% Change	No-Build Category	Build Category
97	Annual	25.4	31.3	59%	Acceptable	Unacceptable
	Spring	25.5	31.9	64%	Acceptable	Unacceptable
	Summer	23.5	26.3	28%	Acceptable	Acceptable
	Autumn	25.1	30.2	51%	Acceptable	Acceptable
	Winter	37.2	45.4	82%	Unacceptable	Unacceptable
98	Annual	29.3	30.4		Acceptable	Acceptable
	Spring	31.4	31.7		Unacceptable	Unacceptable
	Summer	22.8	23.3		Acceptable	Acceptable
	Autumn	27.5	28.5		Acceptable	Acceptable
	Winter	41.8	43.6		Unacceptable	Unacceptable
99	Annual	20.2	31.4	112%	Acceptable	Unacceptable
	Spring	20.8	31.8	110%	Acceptable	Unacceptable
	Summer	16.6	24	74%	Acceptable	Acceptable
	Autumn	19.2	29.6	104%	Acceptable	Acceptable
	Winter	29.5	46.2	167%	Acceptable	Unacceptable