Notice of
Project Change

Project
Notification
Form

Submitted Pursuant to
Article 80 of the
Boston Zoning Code

Prudential Center Redevelopment
Exeter Residences & 888 Boylston

Phases 6 & 4a
Boston, MA

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

Submitted by:
Boston Properties, Inc.
800 Boylston Street
Boston, MA 02199

Prepared by:
Vanasse Hangen Brustlin, Inc.
99 High Street, 10th Floor
Boston, MA 02110

In association with:
Goulston & Storrs
Boston, MA

CBT
Boston, MA

Elkus/Manfredi Architects
Boston, MA

AvalonBay Communities, Inc.
Boston, MA

Volume I

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CHAPTER 6: Environmental Protection

1

Introduction/ Executive Summary

1.1 Introduction

BP Prucenter Acquisition LLC, an affiliate of Boston Properties, Inc. and the owner of the Prudential Center, proposes to further enhance one of Boston's most important business and residential addresses through an update of the Prudential Center Development Plan. The plan update responds to the neighborhood's desires for additional residential units at the Prudential Center. In addition, the plan update modifies the previously approved Boylston Office Building, also known as 888 Boylston Street, making it a viable office alternative for quality tenants considering locating to the Back Bay.

The Exeter Residences, located on Exeter Street in Phase 6 of the site Master Plan area, includes the proposed residential program. The proposed building is consistent with the Master Plan as further described in this chapter. The proposed Development Plan changes are located completely within the Prudential Center Redevelopment Planned Development Area Number 37 (PDA No. 37) and conform to the previously established Floor Area Ratio (FAR) for the site.

Since acquiring the Prudential Center in 1998, Boston Properties has developed, or caused to be developed, almost all of the 4,500 feet of street frontage surrounding and within the Prudential Center. The final 200 feet of street frontage is the Boylston Street frontage of Phase 4a. Every phase of development has been undertaken to satisfy a demand in the market for a particular product (e.g. Class A office in the early 2000s, luxury full service residential in the mid 2000s). The type of office product that tenants require has changed since the original redevelopment plan was envisioned in the 1980s. High rise office space is in demand while the demand for low rise office space that was once used as corporate back-office space has been shifted out of the Commonwealth and in some instances out of the country. Over the same period, the Back Bay has emerged as a 24/7 neighborhood that is ideally suited for people who like to live, work and play in their locale. 888 Boylston as proposed would appeal to a niche segment of the market who is looking for view space within a vibrant urban community. 888 Boylston would benefit local businesses as the office tenants would frequent local restaurants, shops, and services. 888 Boylston would benefit the public realm as a new active plaza area in front of the building would replace the last remnants of the original 1960s design. The final 200 feet of street frontage separating the Mandarin Oriental Boston and the Hynes Convention Center would finally be finished.

This document provides a description of the new Prudential Center components and an evaluation of potential impacts and measures that will be undertaken to offset project impacts, all in accordance with the proposed scope given in Appendix A.

1.2 Article 80 Submission

This document is being submitted under Article 80 of the Boston Zoning Code (the Code) to notify the Boston Redevelopment Authority (the BRA) of an additional development component phase to be approved as Phase 6, which previously was approved on a Master Plan level, of the Prudential Center Redevelopment (PDA No. 37), and of a change in a portion of Phase 4a, also a development component phase within PDA No. 37. PDA No. 37 was subject to review and approval under Article 31 of the Code by the BRA on January 18, 1990, by the Boston Zoning Commission on March 20, 1990, and by the Mayor on March 20, 1990. PDA No. 37 was most recently subject to review and approval under Article 80 of the Code by the BRA on May 9, 2002, by the Boston Zoning Commission on July 24, 2002, and by the Mayor on July 26, 2002, at which time a Master Plan concept was approved for Phase 6. The current filing seeks review under the provisions of Section 80A-6, Section 80B-5, and Section 80C-7 for approval on a Development Plan level of Phase 6, previously approved in 2002 on a Master Plan basis, and for a modification of Phase 4a previously approved in the 1990 Development Plan. PDA No. 37 does not designate project sites specifically, but rather delineates development components (whole buildings or portions of retail expansion) as being part of a contemplated phase of construction.

The Proposed Project sub-phase of Phase 6, to be known as Exeter Residences (The Exeter Residences), proposes a new development component consisting of a new residential building in the area delineated as Phase 6 on a Master Plan basis within PDA No. 37. The building is sited with its primary entrance on Exeter Street. The building site includes a portion of what is currently the Lord & Taylor building.

Phase 6 has not previously been subject to Large Project Review. The 2002 Master Plan recognized that a further Amendment to the Development Plan would be required to implement Phase 6. The Master Plan envisioned additional residential development within the boundaries of Phase 6. Boston Properties has selected AvalonBay Communities, Inc. (AVB) to develop Exeter Residences located within the Prudential Center Complex on Exeter Street. The proposed Exeter Residences will consist of a 30 story residential building containing approximately 256,000 square feet of residential and retail space with a height of approximately 340 feet in the vicinity of the existing residential buildings owned by AVB referred to in the Development Plan as Boylston Apartments, Fairfield Apartments, and Gloucester Apartments.

The Proposed Project sub-phase of Phase 4a, known as the Boylston Office Building (888 Boylston), proposes an increase in height and square footage to the previously approved Boylston Office Building, which was originally approved as the development component for Phase 4a of PDA No. 37. The reviewer should be aware that the 888 Boylston site occupies a portion of the areas designated for construction under Phase 4a, some of which was constructed between 1990 and 1993. However, development components outside of the 888 Boylston site, but still within the Phase 4a boundary lines, are specifically identified in this document to provide context.

888 Boylston (Phase 4a) was described in the Prudential Center Redevelopment Planned Development Area Final Project Impact Report/Environmental Impact Report (Prudential FPIR/FEIR).[1] The 888 Boylston building is to be developed by Boston Properties, Inc. (Boston Properties) or an affiliate thereof, as the Proponent, and will be located within the Prudential Center Complex at 888 Boylston, between the existing arcade entry and the Hynes Convention Center. The proposed modification to 888 Boylston Street adds eight additional stories to the previously approved office building, resulting in an increase of approximately 149,000 square feet of office space, an increase of approximately 2,500 square feet of common and retail space, and an increase of approximately 110 feet in height. As so modified, 888 Boylston and the remainder of Phase 4a will consist of a 19 story office building containing approximately 369,000 square feet of office space and approximately 51,000 square feet of retail space with a height of approximately 265 feet.

Figure 1-1 is the Site Plan for PDA No. 37 and depicts the boundary lines of Phase 6 and 4a development components including the location of Exeter Residences and the 888 Boylston sites within their respective Phase 6 and 4a boundaries and those of the Prudential Center.

[1] Prudential Center Redevelopment, Final Project and Environmental Impact Report, EOEA §7208. Submitted November 13, 1989, by The Prudential Property Company, Inc. for the Prudential Insurance Company of America. The BRA Final Adequacy Determination was issued on April 27, 1990.

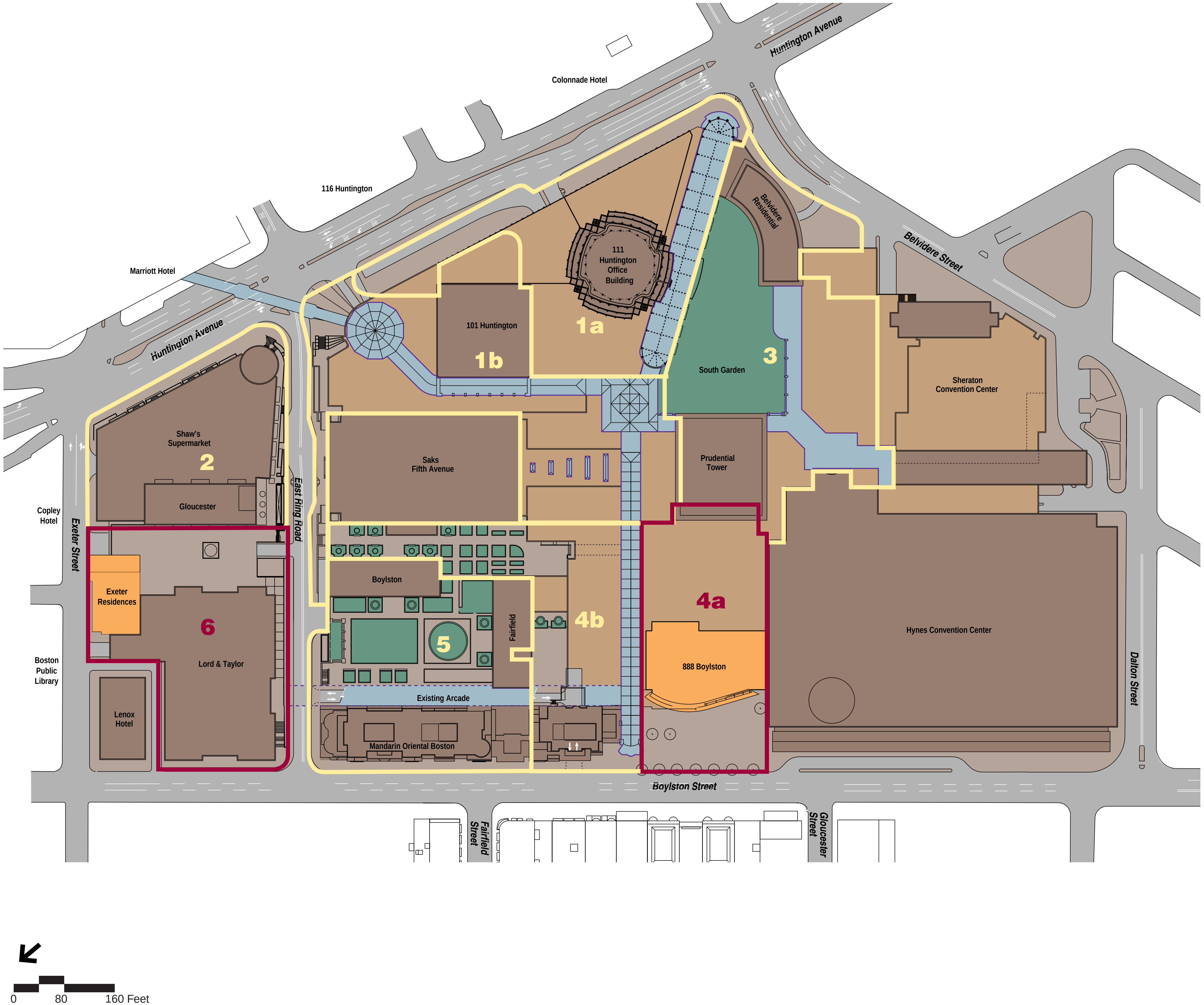

Figure 1-1

Exeter Residences and 888 Boylston within PDA #37 Prudential Center

1.3 Project Filings

This Article 80 submission constitutes a Notice of Project Change and a Project Notification Form as described below.

Notice of Project Change

The proposed Exeter Residences and 888 Boylston represent a change in project program. The Approved Project is the Prudential Center Development for Planned Development Area No. 37, which was reviewed under the Article 31 review process by the BRA and other public agencies in 1990, as modified under the Article 80 review process by the BRA and other public agencies in 2002. Accordingly, under Article 80, Section 80-5(3)(a)(v) of the Code, the Approved Project is subject to review under Article 31 of the Code, the predecessor to Article 80. However, since an Amendment to the Development Plan is being submitted under Article 80C to provide for approvals for the new program, use, and design of Phase 6 and to implement the proposed changes to 888 Boylston, the new Exeter Residences, and the modifications to 888 Boylston are also being submitted for review under Article 80. According to relevant sections of Article 80A-6 of the Code, in the event of a material change in a Proposed Project or a project phase, the Director of the BRA is to determine whether the project change significantly increases those impacts of the Proposed Project or project phase that are within the scope of the required review, and whether such increased impacts warrant resubmission of the PNF, rescoping, supplementary documentation, or a further DPIR, or FPIR. This Notice of Project Change responds to these requirements.

Project Notification Form

Exeter Residences and 888 Boylston are part of PDA No. 37 and are being submitted for review required by Article 80, Section 80B-5, for Large Project Review by filing of a Project Notification Form (PNF) with the BRA. The PNF focuses on the differences between the development of Exeter Residences and the revised 888 Boylston building as compared to the Approved Project of the PDA No. 37 which was approved by the BRA, the Boston Zoning Commission and the Mayor in 1990, as modified in connection with the Boylston Street Mixed Use Project which was approved by the BRA, the Boston Zoning Commission and the Mayor in 2002.

Related Article 80 and Other Filings

The Notice of Project Change and the Project Notification Form in this Article 80 Submission will be consistent with proposed future filings. Under Article 80C, the Proponent will submit to the BRA a proposed Fourth Amendment to the Development Plan for Planned Development Area No. 37. The amendment will provide for modifications to the Development Plan which are consistent with this Article 80 Submission.

The Proponent will also submit a petition for a Zoning Text Amendment to the Boston Zoning Commission to modify certain provisions of Article 41 dealing with building height within the PDA to be consistent with the description of Exeter Residences and 888 Boylston in this Article 80 Submission. It is anticipated that the Fourth Amendment to Development Plan and the Petition for Zoning Text Amendment will be presented to the BRA for action simultaneously with action by the BRA on this Article 80 Submission. These related filings also will be subject to approval by the Boston Zoning Commission and the Mayor.

1.4 History of Prudential Center Redevelopment

The original Prudential Center completed in 1965 was the City of Boston's first mixed use center - a planned unified business, residential, and civic complex comprising 26 acres of restaurants, retail, hotel, parking garage, plazas, and covered walkways, focused around the Prudential Tower. In the late 1980s, a plan for the redevelopment of the Prudential Center complex, aimed at better integrating the area into the neighborhood and City was proposed. This effort was formalized in a Development Plan for a Planned Development Area. The overall plan and objective of the Development Plan for Prudential Center Planned Development Area (PDA) No. 37 was the re-integration of the Prudential Center into the life and community of Boston.

As described above, the Development Plan for PDA No. 37 was reviewed under Article 31, predecessor to Article 80, beginning in 1986 and culminating in final approval in 1990. The Master Plan for PDA No. 37 was reviewed under Article 80 in 2002. The Phase 6 development component is part of the Prudential Center Redevelopment approved on a Master Plan level in 2002. The Phase 4a development component is part of the Prudential Center Redevelopment approved on the development plan level in 1990

In the Fall of 1986, PruPAC was formed as an organization of community groups by Mayor Flynn to provide guidance to the BRA and City in evaluating the proposals of

The Prudential Life Insurance Company of America (Prudential), the then owner of the Prudential Center, for redevelopment and expansion of the property. The review process resulted in 1990 in the original Development Plan that was carried out in conjunction with the Article 31 (the predecessor to Article 80) review process. Under a Memorandum of Understanding with the BRA executed in the Fall of 1988, PruPAC's continuing advisory role in the implementation and design development of PDA No. 37 was recognized. PruPAC has continued to play an active role in the review of the design plans for Prudential Center, and since the acquisition of portions of the Prudential Center by each of Boston Properties and AvalonBay in 1998, the PruPAC community review process has continued. This process has enabled the community to review and advise on the development proposal, resulting in a project that continues to be sensitive to the interests of the surrounding neighborhood. Many of the successful elements of PDA No. 37 are attributable to PruPAC input. As in previous filings, the Proponent has requested the PruPAC continue to advise the BRA under the Memorandum of Understanding in lieu of a separate Impact Advisory Group.

The approved Prudential Center Development Plan was originally divided into six project phases, with two phases divided into subphases:

- Phases la and lb (111 Huntington and Retail Expansion) were constructed;
- Phase 2 (Supermarket, 53 Huntington) was constructed;
- Phase 3 (100 Belvidere) was constructed;
- Phase 4a (888 Boylston) received schematic design approval for the BRA on July 12, 2001;
- Phases 4b and 5 (Mandarin Oriental Boston) is under construction; and
- Phase 6 (Residential development between East Ring Road and Exeter Street) was approved on the Master Plan level for Prudential Center PDA No. 37.

The Exeter Residences is proposed as the Phase 6 development component to be included in the Development Plan. The modification to 888 Boylston is a proposal for an increase in height to the building included as the Phase 4a development component of the Development Plan.

Pursuant to Article 31, a Project Notification Form was filed by Prudential on June 12, 1988, and a Scoping Determination was issued by the BRA on September 8, 1988. A Draft Project Impact Report was submitted to the BRA on April 12, 1989, and a Preliminary Adequacy Determination was issued by the BRA on August 30, 1989. A Final Project Impact Report was submitted to the BRA on November 14, 1989, and an Adequacy Determination was issued by the BRA on April 27, 1990. Pursuant to Article 80, a Notice of Project Change/Project Notification Form was filed by Boston Properties and CWB Boylston LLC ("CWB") on January 16, 2002, and a Request for

Supplemental Information was issued by the BRA on March 7, 2002. A Response to Request for Supplemental Information was filed by Boston Properties and CWB on March 29, 2002, and a Scoping Determination Waiving Further Review was issued by the BRA on May 14, 2002. An Adequacy Determination was issued by the BRA on September 6, 2005.

The Development Plan and Development Impact Project Plan for PDA No. 37 were approved by the BRA on January 18, 1990, the Boston Zoning Commission on March 20, 1990 and the Mayor on March 20, 1990. Amendment No. 1 to the Development Plan was approved by the BRA on December 8, 1994, the Boston Zoning Commission on December 19, 1994 and the Mayor on December 19, 1994; Amendment No. 2 to the Development Plan was approved by the BRA on August 18, 1998 and September 29, 1998, the Boston Zoning Commission on October 21, 1998 and the Mayor on October 23, 1998; and Amendment No.3 to the Development Plan was approved by the BRA on May 9, 2002, the Boston Zoning Commission on July 24, 2002 and the Mayor on July 26, 2002.

Today the Prudential Center complex consists of the 52-story Prudential Tower and surrounding one-story retail shops; one 25-story office building (101 Huntington), one 36 story office building (111 Huntington), three 26-story apartment buildings (the Boylston, Fairfield and Gloucester Buildings), one 11 story residential building (the Belvidere Residences), two department stores (Lord & Taylor and Saks Fifth Avenue) and a retail arcade, the Sheraton Hotel, a Shaw's Supermarket (53 Huntington), and an underground garage divided into two halves (north and south) by the Massachusetts Turnpike. The north and south garages are connected by a pedestrian tunnel, and by retail/commercial space at the Plaza level. Two-mixed use housing, hotel and retail structures, each 13 stories connected by a low-rise structure are under construction (the Mandarin Oriental Boston).

1.5 Phase 6 & Exeter Residences

History of Phase 6

The site of Exeter Residences lies between Exeter Street and East Ring Road and is bounded by Exeter Street to the east, the parking garage entrance to the south, the Lord & Taylor department store to the north, and Lord & Taylor department store to the west.

This Article 80 Submission proposes the approval of a new Phase 6 of PDA No. 37. The Master Plan previously approved for Phase 6 provided a development concept for additional development between East Ring Road and Exeter Street which could contain residential and possibly up to two levels of retail. Exeter Residences being proposed consists of one new 30 story building to be built on Exeter Street including approximately 253,500 SF of residential space in approximately 200 units, and approximately 2,500 SF of retail and common space, for a total of approximately 256,000 SF.

Figure 1-2 is a Conceptual Plan of Exeter Residences and highlights project features and connections to the Prudential Center Redevelopment complex and adjacent properties. **Figure 1-3** shows an elevation of Exeter Residences along Exeter Street facing east.

Current Proposal for Exeter Residences

Exeter Residences will provide approximately 253,500 SF of residential space comprising approximately 200 residential units, as well as approximately 2,500 SF of retail and common space, for a total of approximately 256,000 SF. The building will have a primary entrance from Exeter Street, a secondary entrance on the plaza level between Lord & Taylor and the Gloucester Building, and a third entrance accessed by the drop-off area under the plaza. Retail uses will be located on the ground level with frontage on Exeter Street.

1.6 Phase 4a & 888 Boylston

History of Phase 4a

The 888 Boylston site is bounded by Boylston Street to the north, the existing Boylston Street Arcade to the east, the existing food court to the south, and the Hynes Convention Center to the west.

This Article 80 Submission proposes a modification of the approved height and square footage for 888 Boylston. The Phase 4a development component is schematically approved and provides for approximately 219,996 square feet (SF), excluding retail and public space at the street and deck levels.

The remainder of Phase 4a, consisting of retail and public space at the street and deck levels is schematically approved and provides for approximately 67,497 SF. Approximately 47,819 SF of this amount was constructed during the period 1991-1993 (although a portion was to be reconfigured as part of the 888 Boylston development). The Approved Project contemplated an 11-story structure with a height of 155 feet.

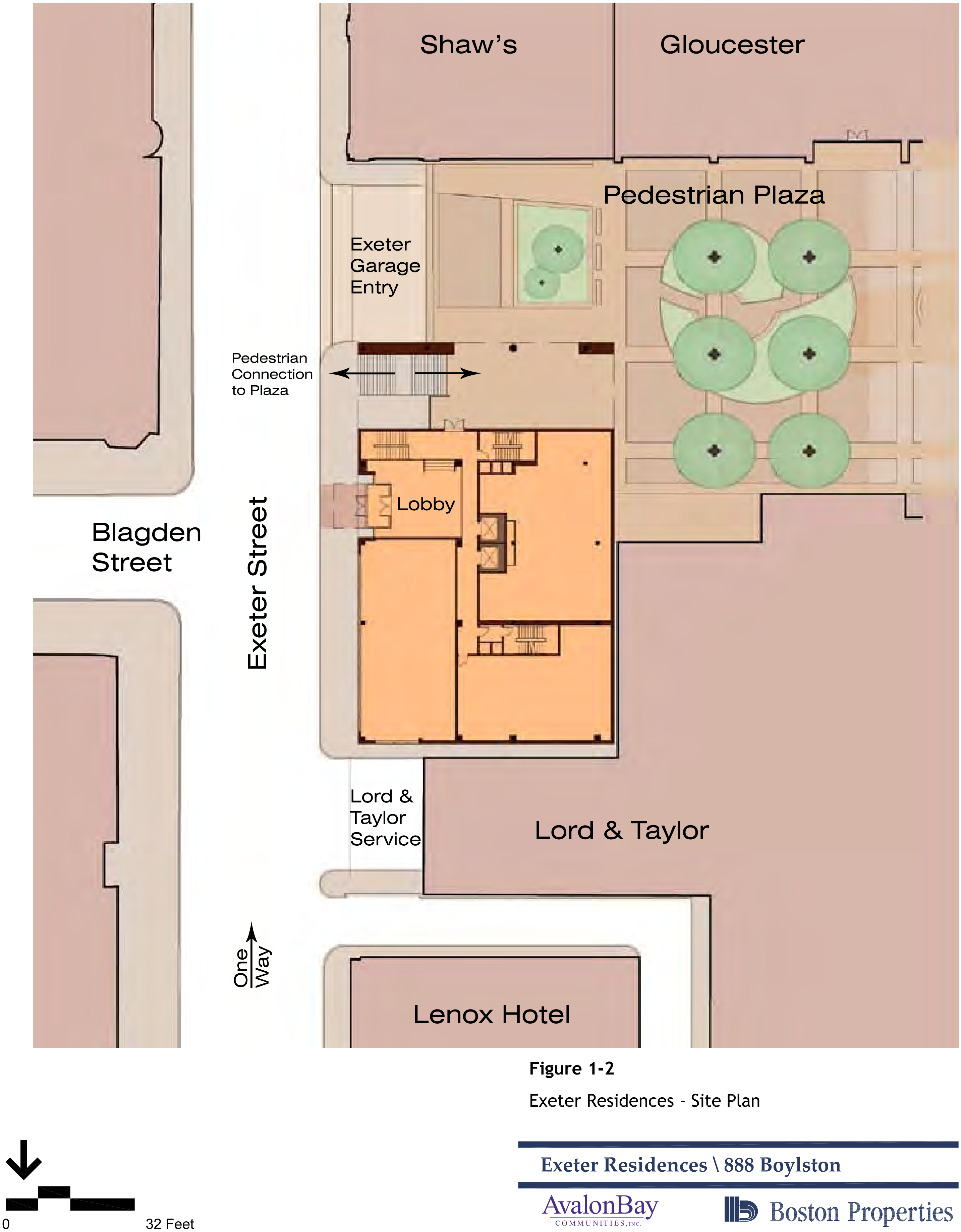

Figure 1-2

Exeter Residences - Site Plan

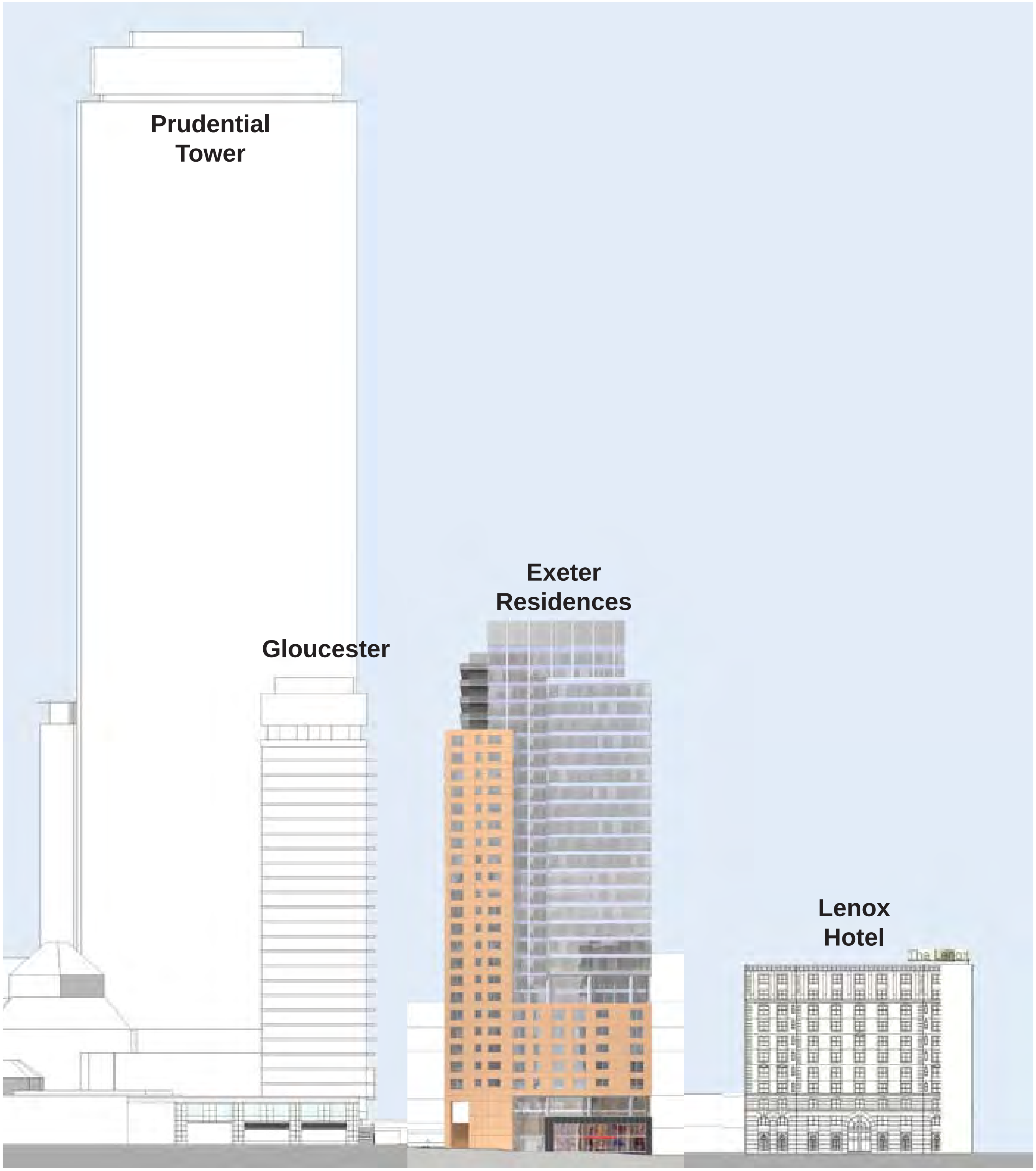

Figure 1-3

Exeter Street Elevation

Current Proposal for 888 Boylston

888 Boylston as proposed will continue to consist of an office building with retail and lobby space at the street and plaza levels. The proposed modification to 888 Boylston will add 8 stories, for a total of 19 stories, consisting of additional square footage of approximately 149,000 SF of office space, approximately 1,700 SF of retail space, and approximately 800 SF of common area, for a total of approximately 151,500 SF in additional space. This additional space will result in total square footages for the 19 story building and the remaining space within Phase 4a of approximately 369,000 SF of office space, approximately 51,000 SF of retail space, and approximately 19,000 SF of common area, for a total of approximately 439,000 SF. The third floor of 888 Boylston, 21,500 SF, may also be developed as retail space. The more restrictive of the two uses (i.e. office and retail) was used to evaluate project impacts in each study included in this document. **Figure 1-4** is a Conceptual Plan of 888 Boylston and highlights project features, and connections to the Prudential Center Redevelopment complex and adjacent properties. **Figure 1-5** shows an elevation of the project along Boylston Street facing south.

The proposed 19-story building consists of a 2-level Office Lobby with two access points; one from the Street Level and one from the Arcade Level. Surrounding the Office Lobby are two to three levels of retail. The Street Level Retail is accessed from the public plaza. The Arcade Level Retail is accessed from the Boylston Arcade and could be interconnected with the Street Level and Third Floor Retail if desired. Both the office lobby and retail space have extensive glass curtain walls to allow high visibility into the building enhancing vitality along Boylston Street.

Above the first two levels are 17 stories of office space with floor plates of approximately 23,000 SF. The Office Tower is clad in a glass and metal curtain wall system. The east, west, and south facades will consist of a slightly tinted low-E vision glass and opaque glass and metal spandrels at the floor lines. The north façade, with its soft curve, will feature clear floor to ceiling glass with butt joints. The mechanical penthouse will receive an architectural enclosure of metal panels and/or glass curtain wall. All mechanical equipment will be adequately screened from view.

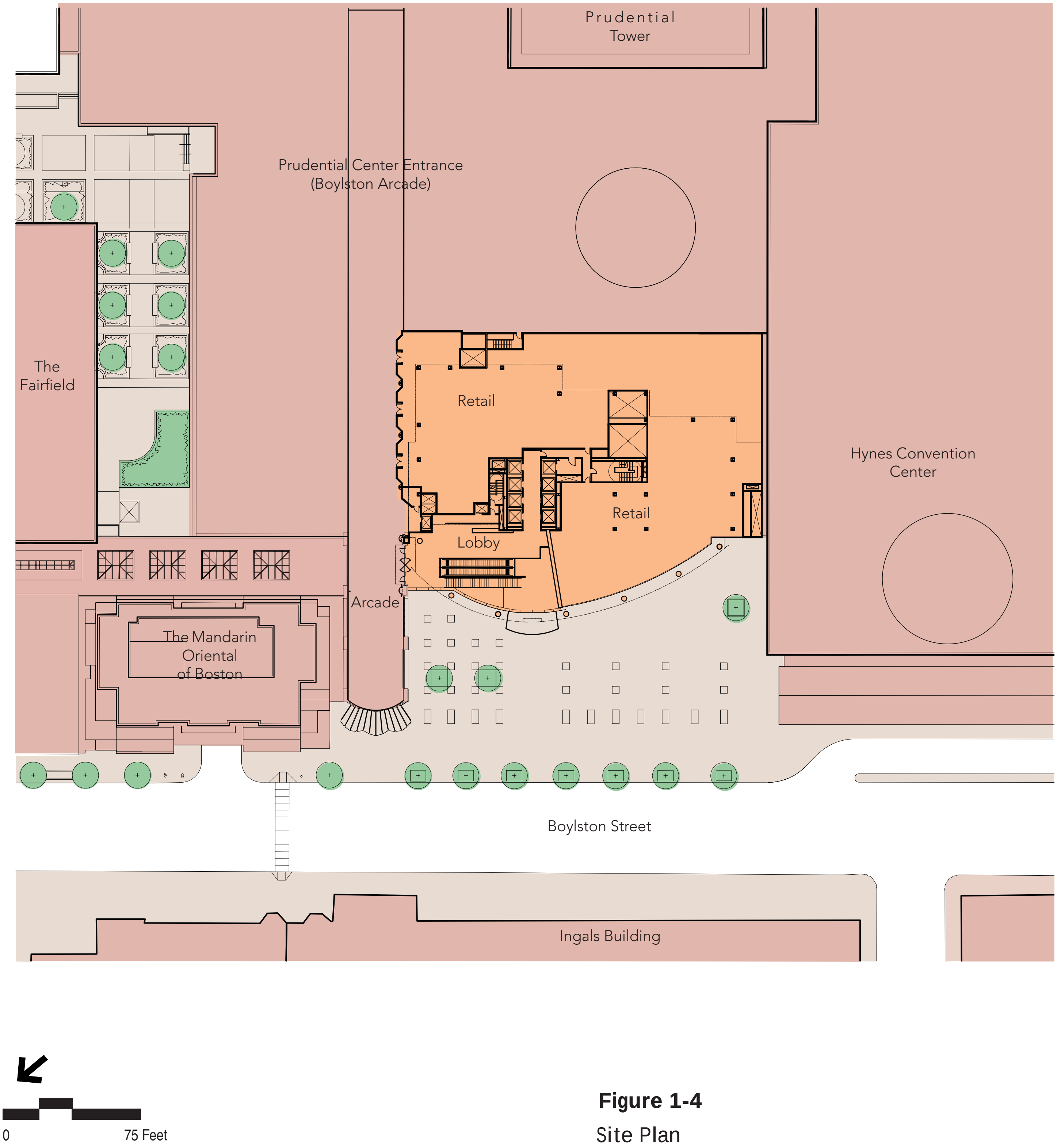

Figure 1-4

Site Plan
888 Boylston

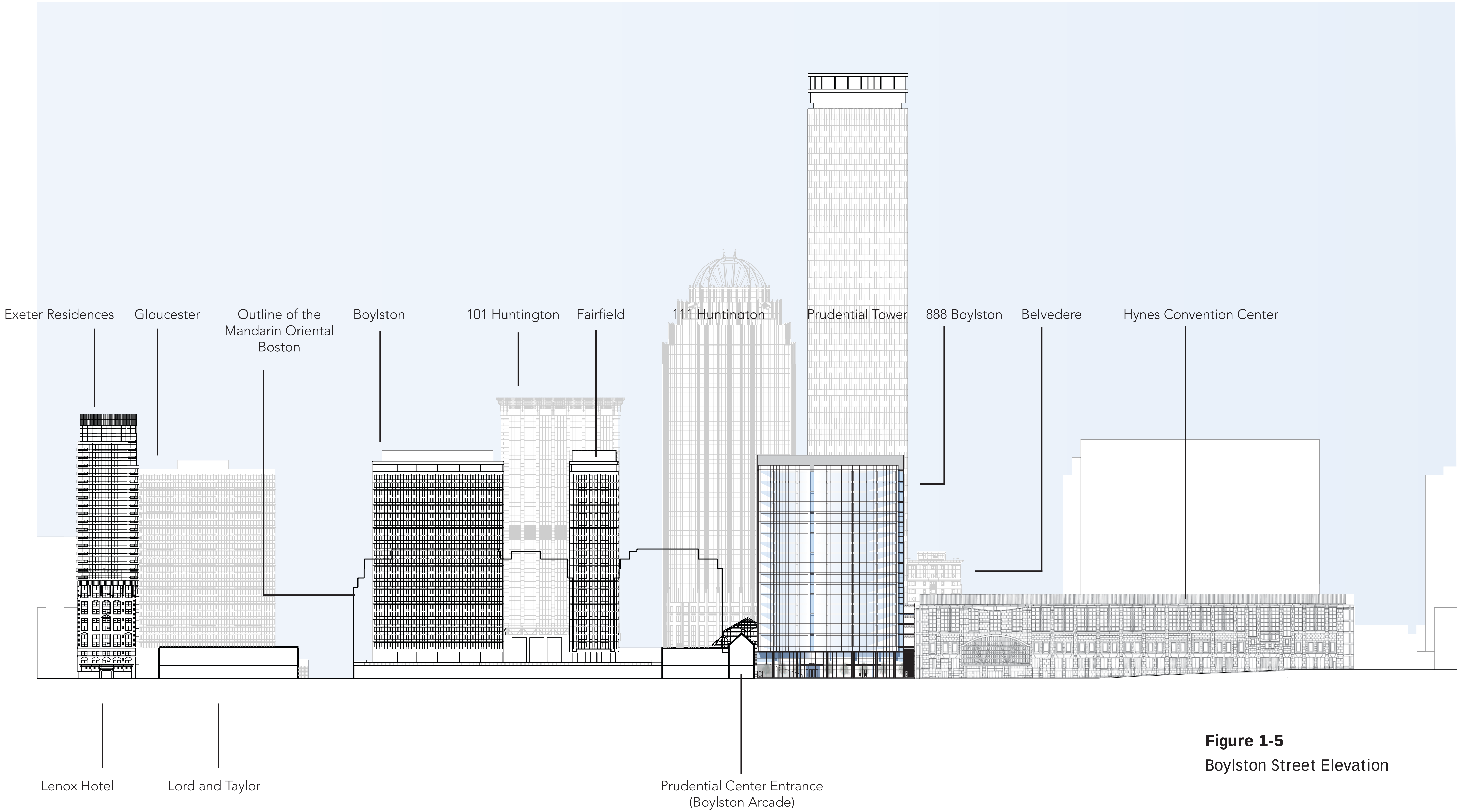

Figure 1-5

Boylston Street Elevation

1.7 Applicant Information

The Proponent of the Proposed Project is Boston Properties, Inc., or an affiliate thereof (Boston Properties). Boston Properties has selected AvalonBay Communities, Inc. (AvalonBay) to develop and operate the Phase 6 component of the Proposed Project, known as the Exeter Residences. The following is a brief profile of each company.

Boston Properties

Boston Properties, Inc., a self-administered and self-managed real estate investment trust (REIT), is one of the largest owners, managers, and developers of first-class office properties in the United States, with a significant presence in four core markets: Boston, Washington, D.C., Midtown Manhattan, and San Francisco. The Company was founded in 1970 by Mortimer B. Zuckerman and Edward H. Linde in Boston, where it maintains its headquarters. Boston Properties became a public company in June 1997 and is traded on the New York Stock Exchange under the symbol BXP.

The Company acquires, develops, and manages its properties through full-service regional offices in Boston, New York City, Washington, D.C., San Francisco, and Princeton, New Jersey. Its property portfolio is comprised primarily of first-class office space and also includes two hotels. Boston Properties is well-known for its in-house building management expertise and has a superior track record in developing Class A, Central Business District (CBD) office buildings, suburban office centers and build-to-suit projects for the U.S. government and a diverse array of high-credit tenants.

AvalonBay

AvalonBay Communities, Inc. is in the business of developing, redeveloping, acquiring, and managing high-quality apartment communities in the high barrier-to-entry markets of the United States. These markets are located in the Northeast, Mid-Atlantic, Midwest, Pacific Northwest, and Northern and Southern California regions of the country. As of March 31, 2007 AvalonBay owned or held interest in 171 apartment communities containing 49,402 apartment homes in ten states and the District of Columbia, of which 16 communities were under construction and six communities were under reconstruction. In addition, AvalonBay held future development rights for 56 communities. AvalonBay Communities, Inc.'s common stock trades on the New York Stock Exchange and under the symbol AVB.

1.8 Project Teams

Owner Contacts

Boston Properties, Inc. 800 Boylston Street Boston, MA 02199 617-236-3300 Michael Cantalupa, Senior Vice President of Development David Stewart, Project Manager, Development	AvalonBay Communities 51 Sleeper Street, Suite 750 Boston, MA 02210 617 654-9500 Bill McLaughlin, Senior Vice President Michael Roberts, Vice President of Development

Consultant Contacts

Legal	**Permitting/Civil Engineering/Transportation Engineering**
Goulston & Storrs 400 Atlantic Avenue Boston, MA 02210-3333 617-482-1776 Marilyn Sticklor Jean Bowe	Vanasse Hangen Brustlin Inc. 99 High Street, 10th Floor Boston, MA 02110 617-728-7777 Mark Junghans – Permitting/Civil Engineering Ravi Raveendran – Transportation
Architect	
Exeter Residences Elkus / Manfredi Architects 300 A Street Boston, MA 02210 617-426-1300 David Manfredi John Martin	**888 Boylston** Childs Bertman Tseckares Inc. 110 Canal Street Boston, MA 02114 617-262-4354 Robert Brown Kenneth Lewandowski
Geotechnical Engineer	**Acoustic Engineer**
Haley & Aldrich Inc. 465 Medford Street, Suite 2200 Boston, MA 02129-0414 617-886-7400 Marya Gorczyca	Cavanaugh Tocci Associates 327 F Boston Post Road Sudbury MA 01776-3027 978-443-7871 Brion Koning
Mechanical Engineer	**Pedestrian Level Wind Analysis**
TMP Consulting Engineers 52 Temple Place Boston, MA 02111 617-357-6060	Rowan Williams Davies & Irwin 650 Woodlawn Road West Guelph, Ontario N1K 1B8 519-823-1311

Richard Noce Jim Magarian	Deborah Near

1.9 Director's Determination

Pursuant to Section 80A-6 and Section 80B-5, the Proponent seeks the Director's determination as to what additional review maybe required in connection with Exeter Residences and 888 Boylston. As a result of continuing PruPAC guidance and review, the Proponent is hereby filing this Article 80 Submission with respect to approval of a development component for Phase 6 and changes in portions of the Phase 4a development component so that the Director may evaluate the potential for Exeter Residences and 888 Boylston to increase those impacts previously associated with the Approved Project. This Article 80 Submission, and the materials filed herewith, describes the anticipated impacts and related mitigation for Exeter Residences and 888 Boylston.

2

Notice of Project Change (NPC)

2.1 Project Changes

Exeter Residences is a proposed development component for Phase 6 of the Prudential Center Redevelopment Planned Development Area No. 37. The development component as proposed, provides for the appearance of the structure, uses (residential with supporting first floor retail), streetscape and plaza improvements, densities, proposed traffic circulation, parking and loading facilities, access to public transportation, proposed dimensions of structures, proposed building elevations, schematic layout drawings and exterior building materials. Exeter Residences will consist of one new 30 story residential structure with a height of approximately 340 feet. Exeter Residences involves program and design changes as described below.

As proposed, 888 Boylston increases the height and square footage of the Boylston Office Building, from the previously approved development component of Phase 4a of the approved Prudential Center Redevelopment, Planned Development Area No. 37. As proposed 888 Boylston would consist of one new 19 story office and retail structure with a height of approximately 265 feet to be built on Boylston Street, set back from the street. The program and design changes are described below.

The proposed increase in Gross Floor Area of Exeter Residences and 888 Boylston if approved would be within the limits of the FAR of 6 established by Article 41 of the Zoning Code. As a result, no increase in the FAR above the permitted level is proposed.

Development Changes to Phase 6

As shown in Table 2-1, the addition of the Phase 6 development component is a primarily residential use. Exeter Residences includes approximately 200 residential units consisting of approximately 253,500 SF of residential and approximately 2,500 SF of retail and common space, for a total of approximately 256,000 SF. The street level will contain retail space and the primary entrance to the upper residential floors.

Parking for Exeter Residences would provide approximately 140 spaces to serve the residential units, which is a ratio of about 0.70 spaces per dwelling unit. No new garage area is required to realize this parking.

When compared to the approved Prudential Center PDA No. 37, the proposed Exeter Residences accounts for approximately 4.2 percent of the total PDA No. 37 as amended through 2005. Thus, the proposed Exeter Residences accounts for an approximate Project Change of only 4.2 percent of the total PDA No. 37.

Program Changes to Phase 4a

As shown in Table 2-1, the change in the portion of the Phase 4a development component, known as 888 Boylston, includes primarily additional office uses with one additional floor of retail space contiguous to the existing Prudential Center Retail Shops. The modification to 888 Boylston will add approximately 149,000 SF of office, approximately 1,700 SF of retail, and approximately 800 SF of common area, for a total of approximately 151,500 additional SF. Please note that the third floor of 888 Boylston (21,500 SF) may be developed as retail space, but would not change the total square footage.

Parking for 888 Boylston would be accomplished through the addition of 182 parking spaces within the existing limits of the Prudential Center garage. These additional spaces result in a total of 240 spaces for use by 888 Boylston, which is a ratio of 0.65/1,000 SF for the total office use of 369,000 SF within Phase 4a. No additional parking is included for new retail space. In comparison, the Approved Project allocated 58 parking spaces for the Boylston Office Building.

The portions within the Phase 4a development component that are not part of 888 Boylston include common areas (such as seating at the food court) and retail areas. These areas total approximately 67,500 SF. The Phase 4a development components, including the 67,500 SF outside of the 888 Boylston area, will total approximately

439,000 SF. Approximately 47,819 SF of this amount has been constructed previously during the period 1991-1993.

When compared to the approved Prudential Center PDA No. 37, as amended through 2005, the change in the Boylston Office Building from the Approved Project accounts for approximately 2.5 percent of the total PDA No. 37.

Table 2-1
Comparison between the Approved Project and Exeter Residences / 888 Boylston

Project Components	Approved Project *	Proposed Project		Change
		Size	Description	
Phase 6 (Exeter Residences)				
Residential	N/A	253,500 SF	200 units	253,500 SF
Retail and Common Space	N/A	2,500 SF		2,500 SF
TOTAL	**N/A**	**256,000 SF**		**256,000 SF**
Height/Stories	N/A	340 feet	30 stories	340 feet / 30 stories
Phase 4a (888 Boylston)				
Office	219,996 SF	368,996 SF		149,000 SF
Retail	48,990 SF	50,690 SF		1,700 SF
Common	18,507 SF	19,307 SF		800 SF
TOTAL Changes to Phase 4a	**287,493 SF**	**438,993 SF**		**151,500 SF**
Height/Stories	155 feet / 11 stories	265 feet	19 stories	110 feet / 8 stories

* *Prudential Center Redevelopment approved Development Plan*

■

Design Changes to Phase 4a

Since the schematic plans for Phase 4a were previously approved, the design of 888 Boylston was modified in terms of siting, massing and height with the exceptions noted in this Article 80 Submission.

888 Boylston is proposed to be a 19 story mixed use building, incorporating street and arcade level retail space and a potential third level of retail space with 16 to 17 stories of office space above, supported by 2 stories of underground parking. The third level of the building will be designed to accommodate either retail or office

uses. Situated between the Prudential Center Arcade entrance and the Hynes Convention Center, the project is set back 77 feet from Boylston Street to create a new pedestrian scaled street level plaza which will replace the existing, two-level plaza. The building has been moved forward from the 2001 design in order to avoid impact to the MTA's tunnel ventilation infrastructure. This move will help to improve access and visibility to the ground floor retail tenants and create a more active public space. The increased height proposed will comfortably place the building in the context of the other office buildings at Prudential Center and will create a proper transition from Boylston Street to the taller Prudential Tower. All related figures can be found at the end of this section.

Additional details concerning 888 Boylston are included in Chapters 3 and 4 of this Article 80 submission.

3

Project Notification Form (PNF)

3.1 Project Overview

Exeter Residences is the development component of Phase 6 and 888 Boylston is a modification of the previously approved Boylston Office Building which was included in Phase 4a. Phases 4a and 6 are as depicted and described in the Prudential Center Redevelopment, Planned Development Area No. 37 (PDA No. 37). The Exeter Residences will be located within the Prudential Center complex fronting along Exeter Street, next to the existing Shaw's Supermarket, the Lord & Taylor building at 760 Boylston Street and the Exeter Street entrance to the north parking garage. 888 Boylston will be located within the Prudential Center Complex along Boylston Street between the Boylston Arcade entrance and the Hynes Convention Center. **Figure 1-1** shows the Phases of the Prudential Center Redevelopment Planned Development Area including the location of Exeter Residences within the boundaries of Phase 6 and the location of 888 Boylston within the boundaries of Phase 4a, respectively. Exeter Residences will consist of one new residential structure with 30 stories, as shown in **Figure 1-3**. 888 Boylston will consist of a new 19 story office building, as shown on **Figure 1-5**. Together, the new program associated with Exeter Residences and changes to 888 Boylston will total approximately 407,100 net new square feet.

The addition of the Exeter Residences will add to the existing residential neighborhood at the Prudential Center and respond to the demand for additional housing opportunities in the Back Bay. The development will create housing well served by mass transit; will enliven the pedestrian experience on Exeter Street; and will create new pedestrian connections between the Prudential Center, Exeter Street and Copley Square. The project will create approximately 200 units of housing in a building with an area of approximately 256, 000 square feet on 30 above grade levels. The project's Back Bay location is a block west of Copley Square and has a diverse mix of shopping, restaurants and services to support an urban lifestyle.

The addition of 8 floors to 888 Boylston will compliment the different heights of buildings currently at the Prudential Center. Within the context of the Prudential Tower, 111 Huntington and 101 Huntington, and given its setback from Boylston Street, a 19 story building fits well within the family of office buildings and sits comfortably next to its neighbors. The additional height is a direct response to the type of office space that Class A tenants require in the City of Boston which in turn will have a positive impact on the vitality of the Prudential Center and the surrounding businesses.

■

Project Context

PDA No. 37 encompasses the area known as Prudential Center bounded by Boylston Street, Exeter Street, Huntington Avenue, Belvidere Street and the Hynes Convention Center. The Development Plan originally contemplated a five phase redevelopment of Prudential Center and the Master Plan later added a sixth phase. Phase la was the Huntington Avenue Office tower (111 Huntington) and south retail. Phase lb was retail along Huntington Avenue. Phase 2 was the Neighborhood Shopping Center (53 Huntington; now a Shaw's Supermarket) at the corner of Exeter Street and Huntington Avenue. Phase 3 was the Belvedere Residential building (100 Belvidere Street), with associated retail. Phase 4a was the Boylston Street office building (888 Boylston) and associated retail. Phases 4b and 5, as modified in 2002, were the Boylston Street Mixed Use Project (now the Mandarin Oriental Boston). Phase 6 (approved on a Master Plan level) was residential with potential retail between East Ring Road, Exeter Street and Boylston Street.

Implementation of the Development Plan began in the early 1990s by the original proponent, Prudential Life Insurance Company, which constructed portions of the retail and arcades which were located within the boundaries of various phases. With the continuous guidance and review of PruPAC, implementation continued in the late 1990s by Boston Properties and its affiliated entities (Boston Properties) and is ongoing. Phase 1 (111 Huntington and retail), Phase 2 (the Neighborhood Shopping Center) and Phase 3 (the Belvidere Residences) have been constructed. Phases 4b and 5 (the Mandarin Oriental Boston) is currently under construction. Phase 4a (888 Boylston) received Schematic Design Approval on July 12, 2001.

The overall redevelopment program for Prudential Center was analyzed in the FPIR/FEIR as containing a total of 1,983,000 square feet (SF) or 1,977,500 net new SF (since 143,000 SF of the total redevelopment was demolished and reconstructed retail). This redevelopment was additional to the pre-existing 4,141,000 SF (including a 10,000 SF Sheraton Expansion) at Prudential Center and provided for a total development at Prudential Center of 6,123,000 SF. Of this amount, the approved program for Phase 4a development component consisted of approximately 280,100 SF.

The Mandarin Oriental Boston was analyzed in the Notice of Project Change/Project Notification Form and Supplemental Information prepared in 2002. As a result of approval of the Mandarin Oriental Boston as Phases 4b and 5, the redevelopment program for the Prudential Center (including the original program for Phase 4) contains 1,983,700 SF.

The additional square footage proposed with Exeter Residences and the additional floors to 888 Boylston adds approximately 407,500 SF or approximately 6.7 percent as compared to the program contained within the Prudential Center Redevelopment PDA No. 37, but does not exceed the total FAR allowed by Article 41 of the Zoning Code.

This Large Project Review for Exeter Residences analyzes the new Phase 6 in its entirety in the context of PDA No. 37 and the approved Development Plan. The Approved Project for the 888 Boylston site under the Development Plan was fully approved in 1990 by the issuance of a Final Adequacy Determination and the adoption of the Development Plan. The PDA and Development plan have been subject to modifications and updates through 2005. Accordingly, this Large Project Review for 888 Boylston focuses on the comparison between the proposed additional height and square footage at 888 Boylston and plan in the originally approved Phase 4a.

3.2 Area Context

Exeter Residences and 888 Boylston play an important role integrating and defining the Exeter Street and Boylston Street corridors, and enhance the urban streetscape for area residents and pedestrians. The following section describes the Prudential Center Redevelopment area components, and provides context for the development of Exeter Residences and for the additional height of 888 Boylston. **Figure 1-1** shows the Prudential Center PDA No. 37 phases including Exeter Residences and 888 Boylston within the boundaries of Phases 6 and 4a respectively.

Planning Context – PDA No. 37

The Prudential Center completed in 1965 was the City of Boston's first mixed use center -a planned unified business, residential and civic complex comprising 26 acres of restaurants, shops, hotel, parking garage, plazas and covered walkways, focused around the Prudential Tower. In the late 1980s, a plan for the redevelopment of the

Prudential Center complex, aimed at better integrating the area into the neighborhood and City was proposed. This effort was formalized in a Development Plan for a Planned Development Area. The overall plan and objective of the Prudential Center Development Area (PDA) No. 37 was the re-integration of the Prudential Center into the life and community of Boston. Through thoughtful transitions of scale and softening of perimeter of the project area, and with multiple pedestrian access routes around and through the improved features of the complex the Prudential Center has been more effectively integrated into the urban fabric surrounding the complex.

In 1986, the Mayor established the Prudential Project Advisory Committee (PruPAC) to advise the City in the review of the Prudential Center Redevelopment. The review process among PruPAC, Prudential, the BRA, the BTD, the Mayor's Office of Neighborhood Services, and other interested community representatives resulted in 1990 in the original Development Plan, which was carried out in conjunction with the Article 31 (the predecessor to Article 80) review process. Since the acquisition of Prudential Center by Boston Properties, the PruPAC community review process has continued. This process has enabled the community to review and advise on each development proposal, and the result is a project which continues to be sensitive to the interests of the surrounding neighborhood.

The Prudential Center Redevelopment Development Plan, approved in 1990 and amended in 2002 regarding Phases 4b and 5 outlined five phases of projects for the redevelopment of Prudential Center. A Master Plan adopted in 2002 added a sixth phase. Implementation of the Development Plan began in the early 1990s and is on-going. Phases 1, 2, and 3 have been constructed. Phase 4a received schematic design approval and approval by the Boston Civic Design Commission, and Phases 4b and 5 are under construction. Phase 6 has been approved in general concept at the Master Plan level.

The following section describes in greater detail the components and status of Prudential Center Redevelopment projects. The approved Prudential Center Development Plan was divided into six project phases and two of the phases were divided into sub phases:

- Phases la and lb (111 Huntington Office Building and Retail Expansion),
- Phase 2 (Shaw's Supermarket, 53 Huntington),
- Phase 3 (The Belvedere Condominiums, 100 Belvidere Street),
- Phase 4a (888 Boylston),
- Phase 4b (West Component of Mandarin Oriental Boston),
- Phase 5 (East Component of Mandarin Oriental Boston), and
- Phase 6 (Exeter Residences)

111 Huntington Avenue (Phase 1a)

The second largest tower in the Prudential Center, 111 Huntington Avenue is the cornerstone of the Prudential Center's redevelopment and expansion and a prominent anchor along the south side of the complex. Located across from the Christian Science Center, this new building updated the Prudential Center's identity as a world-class commercial district. The building has three major components: a 400-foot long Winter Garden; a five-story masonry base containing office, retail and links to the MBTA Prudential Center Station; and, a richly faceted 36-story glass office tower that fronts onto the Winter Garden. The Winter Garden, a wonderfully landscaped indoor urban space, improves pedestrian connections between the Back Bay and South End. An interior linear park combining open space and circulation, this indoor space is 50 feet wide and 35 feet high. It serves as the grand entrance to the Prudential Center at the corner of Huntington Avenue and Belvidere Street and provides a new connection to the subway station below. Lined by retail shops on one side and a glass wall overlooking the South Garden, the Winter Garden includes numerous seating areas and acts as an extension of the outdoor south garden.

The south garden is a 1.2 acre park, located in the middle of the Prudential Center. It includes a spectacularly landscaped public garden with an outdoor stage and a nautical water feature. The garden is open to the public.

The low-rise portion of the 111 Huntington building is clad in traditional materials to harmonize with the surrounding commercial avenue at street level. By contrast, the glass tower has a round form that symbolizes the convergence of the South End and Back Bay street grids. Depth and texture are added to the curtain wall with the use of rhythmic mullions and aluminum fins that transform into projecting blades at the top of the tower, creating a distinctive radiant crown. This phase was completed in 2001.

Shaw's Neighborhood Market Relocation (Phase 2)

The closing of the existing Star Supermarket next to the Boylston Street Arcade entrance and the opening of a new Shaw's Supermarket on Huntington Avenue enhances the rejuvenating impact of the entire redevelopment project, serving the South End and St. Botolph neighborhoods in addition to the Back Bay. This phase was completed in 2003.

The Belvedere Condominium (Phase 3)

The Belvedere Condominium is an 11-story, 131,000 square foot building located at 100 Belvidere Street. The Belvedere contains nine levels of residential space and a total of 61 units. Also included in the building's program are a private dining room, a library, a rooftop deck, and direct access to the Prudential retail arcades and parking. The Belvedere was completed in 2002.

The Mandarin Oriental Boston (Phase 4b and 5)

The Mandarin Oriental Boston, located at 776 and 778 Boylston Street consists of two-mixed use housing, hotel and retail structures, each 13 stories which are connected by a low-rise structure. The project contains 512,000 SF. The Mandarin Oriental Hotel is located primarily within the east building and a rental apartment component is located within the west building. For sale condominiums are located on the upper levels of both buildings. The Mandarin Oriental Boston is currently under construction.

Exeter Residences (Phase 6)

The Phase 6 area was envisioned to include development components containing a residential tower with lower floor retail at a Master Plan level in 2002. The Phase 6 area also includes the existing Lord & Taylor building.

888 Boylston (Phase 4a)

The Boylston Office Building was included as an Approved Project consisting of an 11 story office building at 888 Boylston. In 2001, schematic design approval was received for the project as a new 287,493 square foot office building, in addition to the previously constructed other areas within Phase 4a, the existing Prudential Center and the surrounding streetscape. Modification of Phase 4a is being proposed in this Notice of Project Change/Project Notification Form.

3.3 Description of Exeter Residences

Exeter Residences will provide approximately 253,500 SF of residential space comprising approximately 200 residential units, as well as approximately 2,500 SF of retail and common space, for a total of approximately 256,000 SF. The building will have a primary entrance from Exeter Street, a secondary entrance on the plaza level between Lord & Taylor and the Gloucester Building, and a third entrance accessed by the drop-off area under the plaza. Retail uses will be located on the ground level with frontage on Exeter Street. The following section describes the floors plans of the building.

Ground Floor (Street Level)

The street level has retail space and the building entrance fronting on Exeter Street. The west half of the floor is adjacent to the existing parking garage and is utilized primarily for two-story tall mechanical and back-of-house spaces.

The ground floor level also includes a direct pedestrian connection to the existing drop-off area in front of the Gloucester Building enabling residents to have multiple points of access from the street.

Second Floor (Plaza Level)

The second level has a direct connection to the plaza and contains the lobby seating area. The lobby is a two story space and is open to the amenities level above. The west half of the floor is open to the mechanical spaces below.

Third Floor

The third floor is the amenities level of the building. Common and fitness rooms are arranged on the eastern half of the floor plate overlooking Exeter Street. The Common Room also overlooks the lobby space on the second floor below. Storage spaces are arranged on the west half of the floor plate adjacent to the existing Lord & Taylor department store.

Upper Floors

The upper floors consist of studio, one-bedroom, two-bedroom, and three-bedroom apartments with two-story duplex units on the top two floors.

Parking/Service Levels

The Exeter Residences will include the addition of approximately 140 parking spaces through a combination of expanding the existing garage nests and managed parking techniques. This is a ratio of about 0.7 parking spaces per dwelling unit. The parking spaces will be allocated from the existing two-level Prudential Center garage. The design of the Exeter Residences will integrate with the existing parking facility by establishing direct pedestrian access via new elevators to the parking levels below the building. Parking nests for Exeter Residences residents will be configured to allow immediate access from the Exeter Residences elevators.

Transportation

The Prudential Center is extremely well served by mass transit with the Green and Orange MBTA train lines at Copley Square and Back Bay Station respectively. Many nearby bus routes with service from Boylston, Huntington and surrounding streets service the project as well. The Green Line "Prudential Center Station" head house is accessible directly from the project's system of arcades as is the Back Bay station commuter rail service, which is connected to the arcades through the adjacent Copley Place.

Loading

Loading service is via the existing Shaw's loading dock. A new service elevator adjacent to the existing loading dock is proposed as part of this project. It will provide vertical transportation to the Blue level of the Prudential Center garage. Services will traverse horizontally in the garage and enter the Exeter Residences building where elevators provide access to the destination floor.

Pedestrian Access & Environment

The Exeter Residences site is situated in a highly developed urban neighborhood with substantial services and amenities within a close distance. The site encourages residents to walk to their destination or a choice of transit stops as it is more convenient than driving for most day-to-day needs.

This project will infill a significant pedestrian connection between Back Bay and Copley Place and will replace loading docks, parking entrances and mechanical equipment at the street with an active edge of retail and residential frontage, enlivening Exeter Street.

Vehicular Access

Part of this project will include re-configuration of the existing Exeter Street Prudential Center Garage entrance. Residents and visitors to Exeter Residences will enter the Prudential Center Garage from Exeter Street. The project will reconfigure the access lanes to the existing garage to minimize the length of the curb cut on Exeter Street and will maintain the number of access lanes provided.

Other Features

Pursuant to the new Article 37 guidelines, Exeter Residences will actively engage in green building design measures as the project progresses. The development team is committed to the conservation and preservation of natural resources. Exeter Residences will be designed using strategies consistent with the U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) Certification program for new buildings.

The project team will track LEED credits and demonstrate that the project meets the criteria for LEED Certification by the USGBC (see Appendix G).

Exeter Residences will qualify for many of the Sustainable Sites credits due to its location, development density and proximity to mass transit. The project will support Alternative Transportation efforts by providing bicycle storage and changing rooms, and by minimizing parking capacity. Stormwater runoff will be captured in accordance with the Groundwater Overlay District requirements and used to re-charge the groundwater table.

Low-flow fixtures and water efficient landscaping will promote Water Efficiency and Energy Star rated appliances will reduce energy demands. High-albedo cladding, roofing and paving materials will mitigate the heat island effect, thereby reducing cooling energy demands.

The project will utilize low volatile organic compound (VOC) paints, carpets, sealants, and adhesives to protect Indoor Environmental Quality.

3.4 Description of 888 Boylston

Phase 4a, which includes the building at 888 Boylston, referred to as the "Boylston Office Building" in the Prudential Center Development Plan has an approved program of approximately 287,493 SF with includes 219,996 SF of office space, 48,990 SF of retail space, and 18,507 SF of common space. The portions within the Phase 4a development component that are not part of 888 Boylston include common areas (such as seating at the food court) and retail areas. These areas total approximately 67,500 SF.

The proposed program for 888 Boylston will add approximately 149,000 SF of office, approximately 1700 SF of retail, and approximately 800 SF of common area, for a total of approximately 151,500 SF. The retail space is planned to be located on the street and arcade levels of the building. The office space will be accessed through a two story lobby with entrances on both the street and arcade levels. At this time 21,500 SF of the third floor may become either office or retail space. As stated earlier within the document, various studies included in the document carried the more restrictive case in considering impacts. The following section describes the floor plans for the building.

Ground Floor (Street Level)

The proposed building, and hence the Ground Floor, is set back approximately 77' from Boylston Street and thus considerably further from the established building line along Boylston Street. This set back offers the opportunity for a public plaza that provides pedestrian access to both the two story Office Lobby and Ground Floor Retail.

Second Floor (Arcade Level)

The Second Floor (Arcade Level) consists of the second floor of the Office Lobby and additional Arcade Level Retail. Through the reconfiguration of existing retail along the Boylston Arcade both the Office Lobby and new retail will have a direct connection to the Prudential Center Arcade System.

Third Floor

The Third Floor is designed with a floor to floor height that is suitable for either office or retail uses. The Second and Third Floor Retail could be interconnected under one tenancy through the use of internal circulation.

Upper Floors

Upper Floors 4 through 19 are office floors ranging from 22,900 to 23, 600 square feet.

Parking/Service Level

The Approved Project, which included 219,996 SF of office use as approved at the schematic level, had an increase of 58 parking spaces associated with Phase 4a. As currently proposed, 888 Boylston would add 182 spaces over the previously approved plan through a combination of adding an interstitial parking level and using managed parking techniques, for a total of 240 spaces. This is a ratio of 0.65/1,000 SF for the total office use of 369,000 SF within Phase 4a.

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Transportation

The proposed building is well served by mass transit with the Green and Orange MBTA train lines at Copley Square and Back Bay Station and many nearby bus routes with service from Boylston, Huntington and surrounding streets.

■

Loading

Loading service is via the existing North Service Area which also services The Mandarin Oriental Boston, The Avalon Fairfield, and retail tenants along the Boylston Arcade.

■

Pedestrian Access & Environment

888 Boylston replaces the existing North Plaza with a new building and street level pedestrian plaza that will enliven the streetscape between the Hynes Convention Center and the entrance to the Boylston Arcade along Boylston Street. The plaza will be landscaped and provide direct access to the Office Lobby and Ground Floor Retail.

■

Vehicular Access

Vehicular access to the garage area below the project will be through the newly constructed entrance off East Ring Road that was built in conjunction with the Mandarin Oriental Boston.

■

Other Features

Pursuant to the new Article 37 guidelines, 888 Boylston will actively engage in green building design measures as the project progresses. The development team is committed to the conservation and preservation of natural resources. 888 Boylston will be designed using strategies consistent with the U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) Certification program. Attached in Appendix G is a first pass at the LEED-CS v2.0 (Core and Shell) Checklist anticipating approximately 26 points and falling within the category of a certifiable LEED project.

888 Boylston is an ideal candidate for this effort since it is located within a densely populated urban area close to several public transportation systems and numerous amenities which reduce the need to drive automobiles. The building will be designed with features to reduce energy consumption and air pollution while enhancing the interior environment with natural daylight, adequate indoor air quality and a well tuned thermal comfort system. Tenants will be encouraged to continue to build on the green initiatives of the base building by specifying green products and appliances.

Other features of the project include energy saving mechanical, electrical and plumbing systems. The goal is to meet the City of Boston's Article 37 requirements pertaining to sustainable development.

3.5 Project Public Benefits

Exeter Residences and 888 Boylston will provide substantial public benefits to the City of Boston and its neighborhoods. Notable improvements derive from the addition of residential units to the Prudential Center and Back Bay.

Since acquiring the Prudential Center in 1998, Boston Properties has developed or caused to be developed almost all of the 4,500 feet of street frontage surrounding and within the Prudential Center. The final 200 feet of street frontage is the Boylston Street frontage of Phase 4a. Every phase of development has been undertaken to satisfy a demand in the market for a particular product (e.g. Class A office in the early 2000's, luxury full service residential in the mid 2000's). The type of office product that tenants require has changed since the original redevelopment plan was envisioned in the 1980's. High rise office space is in demand while the demand for low rise office space that was once used as corporate back-office space has been shifted out of the Commonwealth and in some instances out of the country.

Over the same period, the Back Bay has emerged as a 24/7 neighborhood that is ideally suited for people who like to live, work and play in their locale. 888 Boylston as proposed would appeal to a niche segment of the market who is looking for view space within a vibrant urban community. 888 Boylston would benefit local businesses as the office tenants would frequent local restaurants, shops, and services. 888 Boylston would benefit the public realm as a new active plaza area in front of the building would replace the last remnants of the original 1960's design. The final 200 feet of street frontage separating the Mandarin Oriental Boston and the Hynes Convention Center would finally be finished.

Other public benefits relate to provision of housing linkage funds which are designed to mitigate the impacts of large scale real estate development on the supply of low and moderate income housing. 888 Boylston will also contribute a jobs contribution exaction to mitigate the effects of new large-scale real estate development by providing for related job training for low and moderate income people. These linkage benefits are described below, and are presented in additional detail in Chapter 8. In addition, the Exeter Residences is responding to the Mayor's Executive Order on Affordable Housing. Other neighborhood and city wide initiatives include a community benefits fund, job creation, fiscal benefits, and streetscape and open space improvements. These additional public benefits and total public benefits are described below and summarized in Table 3-1 at the end of this section.

Housing Linkage

Exeter Residences is estimated to have 2,500 SF and the incremental development for 888 Boylston is estimated to have 151,500 SF dedicated to Development Impact Uses as defined in Article 80B-7. Housing linkage payments are calculated at the rate of $5.00/SF for the areas included in the Approved Project in 1990 and at the rate of $7.87/SF for the additional area proposed by this Notice of Project Change/Project Notification Form. Exeter Residences will contribute $19,675; 888 Boylston will contribute $2,629,770 for a combined contribution of $2,649,445 in housing linkage payments.

Job Linkage

The project program changes related to the Exeter Residences is estimated to have approximately 2,500 SF and the incremental development for 888 Boylston is estimated to have approximately 151,500 SF dedicated to Development Impact Uses as defined in Article 80B-7. Job linkage payments are calculated at the rate of $1.00/SF for the areas included in the Approved Project in 1990 and at the rate of $1.57/SF for the additional area proposed by this Notice of Project Change/Project Notification Form. Exeter Residences will contribute $3,925; 888 Boylston will contribute $525,348 for a combined contribution of $529,273 in job linkage payments.

Affordable Housing

Under the Mayor's Executive Order on Affordable Housing dated February 29, 2000, as amended by An Order Relative to the Affordable Housing Cost Factor dated February 3, 2005 and as further modified by An Order Relative to the Inclusionary Development Policy dated May 16, 2006 (the Executive Order), not less than 15% of all Unit (if on-site) or 15% of market rate units (if off-site or based on a “cash-out”) are subject to the Inclusionary Development Policy. The developer may include such units on-site within the Prudential Center or could make a grant for the construction, preservation or rehabilitation of housing units, which may be off-site, equivalent to

15 percent of the market rate housing units in the amount of $200,000 per unit for rental housing.

To meet the objectives of creating Affordable Units, the proponent proposes to have created as Affordable Units within the Prudential Center Site the number of units equivalent to 25 percent of the number of total units, as determined under the Executive Order and relevant sections of the Code. AvalonBay will contribute this percentage through a combination of new onsite affordable housing construction and affordable restrictions at other developments within the Prudential Center owned by AvalonBay.

Community Benefits Fund

Under Section XII and Exhibit E to the Development Plan and Section 10 and Exhibits C and D to the Cooperation Agreement relating to Other Public Benefits, $195,831 was to be paid by the Proponent of Phase 4a to fulfill obligations made to previously designated recipients. This contribution is for projects intended to maintain the vitality of the impacted neighborhoods and to improve the quality of life in the City. The specific projects proposed to be funded are indicated in the Development Plan, as modified from time to time at the request of PruPAC. The payment of $195,831 was to be made on the issuance of the building permit for the Phase 4a. However, at the request of the BRA, in 2003 Boston Properties pre-paid the amount of $104,036 attributable to Phase 4a so that the community would have use of these funds at an earlier point in time, with the balance of $91,795 payable on the issuance of a building permit for Phase 4a.

Exeter Residences is estimated to have 256,000 SF and the incremental development for 888 Boylston is estimated to have 151,500 SF. At the rate of $1.25/SF for the additional area proposed by this Notice of Project Change/Project Notification Form, Exeter Residences and 888 Boylston will contribute $320,000 and $385,206, respectively. The Projects in total will contribute $705,206 towards the Community Benefits Fund.

Job Creation

In addition to construction jobs, when completed the office building will add 600 permanent office jobs to the Prudential Center site.

Fiscal Benefits

The Exeter Residences are expected to increase annual tax revenue to the City of approximately $500,000 in real estate taxes annually. 888 Boylston is anticipated to generate an additional $1,515,000 dollars in annual tax revenue, for a total of $4,200,000 annually. The developments combined will total $4,700,000 in annual real estate taxes.

Streetscape and Open Space Improvements

Both Exeter Residences and 888 Boylston incorporate pedestrian and streetscape improvements and will be vital components of each. As outlined in the Project Description above, and in greater detail throughout the document, these measures will serve to enliven the existing streetscape along Boylston and Exeter Streets while enhancing the pedestrian plaza connecting the Hynes Convention Center and the entrance to the Boylston Arcade. Furthermore, both developments have committed $200,000 donations per development dedicated purely to future or on-going Boylston Street Improvement projects in recognition of the importance that Boylston Street has for the Prudential Center and the Back Bay.

Summary of Project Public Benefits

Table 3-1
Summary of Public Benefits – Exeter Residences and 888 Boylston

Benefit	Description	Incremental Amount*	Total Amount
Housing Linkage	Exeter Residences has 2,500 SF dedicated to Development Impact Uses	$19,675	$19,675
	888 Boylston has 151,500 SF dedicated to Development Impact Uses	$1,192,305	$2,629,770
Jobs Linkage	Exeter Residences has 2,500 SF dedicated to Development Impact Uses	$3,925	$3,925
	888 Boylston has 151,500 SF dedicated to Development Impact Uses	$237,855	$525,348
Affordable Housing	Create the number of units equivalent to 25 percent of the number of Market Rate Units (Exeter Residences)	50 units	50 units
Communities Benefits Fund	Under the Development Plan and Cooperation Agreement – Exeter Residences	$320,000	$320,000

	Under the Development Plan and Cooperation Agreement – 888 Boylston	$189,375	$385,206
Job Creation	In the office component (in addition to construction jobs)	600 permanent jobs	600 permanent jobs
Fiscal Benefits	Annual real estate tax revenue to the City – Exeter Residences	$500,000	$500,000
	Annual real estate tax revenue to the City – 888 Boylston	$1,515,000	$4,200,000
Neighborhood	Boylston Street Improvements	$400,000	$400,000
	Total (excluding real estate tax revenue)	**$2,363,135 plus other benefits**	**$4,283,924 plus other benefits**

*Development Impact Use square footages based on the incremental development from the previously approved Project.

3.6 Project Status

Exeter Residences and 888 Boylston are both currently in the schematic level of design. As the design progresses, the Proponent will work closely with the BRA, representatives of PruPAC and the Boston Civic Design Commission.

■

Exeter Residences

Project Schedule & Estimated Commencement

The construction of Exeter Residences would start as early as the third quarter of 2008 and have a duration of approximately 24 months.

Approximate Construction Costs

Exeter Residences is estimated to have a construction cost of approximately $77 million (hard costs of construction).

■

888 Boylston

Project Schedule & Estimated Commencement

The construction of the 888 Boylston would start as early as the third quarter of 2008 and have a duration of approximately 24 months.

Approximate Construction Costs

888 Boylston is estimated to have a construction cost of approximately $115 million (hard costs of construction).

3.7 Regulatory Controls, Permits and Agency Coordination

The Proponent will coordinate with other local governmental agencies during the permitting process including the BRA, Boston Traffic and Parking Department, the Public Improvement Commission, the Public Works Department, the Public Safety Commission, the Boston Air Pollution Control Commission, the Boston Water and Sewer Commission, and Boston Civic Design Commission.

On the State level, the Proponent will coordinate with Massachusetts Environmental Policy Act Unit, Massachusetts Historical Commission, Department of Environmental Protection and the Massachusetts Water Resources Authority (as required). On the Federal level, the Proponent will coordinate with the Federal Aviation Administration and with the Environmental Protection Agency. Table 3-2 presents a list of permits and approvals that may be required for the Projects.

Table 3-2 Anticipated Permits

Agency	Approval
City of Boston	
Boston Redevelopment Authority	Article 80 Notice of Project Change
Boston Redevelopment Authority	Article 80 Large Project Review
Boston Redevelopment Authority	Article 80 Review for Amendment to Development Plan (including Groundwater Conservation Overlay District and the Green Building Design – Article 37)
Boston Zoning Commission and Mayor	Amendment 4 to Development Plan for PDA No: 37
Boston Zoning Commission and Mayor	Zoning Text Amendment
Boston Civic Design Commission	Design Review
Boston Transportation Department	Transportation Access Plan Agreement Amendment

	Traffic Signal Control Agreement (if required) Traffic/Construction Management Plan
Boston Redevelopment Authority	Design Review
Boston Air :Pollution Control Commission and Public Safety Commission	Amendment to garage permits and inflammable storage permit
Public Improvement Commission	Approval of Improvements in Public Way
Boston Board of Appeal (or state appeal board)	Building Code Variance for Subdivision
Boston Water and Sewer Commission	Site Plan Approval Construction Dewatering Permit (if required)
Boston Public Works Department	Street Opening/Occupancy Permit
Inspectional Services Department	Demolition Permit Subdivision Permit Building Permit
Commonwealth of Massachusetts	
MEPA Office, Executive Office of Environmental Affairs	Notice of Project Change
Massachusetts Historical Commission	Determination of No Adverse Effect or Notice of Project Change (if required)
Department of Environmental Protection	Sewer Extension/Connection Permit Cross-connection permit via Boston Water and Sewer Commission (if required)
MassHighway Department	Traffic Signal Permit (if required)
Massachusetts Water Resource Authority	Construction Dewatering Permit (if required)
Federal Government	
Federal Aviation Administration	FAA Determination of No Hazard
Environmental Protection Agency	National Pollution Discharge Elimination System General Permit

- This table presents a preliminary list of permits and approvals from state and local governmental agencies, which are presently expected to be required for the project, based on project information currently available. It is possible that not all of these permits or actions will be required, or that additional permits or actions may be needed all of which may become evident during project design and development.

Boston Civic Design Commission (BCDC)

The Schematic Design Plans will be reviewed by the Boston Civic Design Commission under Article 28 of the Boston Zoning Code.

Massachusetts Environmental Policy Act (MEPA)

The Proponent will inform MEPA of the proposed Exeter Residences and 888 Boylston additions and of this Article 80 Submission. The Proponent intends to file a

Notice of Project Change with MEPA subsequent to completion of the Article 80 process based on the Notice of Project Change and Large Project Review.

■

Architectural Access Board Requirements (AAB)

Exeter Residences and 888 Boylston will comply with the provisions of the Architectural Access Board Regulations, 521 CMR Sec. 3 et seq., and with Article 30 of the Zoning Code regarding accessibility.

3.8 Zoning & Development Plan Relief Required

The Prudential Center Site is located within the Huntington Avenue Prudential Center District under Article 41 of the Zoning Code and is within PDA No. 37 under a Development Plan and, accordingly, has the designation of "D" on the Zoning Map. The site also lies within the Groundwater Conservation Overlay District and Restricted Parking Overlay District.

In order to permit construction of Exeter Residences and 888 Boylston as proposed, Section 41-12 of the Code pertaining height will be modified as related to a PDA. No modification is proposed with respect to FAR, which will remain within the limits of 6 as allowed by the Zoning Code. All developments on Boylston Street will continue to be reviewed by the BRA to achieve consistency with the Boylston Street Guidelines, as well as with Article 41. All developments within this area will be regulated by an amendment to the Development Plan, to be approved by the BRA, the BZC and the Mayor, under the standards of both Article 41 and the Boylston Street Guidelines, as appropriate.

Table 3-3 outlines the approximate zoning dimensions for Exeter Residences and 888 Boylston which are subject to revision and refinement during the course of the design review process.

Table 3-3
Exeter Residences & 888 Boylston Approximate Zoning Dimensions

	Building Height	Approx. Building Area	Typical Floor
Exeter Residences (Phase 6)	340 feet	256,000 SF	10,300 SF
888 Boylston (Phase 4a)	265 feet	439,000 SF*	21,700 SF

*67,500 SF is within Phase 4a but outside of the 888 Boylston footprint.

Development Plan

In order to permit and construct Exeter Residences and 888 Boylston as proposed, and as part of the Approved Project for the Phases 6 and 4a development components in PDA No. 37, the Development Plan for PDA No. 37 will be amended by Fourth Amendment to the Development Plan.

The Fourth Amendment to the Development Plan will be subject to review under the Article 80C procedure of the Code.

3.9 Public Review Process

Under a Memorandum of Understanding dated October 31, 1988, PruPAC was recognized as the community group providing review for the Prudential Center Redevelopment. The BRA has determined that, since PruPAC's formation and functioning in an advisory review capacity predated Mayor Menino's Executive Order of October 10, 2000 regarding Impact Advisory Groups, PruPAC will continue to advise the BRA under the Memorandum of Understanding in lieu of a separate Impact Advisory Group.

The Proponent will participate in PruPAC Subcommittee review with PruPAC's Design Subcommittee and with PruPAC's Access and Mitigation in order to obtain PruPAC support to pursue the amendments to the Development Plan related to the Project which is the subject of this Article 80 Submission. During the course of these meetings, it is anticipated that the BRA will take into consideration the input it receives from PruPAC.

3.10 Development Review Components

The Notice of Project Change/Project Notification Form compares the construction of Exeter Residences and the modification to 888 Boylston with the Approved Program as described in the Prudential Center Redevelopment Final EIR and the 2002 Notice of Project Change/Project Notification Form. As per Article 80B-3 the following components are addressed:

- Urban Design Component – Chapter 4
- Transportation Component – Chapter 5
- Environmental Protection Component – Chapter 6
- Infrastructure Systems Component – Chapter 7
- Development Impact Project Component – Chapter 8

4
Urban Design

4.1 Introduction

The following section outlines the design basis, process and reference for the proposed buildings.

4.2 Urban Context – Exeter Residences

The proposed Exeter Residences sits on the eastern edge of the Prudential Center Planned Development Area (PDA) and is bounded by Exeter Street to the east; a parking garage entrance to the south; the Lord & Taylor department store to the north; and a public plaza to the west. The building will rise in a footprint that integrates with parts of the existing Prudential Center parking garage entrance and a portion of the Lord & Taylor department store. All related figures are at the end of this section.

The project infills a vacant plaza edge along Exeter Street currently fronted with loading docks, parking entrances and mechanical equipment. The proposed building will replace these undesirable uses with an active street wall that will enhance a pedestrian connection between the Boston Public Library, Blagden Street uses and Copley Place uses to the east and the Prudential Center uses to the west. **Figures 4-1** and **4-2** depict the location of Exeter Residences along Exeter Street from an aerial perspective.

The building's entrance is on axis with Blagden Street and completes a view corridor from Copley Square. The ground floor includes retail space with storefront exposure

Figure 4-1

Exeter Residences - Aerial Photograph

Figure 4-2

Exeter Residences - Aerial Perspective

on Exeter Street. Common room amenities spaces and a secondary entrance located on the second level activate the currently under used plaza between the Gloucester and Lord & Taylor.

Exeter Residences will create housing well served by mass transit; will enliven the pedestrian experience on Exeter Street; and will create new pedestrian connections between the Prudential Center, Exeter Street and Copley Square. The project will create approximately 200 units of housing in a building with an area of approximately 256, 000 square feet on 30 above grade levels. The project's Back Bay location is a block west of Copley Square and has a diverse mix of shopping, restaurants and services to support an urban lifestyle. The comprehensive mass transit infrastructure nearby will minimize the development's impact on vehicular traffic. Parking for the project will be accommodated below grade within the existing Prudential Center garage, and loading will be shared with the existing Shaw's Supermarket loading docks.

■

Height and Massing

The mass of the building is rectangular in plan at approximately 125 feet by 80 feet covering a footprint area of 10,300 square feet. The 30 residential levels sit atop a two level plinth which includes the building entrance and retail on the street level and amenities spaces at the existing plaza level.

The roof of the building will rise slightly above the neighboring residential towers with a height of approximately 340 feet. The height will distinguish Exeter Residences from its horizontally articulated residential neighbors (Gloucester, Boylston and Fairfield buildings) and will make the top half of the building visible from distant points in all directions. **Figure 4-5** demonstrates this East Elevation of Exeter Residences.

The base of the building will activate the street. The shaft of the building places glass and opaque cladding in a dynamic arrangement that maximizes views while minimizing southern glass exposure to reduce energy consumption. The top of the building breaks free from the rest of the mass to reach for the sky and provides a striking silhouette against the other tall buildings of the Prudential Center. **Figures 4-3** and **4-4** reveal perspective views of Exeter Residences from Boylston Street and Huntington Avenue, respectively.

■

Character and Materials

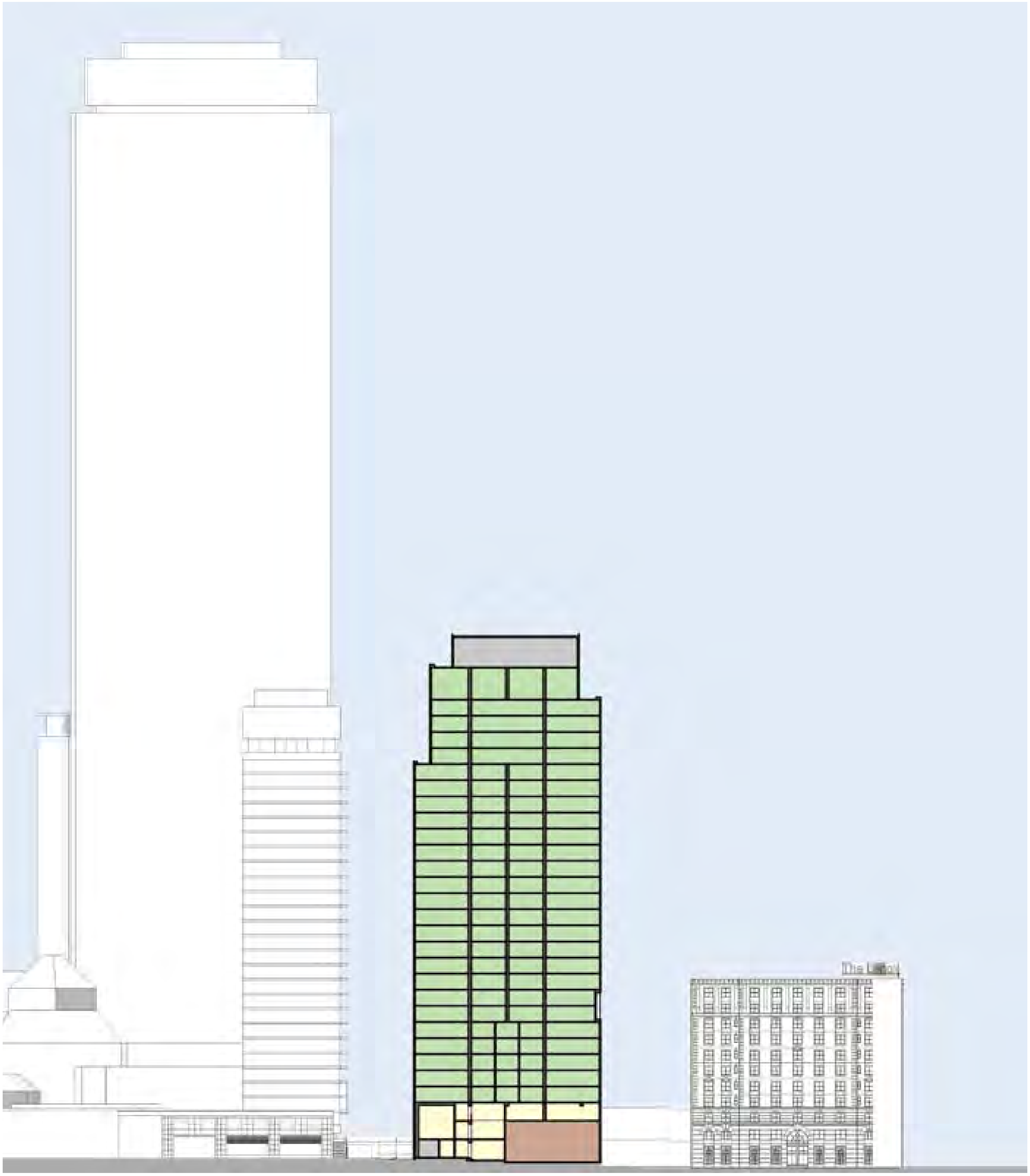
The Exeter Residences is an assemblage of discrete, interlocking forms that create a dynamic architectural composition. The predominantly glass volume on the north

Figure 4-3

Exeter Residences - Perspective View from Boylston Street

Figure 4-4

Exeter Residences - Perspective View from Huntington Avenue



Retail
Lobby
Residential

0 90 Feet

Figure 4-5

Exeter Residences - Building Section

capitalizes on views while interlocking with masonry volumes to activate the building's geometry. The solid, masonry volume with punched windows forms the primary shaft of the building, while the glass volumes convey a slender and elegant proportion.

The building's fenestration and materials celebrate the tower's height while maintaining a residential scale. Contemporary materials and construction techniques will mark this building as a 21st century example of urban high-rise architecture.

The base of the building mediates dual roles as a plinth for the tower and a pedestrian friendly street wall responding to the adjacent context –the classically articulated Lenox Hotel to the north and the Shaw's Supermarket to the south. It seeks to create a transparent face to Exeter Street, inviting pedestrians into the lobby and through to the Prudential Center plaza beyond. A new, monumental stair provides an important mid-block connection through the base between Blagden Street and the Prudential Center. It is an exterior, arcaded stair that will provide continuous access from the street to the plaza.

The residential lobby entrance forms the center of the base composition, revealing a glowing multi-story reception and amenity area. The entrance doors are recessed under a cantilevered steel and glass canopy that protects the residents and announces the lobby on the street.

The façades above include areas of textured precast concrete, smooth metal panel, and glass wall. The different materials reinforce and clarify the corresponding carves in the massing. Precast panels form the datum volume of the building. The cladding has minimal rustication and is activated by punched aluminum frame windows with clear, non-reflective, low-E glass. The window frames are set nearly flush with the cladding for a modern presentation and are glazed in areas with metal panel to lighten the building visually. Operable windows will be part of each residence further animating the façades.

Landscaping

Exeter Residences is sited entirely within the footprint of existing structures and will have a direct connection at its second level to the plaza bounded by the Gloucester residential tower; East Ring Road; and the Lord & Taylor department store. The plaza will remain an urban, predominately hardscape, outdoor space and Exeter Residences will strengthen the definition of its eastern edge. A new stair through the base of the building provides a direct mid-block connection from the plaza to Exeter Street. This new connection will improve pedestrian access to the southern entrance of Lord & Taylor from Huntington Avenue and Copley Square.

The Exeter Street sidewalk will retain its urban feel but will benefit from an improved street wall with frontage of retail and active uses. Curb cuts will be reduced and special paving on the sidewalk will articulate the building entrance and retail spaces. All plant materials will be selected from indigenous species based upon urban hardiness, and low to no irrigation requirements.

4.3 Urban Context – 888 Boylston

888 Boylston is proposed to be a 19 story mixed use building, incorporating street and arcade level retail space and a potential third level of retail space with 16 to 17 stories of office space above, supported by 2 stories of underground parking. The third level of the building will be designed to accommodate either retail or office uses. Situated between the Prudential Center Arcade entrance and the Hynes Convention Center, the project is set back 77' from Boylston Street to create a new pedestrian scaled street level plaza which will replace the existing, two-level plaza, as depicted by the aerial view in **Figure 4-6**. The building has been moved forward from the 2001 design in order to avoid impact to the MTA's tunnel ventilation infrastructure. This move will help to improve access and visibility to the ground floor retail tenants and create a more active public space. The increased height proposed will comfortably place the building in the context of the other office buildings at Prudential Center and will create a proper transition from Boylston Street to the taller Prudential Tower. All related figures can be found at the end of this section.

As conceived, the building will be a foreground element to the Prudential Tower, with its curved glass curtainwall contrasting with the adjacent masonry structures on Boylston Street. The curved façade will reduce the apparent width of the building, will complete the Boylston Street frontage, and will create a dynamic relationship between the Mandarin Oriental Boston and the Hynes Convention Center. In conjunction with the plaza and the Prudential Tower beyond, 888 Boylston represents an experiential "pause" along the south edge of the street.

The street level of 888 Boylston incorporates an office lobby entrance and a large expanse of retail entered from the plaza to insure a dynamic plaza edge and street presence. Escalators in the office lobby bring pedestrians up to a second floor office elevator lobby directly connected to the Boylston Arcade and the new Newbury Arcade running behind the Mandarin Oriental Boston. In this way the building expands and benefits from the powerful urban connectivity represented by the Arcade pedestrian network. Arcade level retail within 888 Boylston connects directly to the Arcade and adds diversity to the retail by offering larger tenant spaces. The opportunity to connect directly to the food court offers increased diversity there as well.

A new parking deck is proposed to be installed within the 2 story volume of the Green-level parking garage. Increasing the underground parking capacity below the building and the plaza within the envelope of the existing Prudential Center garage addresses the additional parking load of a new office space, without adding curbcuts.

888 Boylston ultimately promises to enhance the shopping experience of both the Prudential Center's arcade system and Boylston Street, while creating a revitalized urban plaza adjacent to the Hynes Convention Center. By establishing a continuous façade along Boylston Street, the project also knits together a portion of the street that has long been characterized by disparate fragments, and fulfills several important goals set by the Boylston Street Improvements Master Plan.

Design Development

Boston Properties has implemented a number of design changes since first proposing a building on this site in 2001. Originally proposed at 11 stories over 1 parking level, the building has expanded to 19 stories over 2 parking levels. Originally set back 87′ from Boylston Street property line, the building has moved forward 10′ at the apex of the curve to 77′ from the property line. This move continues to respect required easements from the Hynes Convention Center. The curve of the front façade has been tightened in order to respect views and distance from the Mandarin Oriental Boston. The importance of the move is that the new design does not require major alterations to the MTA's ventilation infrastructure and the building is no longer cantilevered over the Massachusett's Turnpike roadway below.

Height and Massing

888 Boylston will have a height of approximately 265′. As the building abuts the Hynes Convention Center and the Boylston Arcade, the building steps down to heights matching its neighbors. 888 Boylston is a predominantly vertical reading building that contrasts with the horizontal nature of its neighbors, serves as a foreground element to the Prudential Tower and provides a unique backdrop to the new plaza**.** **Figures 4-7** through **4-10** reveal multiple perspective views of 888 Boylston and its relationship to the Prudential Center and Boston's skyline.

The Boylston Street façade is gently curved in order to preserve light and views for the Mandarin Oriental Boston and to respect easements in favor of the Hynes Convention Center. The Hynes Rotunda remains in view from the street. Curving the façade will reduce 888 Boylston's perceived width on Boylston Street, and it will also place new emphasis on the interesting relationship between the neighbors. In addition, this configuration opens up views down Boylston Street from within the building. A veil of glass defines this façade, which is suspended in front of a larger, more solid mass that includes the penthouse. **Figure 4-11** offers a detailed North Elevation of 888 Boylston.

A stepped south elevation follows the footprint of the turnpike and offers corner offices with views to the Christian Science Center, mitigating against the overwhelming presence of the Prudential Tower. The orthogonal nature of the south, east and west facades returns the building to the Prudential Center and Back Bay grid, and will be a more conventional aluminum curtainwall system with both metal panel and glass, and aluminum mullion caps. Corner windows are emphasized with clear glazing brought to the floor.

Character and Materials

The curved, glass curtainwall system with cantilevered glass edges presents a strikingly fresh and modern appearance on Boylston Street in contrast with the heavy masonry appearance of its neighboring buildings. The curved façade is envisioned as a segmented glass veil suspended in front of the structure, and the glass is cantilevered beyond the horizontal and vertical corners of the building to emphasize this veil-like quality. The "veil" is envisioned as completely butt glazed, without any mullion caps, and is entirely clear glass. The building structure and life within the building will enrich this neutral tableau.

An arc of round support columns fronts the slightly recessed retail elevations, providing articulation and scale at the base of the structure. By recessing at the retail storefront, the building expresses the clear programmatic distinction between the first two retail floors and the office tower, and presents a reduced scale at the plaza level.

Large canopies project from the arc of support columns to announce the office lobby and retail entries, again offering elements that reduce the building to a pedestrian scale at the plaza.

Landscaping

The plaza scheme of 2001 will be the basis of design for the current 888 Boylston landscaping features. The space is imagined predominantly as hardscape, with plantings designed to address the solar orientation of this public space. Street trees will complete the Boylston Street Improvements Plan, and specimen trees within the plaza will add satisfying color, texture and pattern. The entrances to the Prudential Center Arcade and the retail spaces fronting the plaza remain clearly visible and

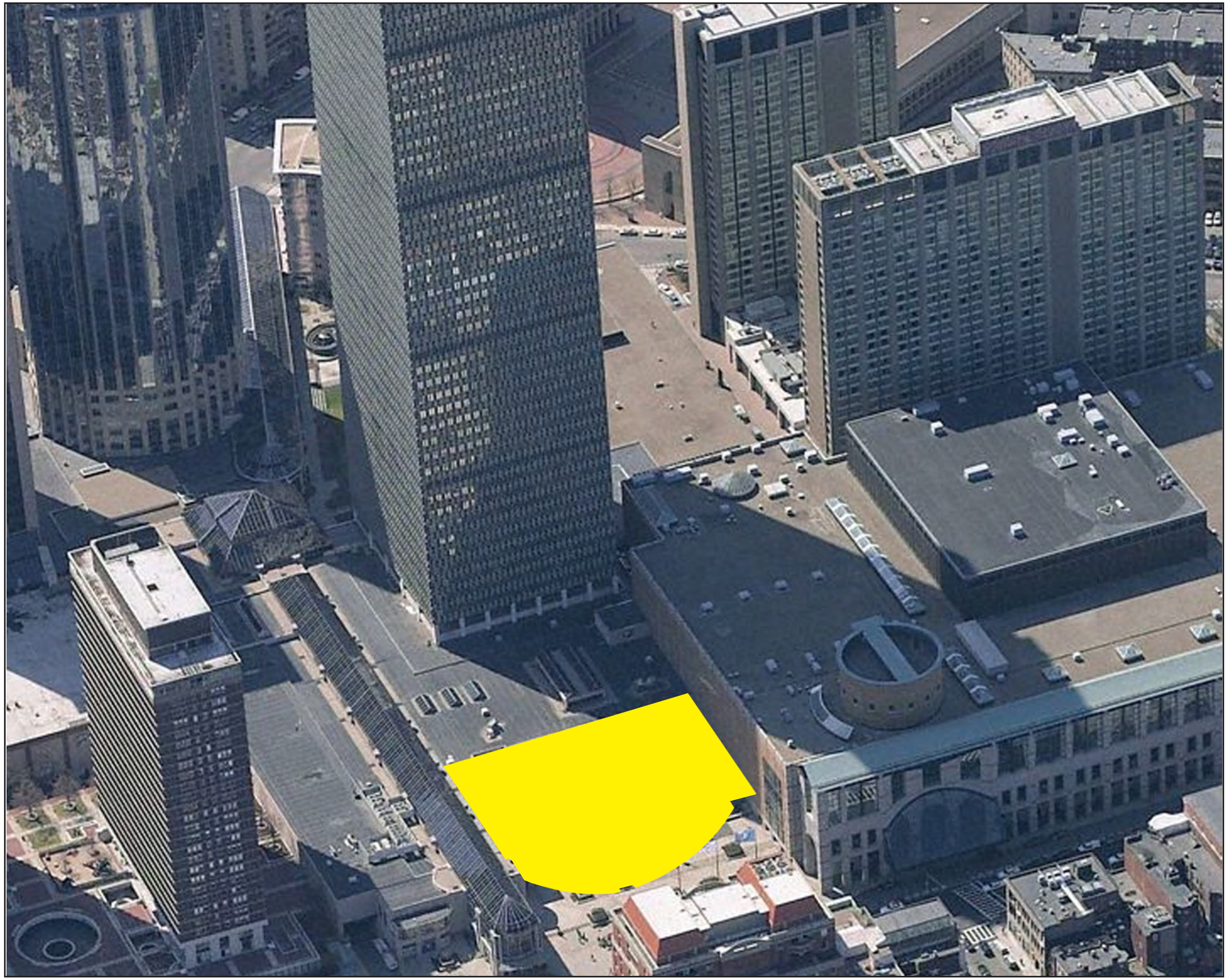


Figure 4-6

888 Boylston Site Aerial

Figure 4-7

View from Mass. Ave. Bridge
over Charles River

Figure 4-8

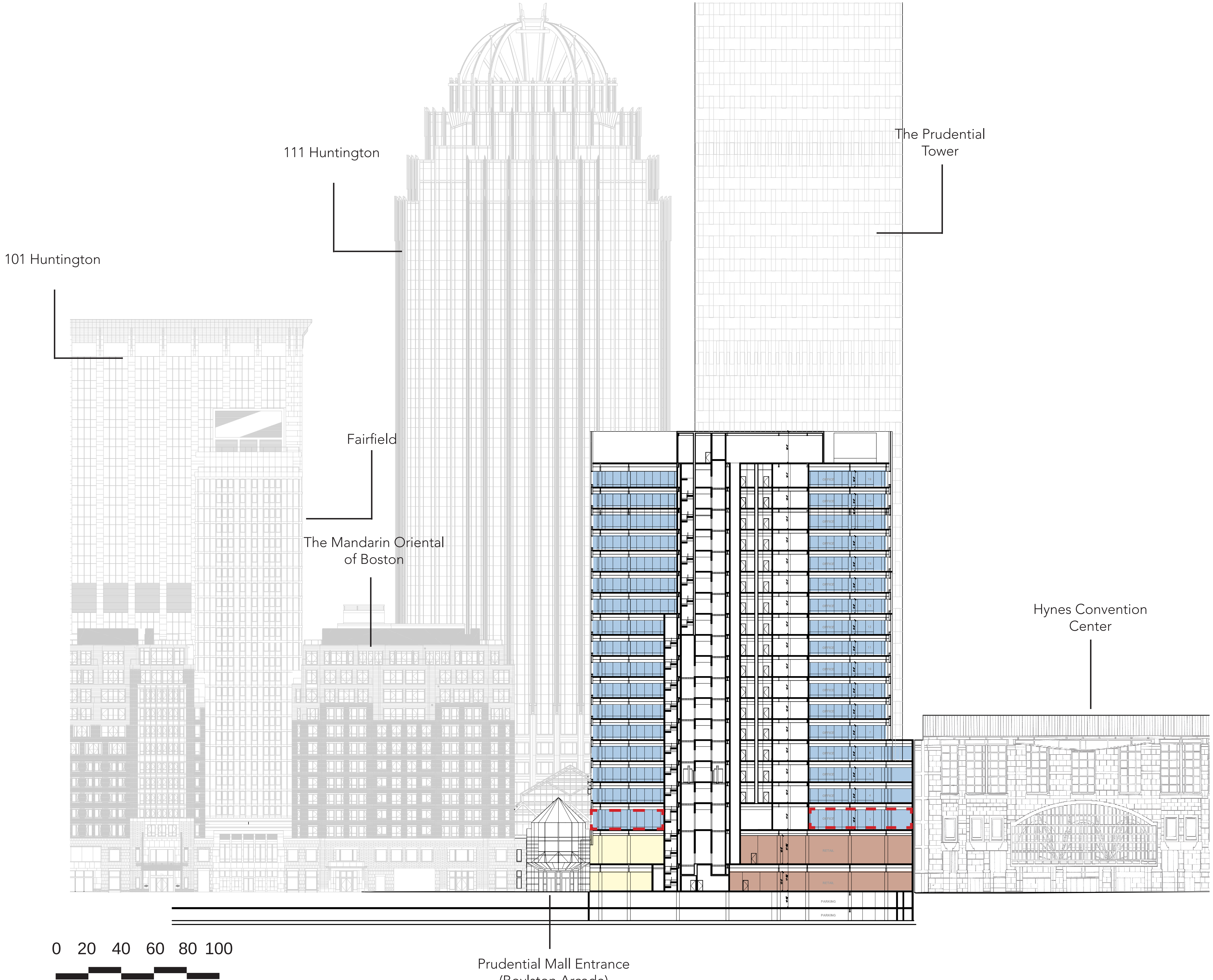
Dusk View from Memorial Dr.
over Charles River

Figure 4-9

View from Mass. Ave. Bridge
over Mass. Pike

Figure 4-10

View from Huntington Ave



Legend

- Lobby
- Retail
- Office
- Residential
- Office/Retail

Figure 4-11

North Elevation - 888 Boylston

easily accessible. Paving is varied, with granite and concrete elements and grass planting beds arrayed in a curvaceous pattern related to the design of 888 Boylston.

4.4 Open Space, Pedestrian Ways & Amenities

The Prudential Center is distinctive in Boston for its expansive network of interior shopping arcade, an amenity that will be expanded by 888 Boylston. Both new buildings are designed to integrate with, and take best advantage of the strong existing pedestrian network at each location.

The 888 Boylston building will bring new retail opportunities to the Boylston Arcade, and will add an additional lobby and connection to the street to the network. The retail space layout offers the potential to draw both food court tenants, full-scale restaurant tenants and both small and large retail tenants to both the Boylston Arcade and Boylston Street.

The existing plaza at this location is a two level construction admitting some sun to Boylston Street at the beginning and end of the day (the Prudential Tower shadow has a significant impact) but offering little in the way of urbanity to either the street or the Prudential Center. By lining the plaza with new retail, the street edge achieves continuity and receives an increased level of activity.

The plaza design from 2001 remains substantially intact. Minor adjustments have been made to accommodate the new building footprint, but the paving diagram and planting scheme remain the same. Visibility of the retail and office lobby from the street will remain a priority in plant selection.

The Exeter Residences will significantly improve the pedestrian experience along Exeter Street. The proposed retail use at the base of the tower will activate the street and a new monumental stair to the plaza will open up Blagden Street to the heart of the Prudential Center. The new connection enables pedestrians to connect from Exeter Street to Ring Road at mid-block via the new monumental stair, or directly through the mezzanine keyhole that forms the front door to the Gloucester.

4.5 Parking

All new parking supporting the Exeter Residences and 888 Boylston will be located within the current garage limits. No changes to the existing access points into and out of the garages area proposed as reflected in **Figure 5-19** within Chapter 5. In addition the parking modifications are not expected to notably change travel patterns and access routes within the garage.

The parking for the Exeter Residences will be established through the introduction of managed parking areas and reconfiguration of the existing residential parking nests within the Prudential Center North Garage. Access to and from the nests will remain the same. Parking nests will be integrated with the elevator core for the new buildings ensuring easy access from car to elevator for residents.

The existing Green level of the Prudential Center parking garage was constructed with an 18′ floor to floor dimension within the footprint of 888 Boylston. This project envisions insertion of a mezzanine parking deck within this space, thereby increasing the parking capacity of the garage within the building footprint. The mezzanine deck would be valet accessible only, allowing for managed parking. Access will be via a ramp from the Green level only, and no additional access ramps or curb cuts from the street are required.

4.6 Conformance with the Boylston Street Improvements Master Plan

The Boylston Street Improvements Master Plan established a number of goals relevant to 888 Boylston, most notably the following:

- To enhance the retail vitality of Boylston Street and improve its visible quality and overall image.
- To enhance the pedestrian experience by installing street amenities.
- To establish specific design criteria for sidewalks, open spaces, signs and plantings.

888 Boylston proposes to reinvigorate an existing plaza with paving and planting materials relating to those in the Master Plan. Street trees will complete the Boylston Street Planting Plan, and specimen trees within the plaza will add satisfying color, texture and pattern. The plaza itself is imagined as an expansion of and welcoming eddy in the Boylston Street sidewalk environment, with a new retail edge that directly addresses the Master Plan emphasis on enhanced retail vitality. The pedestrian experience is addressed with benches, shade, paving variety, and the newly established continuity of the Boylston Street façade.

5 Transportation

5.1 Project Description

This chapter quantifies and discusses the differences between the transportation impacts of the originally approved Prudential Center Redevelopment project and the revised program, which proposes new construction as Phase 6 (Exeter Residences) and includes modification to Phase 4a (888 Boylston). As presented in the Approved Prudential Center Development Plan updated through 2002, no specific plans were identified for Phase 6. The approved Phases 4a included 219,996 square feet of office space, 48,990 square feet of retail space on two floors and 18,507 square feet of common space.

The current proposal for the Exeter Residences (Phase 6) is for approximately 200 units of residential housing in a building with a total area of approximately 256,000 square feet on 30 above-grade levels with approximately 2100 square feet of ground floor retail.

The proposed program for 888 Boylston will add approximately 149,000 SF of office, approximately 1700 SF of retail, and approximately 800 SF of common area, for a total of approximately 151,500 SF. This chapter covers vehicular traffic, pedestrian access, public transportation and parking conditions along Exeter Street., Boylston Street and Huntington Avenue in the vicinity of the two sites. Future operating conditions were evaluated to determine any potential deficiencies and to identify any appropriate mitigation measures.

The location of the two proposed sites is depicted in **Figure 5-1**.

In order to fully assess the incremental demand and related transportation network performance, this analysis will compare each new program component (Exeter Residences and the new program related with 888 Boylston) individually and then together.

Figure 5-1

Site Location Map

Exeter Residences\888 Boylston

AvalonBay Communities, Inc.

Boston Properties

5.2 Summary of Key Transportation Findings

The transportation analysis conducted for the Exeter Residences and 888 Boylston projects, demonstrates that adequate roadway capacity exists along the Boylston Street, Huntington Avenue and as well as study area intersections under peak hour traffic conditions. The small difference in site-generated traffic compared to the Approved Development program can be accommodated within the existing roadway networks. A summary of key findings of the transportation analysis for the two project sites is as follows:

- The highest combination of background and site-generated traffic will occur during the evening commuter peak hour between the hours of 4:00 to 5:00 PM, representing the critical analysis period for the Exeter Residences and/or 888 Boylston projects.
- The Exeter Residences program alone will generate approximately 21 vehicle trips in the weekday morning peak hour and 28 vehicle trips in the weekday evening peak hour while the 888 Boylston program is expected to generate approximately 203 and 210 vehicle trips during the weekday morning and evening peak hours respectively. The Exeter Residences and 888 Boylston projects together are projected to generate 224 vehicle trips during the weekday morning peak hour and 238 vehicle trips during the evening peak hour. Compared to the Approved Development Plan Program planned for the Exeter Residences and 888 Boylston sites, this represents a net increase of 88 vehicle trips in the morning peak hour and 90 vehicle trips in the evening peak hour. It is anticipated that a majority of the trips made to the site will be transit or pedestrian (walking) trips.
- The traffic analyses were conducted for three separate scenarios to evaluate the impacts of the Exeter Residences project alone, the 888 Boylston project alone and the combined Exeter Residences and 888 Boylston projects. All intersections along Boylston Street operate at an acceptable level of service (LOS) of D or better, except the intersection of Boylston Street at Dalton Street which operates at LOS F under the future analysis scenarios. The Exeter Street and East Ring Road intersections along Huntington Avenue will operate at LOS E under the future condition. Signal timing modifications at the above failing locations will improve operating conditions to acceptable levels of service.
- Vehicular access to the parking associated with the Exeter Residences residential building will be primarily via Exeter Street while East Ring Road will serve as the primary vehicular access point for the parking associated with the 888 Boylston office building.
- The sidewalk area along the frontage of the two proposed buildings has been designed with adequate capacity to serve the residential, retail and office uses.

- No additional parking spaces, beyond those approved in the Development Plan, are programmed for the Exeter Residences building. Parking for the Exeter Residences building will be located in a residential "nest" similar to the existing parking nest that serves the adjacent Gloucester Building. No on-street parking will be permitted in front the proposed Exeter Residences building. 182 new spaces will be provided for the 888 Boylston by an insertion of a mezzanine parking deck and parking management within the proposed building space. The parking for 888 Boylston will also be located in a nest area separate from public parking. A forty (40) feet No-standing and No-Stopping curb area is proposed in front of the 888 Boylston building entrance to accommodate pick-up and drop-off activities for 888 Boylston and the Prudential Center Arcade. (Boylston Arcade)
- All parking supporting the Exeter Residences and 888 Boylston projects will be within the current Prudential Center garage limits. No changes to the existing access points into and out of the garages are proposed. In addition, the parking modifications are not expected to notably change travel patterns and access routes within the garage.
- The street level of 888 Boylston offers an office lobby entrance and a large expanse of retail entered from the plaza to insure a dynamic plaza edge and street presence. Escalators at the street level office entrance bring pedestrians up to a second floor office elevator lobby providing a direct link to the Boylston Arcade and Newbury Arcade running behind the Mandarin Oriental Boston. The public streetscape will be designed as an extension of the improvements currently being constructed as part of the Mandarin Oriental Boston project.
- The proponent is committed to providing and enhancing a wide array of Transportation Demand Management (TDM) measures offered to employees and residents as a means to encourage the use of alternative transportation modes. A detailed list of TDM actions is presented in Section 5.7, Transportation Demand Management.

5.3 Study Methodology

This study was conducted in three distinct stages. The first stage (2006 Existing Conditions) involved an inventory of existing transportation conditions for the study area (defined below) including an inventory of the surrounding transportation infrastructure; observations of vehicular traffic, public transportation, and pedestrian activities, and collection of traffic and pedestrian counts.

In the second stage of the study (2011 Design Conditions), future 2011 transportation conditions were projected for the original and currently proposed programs for the Exeter Residences and 888 Boylston sites. Roadway, pedestrian, and transit travel demands were identified and compared to expected transportation capacity. In addition to travel demands from these two sites, specific travel demand forecasts for completion of the Prudential Center Redevelopment were assessed along with future transportation demands from projects proposed by others. A five-year time horizon from the project completion year was selected for analysis, consistent with EOEA and BTD guidelines for the preparation of traffic studies.

The final stage of the study (Mitigation) considers what measures, if any, are needed to address any program-related pedestrian, parking, traffic, and public transportation deficiencies identified in stage two of the study. Because of the limited changes in impacts to the transportation system, no additional transportation improvement actions beyond those identified in the approved Development Plan and Transportation Access Plan Agreement or incorporated as part of the proposed Exeter Residences and/or 888 Boylston Proposal design are needed.

Study Area

The study area for the updated transportation study includes the following roadways:

- Boylston Street
- Huntington Avenue
- Exeter Street

Roadway characteristics, vehicular activities and pedestrian facilities were inventoried and analyzed for the area along the above roadways and the frontage of the proposed buildings.

Intersections being studied as part of the comparison of the development programs are identified below, with the intersections that were included in the Prudential Center FEIR traffic evaluation denoted with an asterisk:

- Boylston Street at Hereford Street / Dalton Street,*
- Boylston Street at Gloucester Street,
- Boylston Street at Fairfield Street / Prudential Center Arcade,
- Boylston Street at East Ring Road,
- Boylston Street at Exeter Street,*
- Huntington Avenue at Exeter Street/ Stuart Street,*
- Huntington Avenue at East Ring Road.

Figure 5-2 illustrates the study area roadways and intersections for the traffic, pedestrian and parking assessments.

Figure 5-2

Study Area Locations

Design Analysis Condition

The analysis of the approved Prudential Center Redevelopment project and the currently proposed program focused on the weekday morning and weekday evening commuter hours and Saturday peak hours, because the peak traffic generating periods were projected to be consistent with these times. The weekday evening peak hour represents the critical transportation analysis condition for the new program, representing the period of greatest combined area traffic and site-generated traffic. Impacts to transportation facilities in the study area are projected to be less during off-peak times when overall traffic volumes are much lower.

Vehicular Traffic

This transportation study analyzed and compared traffic operations under the 2011 Build condition for the Development Plan program, including the approved Phase 4a, with traffic operations under the 2011 Build Condition using the currently proposed development program for Phases 6 and 4a. As described in the following sections, the traffic analysis includes roadway geometrics, traffic controls, observed traffic volumes, trip generation and trip distribution, parking and loading services.

5.4 Existing Transportation Infrastructure

Existing Roadway Conditions

The principal roadways in the report study area, as shown in **Figure 5-2**, are briefly described below. The description of the roadways includes physical characteristics, geometric conditions and traffic control measures.

Boylston Street

Boylston Street is a principal arterial beginning at its intersection with Brookline Avenue in the Fenway neighborhood to the west and ending at its intersection with Washington Street in Chinatown to the east. Near the site, Boylston Street traverses one-way eastbound with five 10-foot lanes and a total width of approximately 50 feet. Currently portions of Boylston Street are under construction and reduced to two through-lanes. Under normal conditions, through traffic operations occur in three lanes, with two lanes being used for parking if allowed and/or parking maneuvers. The signalized intersections on Boylston Street are interconnected as part of the city's computerized signal system. Sidewalks varying in width from 10 feet to 18 feet exist along both sides of Boylston Street.

Huntington Avenue

Huntington Avenue is a major arterial traveling from Dartmouth Street in Back Bay and ends south of the Longwood Medical Area before becoming South Huntington Avenue. Near the site, Huntington Avenue is two to three lanes wide in each direction south of Exeter Street and one-way southbound with four travel lanes north of Exeter Street. The signalized intersections on Huntington Avenue are interconnected as part of the city's computerized signal system. Sidewalks varying in width from 12 feet to 18 feet exist along both sides of Huntington Avenue.

East Ring Road

East Ring Road is a privately owned two-way roadway running perpendicular to Boylston Street. The roadway provides a connection from Boylston Street to Huntington Avenue, but also serves as access to the front door entrances of the Gloucester, Fairfield and Boylston Residential buildings. The roadway width is approximately 24 to 26 feet wide. The roadway is controlled by signals at the Boylston Street and Huntington Avenue intersections. Sidewalks are provided on either side of the street and are typically 12 feet wide.

Exeter Street

Exeter Street is a one-way roadway running perpendicular to Boylston Street beginning at Beacon Street in the Back Bay and ending at Huntington Avenue. The roadway crosses Boylston Street running southward. The roadway width is approximately 25 feet and is controlled by signals at the Boylston Street and Huntington Avenue intersections. Metered parking is available on both sides of Exeter Street with various loading activities occurring during the off peak hours. Traffic operations on Exeter Street are usually light until 8:00 AM until it becomes slightly congested around 8:45 AM. Loading operations for the Shaw's Supermarket and the residential buildings occur at the corner of Huntington Avenue and Exeter Street. These loading operations do not cause major delay or queues on Exeter Street as the trucks arrive sporadically between the hours of 4:00 AM and 2:00 PM. However, unexpected deliveries coupled with truck operations at the Copley Square and Marriott hotels tend to create delays and backups due to double parking of vehicles along Exeter Street. Detailed description of loading operations is presented later in this section.

Study Area Intersections

The roadway intersections in the analysis study area are described below. The description of the intersections includes physical characteristics, geometric conditions, pedestrian facilities and traffic control measures.

Boylston Street at Dalton Street

The intersection of Boylston Street/Dalton Street is a three-legged intersection that operates under a four-phase signal control, including a pedestrian phase. The signal is tied into the city's computerized signal system. At this intersection, Boylston Street operates one-way eastbound and Dalton Street operates two-way to the south of the intersection. The fire station to the north of the intersection has its own actuated phase in the signal control. The Boylston Street eastbound provides for two approach lanes and three departure lanes, with metered parking on both sides of the street. Dalton Street northbound provides for two 12-foot wide approach lanes, with parking restricted on both pavement edges. Pedestrian crossings, within the control of the signal, are provided for in crosswalks on all approaches.

Boylston Street at Hereford Street

Hereford Street forms a three-legged T-type intersection with Boylston Street. Because Hereford Street is close to the Dalton Street intersection and is one-way away from Boylston Street, the signal at the Dalton Street intersection controls traffic flow through this intersection. The Boylston Street eastbound approach provides for three 10-foot wide lanes, and the Hereford Street northbound leg provides for about a 13-foot wide pavement surface undifferentiated by lane markings. Metered parking is provided along both sides of Hereford Street. Sidewalks are located along both sides of Boylston Street and Hereford Street. Pedestrian crosswalks are provided on all approaches.

Boylston Street at Gloucester Street

The Boylston Street/Gloucester Street intersection is a signalized T- intersection with Boylston Street operating as one-way in the eastbound direction with three through lanes and Gloucester Street operating one-way southbound with two left-turn travel lanes. The traffic signal operates under a two-phase control with pedestrians crossing concurrently with un-opposing phases. Pedestrian crosswalks are provided on both approaches. Metered parking is provided along both sides of Gloucester Street and along the north side of Boylston Street. Along the south side of Boylston Street, a cab stand is provided west of the intersection and an MBTA bus stop is located to the east of the intersection. Sidewalks are located along both sides of Boylston Street and Gloucester Street.

Boylston Street at Fairfield Street

Boylston Street/Fairfield Street is a T-type un-signalized intersection. Boylston Street has three travel lanes and is one-way in the eastbound direction, and Fairfield Street is one-way northbound with one travel lane. Currently portions of Boylston Street are under construction and reduced to two through-lanes. Metered parking is provided along both sides of Fairfield Street and along the north side of Boylston Street. A MBTA bus stop is located just southwest of the intersection. Pedestrian crosswalks are provided on both approaches. Sidewalks are located along both sides of Boylston Street and Fairfield Street.

Boylston Street at East Ring Road

The Boylston Street and East Ring Road intersection is a signalized T- intersection, operating under a three-phase signal control. Boylston Street operates in a one-way eastbound direction and East Ring Road operates as a two-way roadway to and from the south. Currently portions of Boylston Street are under construction and reduced to two through-lanes. Metered parking is provided along both sides of Boylston Street under normal operating conditions, however due to construction metered parking is available only on the north side of Boylston Street. Pedestrian crosswalks are provided on both approaches. Sidewalks are located along both sides of Boylston Street and East Ring Road, with partial sidewalk closures on the south side of Boylston Street and west side of East Ring Road due to construction.

Boylston Street at Exeter Street

The Boylston Street/Exeter Street intersection is a four-legged intersection that operates under a three-phase signal control, including a pedestrian phase. At this intersection, Boylston Street operates in a one-way eastbound direction, and Exeter Street operates in a one-way southbound direction. Metered parking is provided along the north side of Boylston Street, and along both sides of Exeter Street just north of the intersection and on the east side of Exeter Street just south of the intersection. Valet parking for the Lenox Hotel is located along the southeast corner of this intersection. Pedestrian crosswalks are provided along three approaches of the intersection. Sidewalks are located along both sides of Boylston Street and Exeter Street.

Huntington Avenue at Exeter Street/Stuart Street

The Huntington Avenue at Exeter Street/Stuart Street intersection is a six-legged intersection that operates under a four-phase signal control with pedestrians crossing concurrently with un-opposing vehicle phases. The southbound Exeter Street approach provides two unmarked travel lanes. Stuart Street operates eastbound away from the intersection with three receiving lanes. Huntington Avenue is one-way and provides four westbound travel lanes to the east of the intersection and is two-way with three approach lanes to the west of the intersection. Parallel to Huntington Avenue's westbound approach is Hotel Drive which serves the Copley Square Hotel and provides one travel lane in the westbound direction. The Copley Parking garage is located to the north of the intersection with its entrance and exit controlled by the signal. On-street, metered parking is allowed on both sides of Exeter Street. The Boston Duck Tours main pickup and drop-off location is located on the northwest side of the intersection, along Huntington Avenue. Pedestrian crosswalks are provided along all of the approaches of the intersection. Sidewalks are located along both sides of Huntington Avenue, Exeter Street and Stuart Street.

Observations at this intersection indicate that the signal timings present internal to the controller do not match the BTD's UTCS programming. In addition, pedestrian crossing times especially across Huntington Avenue are insufficient, causing operational and safety issues.

Huntington Avenue at East Ring Road

The Huntington Avenue/East Ring Road intersection is a four-legged intersection that operates under a three-phase signal control, as well as an exclusive pedestrian phase. At this intersection, Huntington Avenue operates in a two-way eastbound/westbound direction, providing two 11 feet through lanes and one exclusive left turn lane also 11 feet wide, on the eastbound approach. On the westbound approach Huntington Avenue provides two 12 foot through lanes, as well as an exclusive left and right turn lane, which are 12 and 11 feet wide respectively. East Ring Road as well as Harcourt Street both operate in a two-way northbound/southbound direction, and both roadways provide one southbound and one northbound travel lane, with the East Ring Road lanes measuring 12 feet in width each and Harcourt Street lanes 16 feet each. The East Ring Road lanes are each 12 feet wide, and the Harcourt Street lanes 16 feet wide. The Boston Duck Tours main pickup and drop-off location is located on the southeast side of the intersection, along the Huntington Avenue westbound approach. A six foot wide cab stand is located on the northwest side of the intersection along the Huntington Avenue eastbound approach. Pedestrian crosswalks are provided along all approaches of the intersection. Sidewalks are located along both sides of Huntington Avenue, East Ring Road and Harcourt Street.

This intersection is currently operating as pre-timed even though detection is provided on all approaches. The detector amplifiers were not plugged into the controller and there were constant calls on all vehicle phases. The intersection failed to communicate with the central UTCS system.

Massachusetts Avenue at Boylston Street

As per BTD's request vehicle and pedestrian operations were observed at the intersection of Massachusetts Avenue and Boylston Street during the weekday morning and evening peak hours. Massachusetts Avenue and Boylston Street intersect to form a four-legged intersection. This intersection currently operates under a three-phase signal control with concurrent pedestrian movement during the vehicle phases. There are two travel lanes on each direction of Massachusetts Avenue with an exclusive left-turn lane on the southbound approach. Similarly, Boylston Street has two travel lanes on each direction with an exclusive right-turn lane on the westbound approach. Sidewalks are provided along both sides of Massachusetts Avenue and Boylston Street with widths varying from eight feet to twenty feet. Pedestrian crosswalks are provided on all approaches. Parking is restricted on Massachusetts Avenue in the vicinity of the intersection. However, vehicles were parked illegally. Metered parking is available along westbound Boylston Street.

Observations at this location indicate heavy pedestrian activity due to the presence of the Hynes Convention Center T-stop and the Berklee College of Music. Many pedestrians were observed crossing the streets at various locations even though crosswalks are present at the nearby intersection. Vehicles experienced significant delays and long queues along Massachusetts Avenue. This condition occurred during both the morning and evening peak hours. The signal control at the Belvidere Street intersection causes major backup whenever the green signal is actuated for Belvidere Street. Vehicles backup into the Boylston Street intersection as the distance between Belvidere Street and Boylston Street is very short, approximately 300 feet. This is further exacerbated by the pedestrian activity in front of the Berklee College of Music. Overall, it appears that the traffic operations at the Belvidere Street intersection dictate the level of delays and queues along this segment of Massachusetts Avenue. It is apparent that there is no coordination or queue management along Massachusetts Avenue between Belvidere Street and Boylston Street.

■

Existing Traffic Operations

Existing Traffic Volumes

Traffic data were collected in September 2006 to establish the 2006 existing conditions for the critical analysis periods. These included manual turning movement counts for the seven study area intersections and two automatic traffic recorder counts on Boylston Street (west of Fairfield Street) and Huntington Avenue (east of East Ring Road), as shown in **Figure 5-3**.

Turning Movement Volumes

Turning movement counts (TMCs) were conducted at seven intersections from 7:00 AM to 9:00 AM and from 4:00 PM to 6:00 PM on a Thursday and 2:00 PM to 6:00 PM on a Saturday. **Figures 5-4** and **5-5**, respectively, present the resulting weekday and Saturday peak hour traffic volumes at the seven study area intersections.

Hourly Traffic Variation

Hourly traffic variations near the site were identified by conducting two automatic traffic recorder (ATR) counts on Boylston Street and Huntington Avenue over a 48-hour period. These data serve as the basis for identifying the critical design period for the project, and illustrates the pattern of traffic flow in the study area as influenced by other nearby activities.

The ATR data indicate that traffic activity on Boylston Street peaked between 5:00 PM and 7:00 PM, consistent with the evening commuter travel period and averaged 1,052 vehicles per hour. Traffic flow was less during the morning commuter travel period of 8:00 AM to 9:00 AM with 741 vehicles per hour. On Huntington Avenue, traffic volumes peaked in the eastbound direction between 6:00PM and 7:00PM with 1270 vehicles and in the westbound direction between 5:00PM and 6:00PM with 688 vehicles. During the morning, the eastbound direction peaked between 8:00AM and 9:00AM with 1014 vehicles while the westbound direction did not peak until the period of 11:00AM to 12:00PM with 618 vehicles. According to the four-hour TMCs

Figure 5-3

Traffic Count Locations

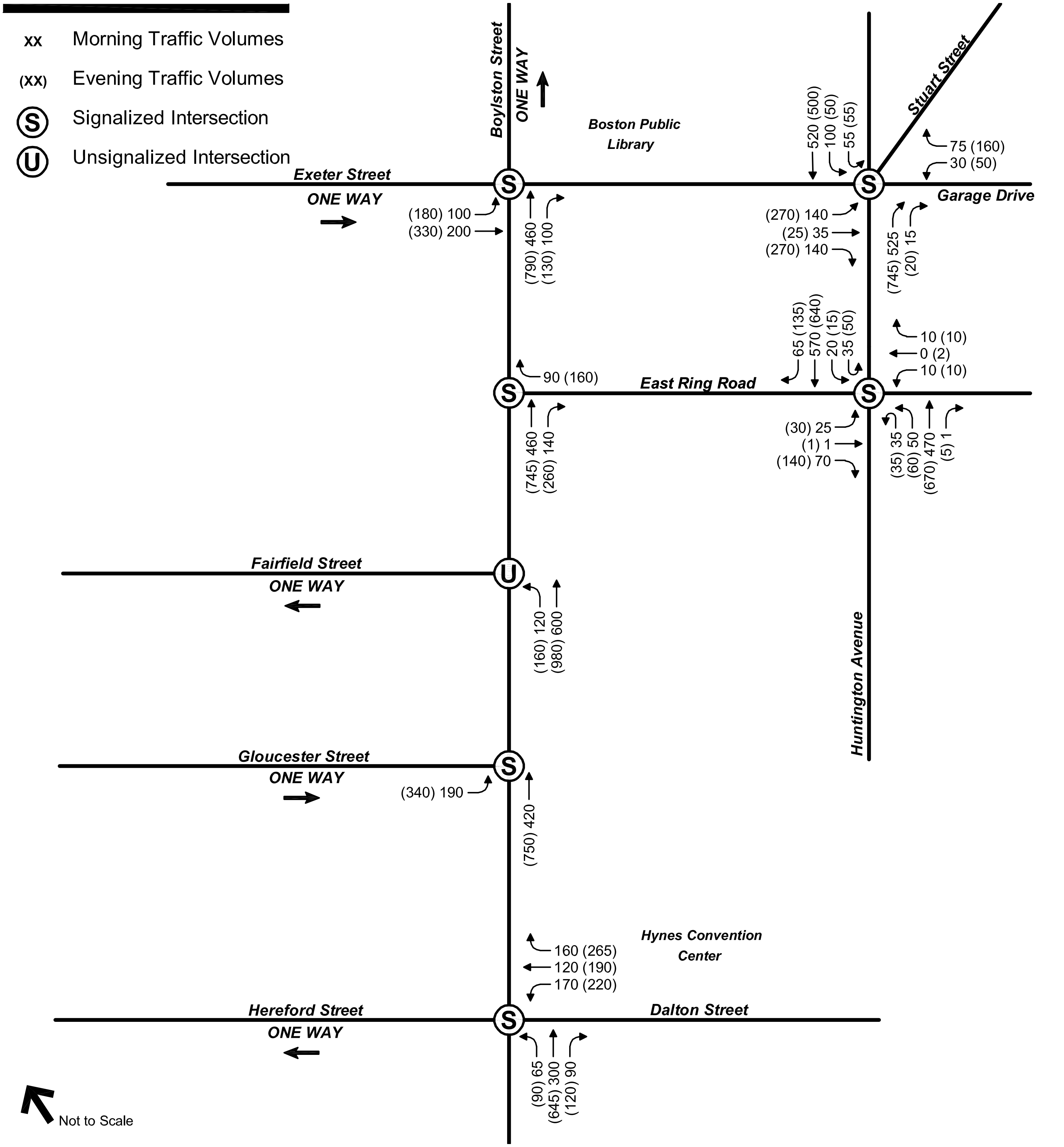


Figure 5-4

2006 Existing Condition
Weekday Morning and Evening
Peak Hour Traffic Volumes

Exeter Residences\888 Boylston

AvalonBay Communities, Inc. Boston Properties

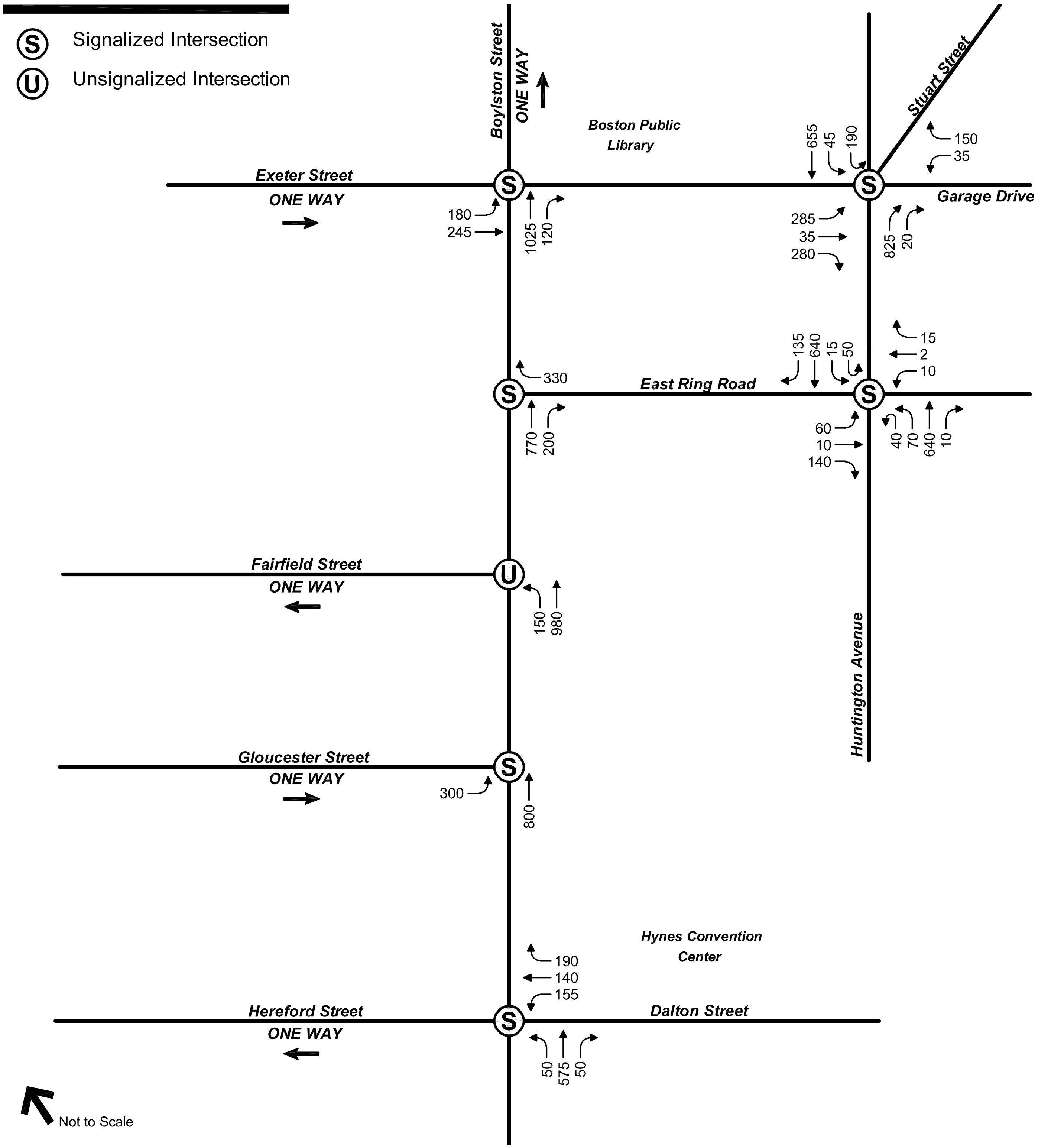


Figure 5-5

2006 Existing Condition
Saturday
Peak Hour Traffic Volumes

Exeter Residences\888 Boylston

AvalonBay COMMUNITIES, INC.

Boston Properties

performed on Saturday, traffic was heaviest around 4:00 PM at a majority of the study intersections.

The analysis utilizes the evening peak hour as the worst case scenario for analyzing network performance. The study area performs better in the morning peak hour. This is consistent with the findings of the FEIR for the Prudential Center. Table 5-1 presents a summary of the results of the existing conditions analysis. As presented in the table below, all study area intersections operate at acceptable level of service (LOS D or better) under the existing condition during the weekday morning, weekday evening and Saturday peak periods except the intersection of Boylston Street at Dalton Street which operates at LOS E during the evening peak hour.

Table 5-1
2006 Existing Condition Capacity Analysis Summary (Signalized Intersections)

	2006 Existing Conditions		
	V/C*	Delay**	LOS***
MORNING PEAK HOUR			
Boylston Street/ Dalton Street/ Hereford Street	0.45	32.9	C
Boylston Street / Gloucester Street	0.15	14.4	B
Boylston Street / East Ring Road	0.27	6.9	A
Boylston Street/ Exeter Street	0.30	17.4	B
Huntington Avenue / Exeter Street / Stuart Street	0.46	22.9	C
Huntington Avenue / East Ring Road / Harcourt Street	0.52	34.5	C
EVENING PEAK HOUR			
Boylston Street / Dalton Street / Hereford Street	0.80	72.8	E
Boylston Street / Gloucester Street	0.25	16.0	B
Boylston Street / East Ring Road	0.42	9.3	A
Boylston Street/ Exeter Street	0.47	21.7	C
Huntington Avenue / Exeter Street / Stuart Street	0.59	25.7	C
Huntington Avenue / East Ring Road / Harcourt Street	0.55	32.8	C
SATURDAY PEAK HOUR			
Boylston Street / Dalton Street / Hereford Street	0.60	27.1	C
Boylston Street / Gloucester Street	0.25	12.7	B

Boylston Street / East Ring Road	0.52	19.0	B
Boylston Street/ Exeter Street	0.48	13.8	B
Huntington Avenue / Exeter Street / Stuart Street	0.78	37.8	D
Huntington Avenue / East Ring Road / Harcourt Street	0.76	47.3	D

Parking and Curb Use

This section identifies the parking supply for the study area. An inventory of existing curb use and parking restrictions in the vicinity of the proposed Exeter Residences and 888 Boylston sites are presented in the Existing Condition **Figure 5-6.**

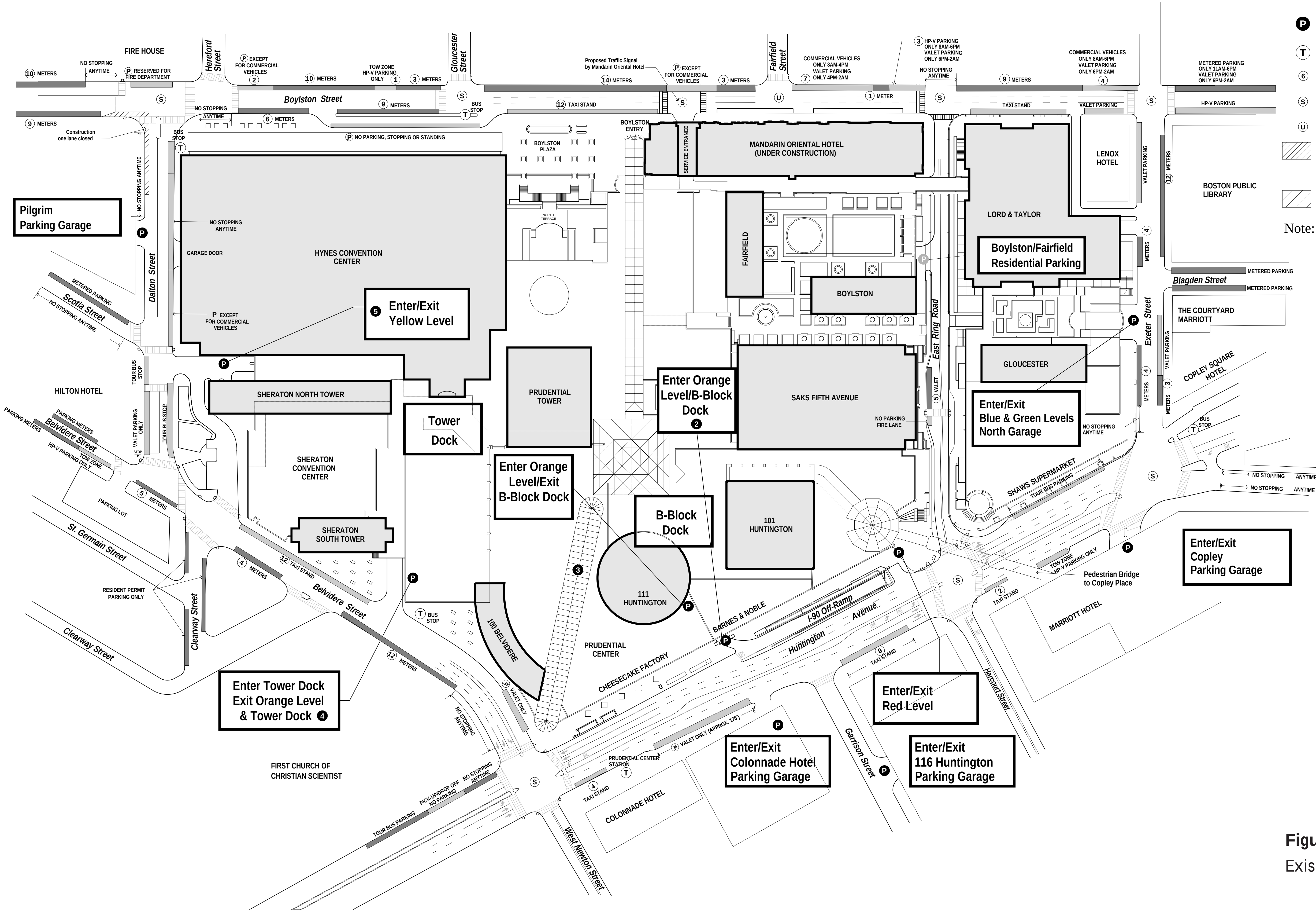
Metered parking is located along Boylston Street predominantly along the northern curbside while a taxi stand, valet parking and handicapped parking exist on the southern side. One bus stop is located opposite Gloucester Street in front of the Hynes Convention Center. At the intersection of Boylston Street and Dalton Street, a bus stop is located at the southeast corner of each intersection. Similarly, metered parking is available on Exeter Street and Belvidere Street.

Parking is restricted for passenger vehicles along Huntington Avenue and Dalton Street within the proximity of the study area. Tour bus parking/loading is located on Huntington Avenue in front of the Shaw's Supermarket and the First Church of Christian Scientist building. Taxi stands and valet parking serve the patrons of the Colonnade Hotel and Marriot Hotel along Huntington Avenue.

The Prudential Center North and South garages serve as public garage facilities. Additional public spaces are located in the Colonnade Hotel, Marriot Hotel and Copley Hotel parking garages.

Public Transportation

The two sites are well served by public transportation. This includes three Massachusetts Bay Transportation Authority (MBTA) bus lines, the orange and green subway lines and commuter rail service, as seen in **Figure 5-7**. All four branches of the Green Line are accessible at Copley Station, located within one-quarter mile of the Exeter Residences and slightly over one-quarter mile from 888 Boylston.



Not to Scale

- Ⓟ Parking Garage
- Ⓣ MBTA Bus Stop
- ⑥ Number of Spaces
- Ⓢ Signalized Intersection
- Ⓤ Un-Signalized Intersection
- Lane/Street Closures due to construction activities
- Buildings under construction

Note: Curb use related to the Mandarin Oriental Hotel taken from approved TAPA plan and field observations

Figure 5-6
Existing Conditions

Source: MBTA

Not to Scale

Figure 5-7

MBTA Bus and Transit Routes

Additionally, the Boston College (B), Cleveland Circle (C) and Riverside (D) branches can be accessed at the Hynes Convention Center station located within one-quarter mile of 888 Boylston and within one-half mile from the Exeter Residences. The Arborway (E) branch can be accessed from the Prudential Station located within one-quarter mile of both sites on Huntington Avenue.

Access to the Orange Line as well as the Attleboro/Stoughton, Needham and Framingham/Worcester Commuter Rail lines is possible from Back Bay Station located on Dartmouth Street approximately one-half mile from the two sites. The Orange line provides service north through Boston and Charlestown to the northern suburbs and south through Roxbury to Jamaica Plain.

Three MBTA bus routes serve the immediate areas near the two sites. Route 39 travels from Back Bay station near the two sites to Forest Hills station to the south. It operates along both Huntington Avenue and Boylston Street near the sites and runs with 5 minutes headways during the peak hours. Route 55 carries passengers from Park Street station to the Fenway neighborhood and typically operates with 30 minute headways throughout the day. It also operates along both Huntington Avenue and Boylston Street near the two sites. Route 9 provides service between City Point in South Boston and Copley Station. It uses East Ring Road near both sites to turn around and operates with headways of approximately 10 minutes during the peak commuting periods.

Pedestrians

The Boylston Street and Huntington Avenue corridors experience significant amount of pedestrian activities in the vicinity of the project area. The proponent Boston Properties has constructed a substantial number of improvements to accommodate pedestrians in conjunction with the 111 Huntington Avenue project. Although the building can be accessed from the curbside, elevators within this building provide an internal pedestrian connection to the Prudential Center Arcade which offers a secured and covered access to the building.

The 2006 Existing Condition Weekday Morning, Evening and Saturday Peak Hour Pedestrian Volumes are depicted in **Figures 5-8** and **5-9**, respectively.

Loading

The Exeter Residences and 888 Boylston developments will utilize existing loading dock areas within the Prudential Center to accommodate the proposed program demands. Specifically, the Exeter Residences will utilize the Shaw's Supermarket

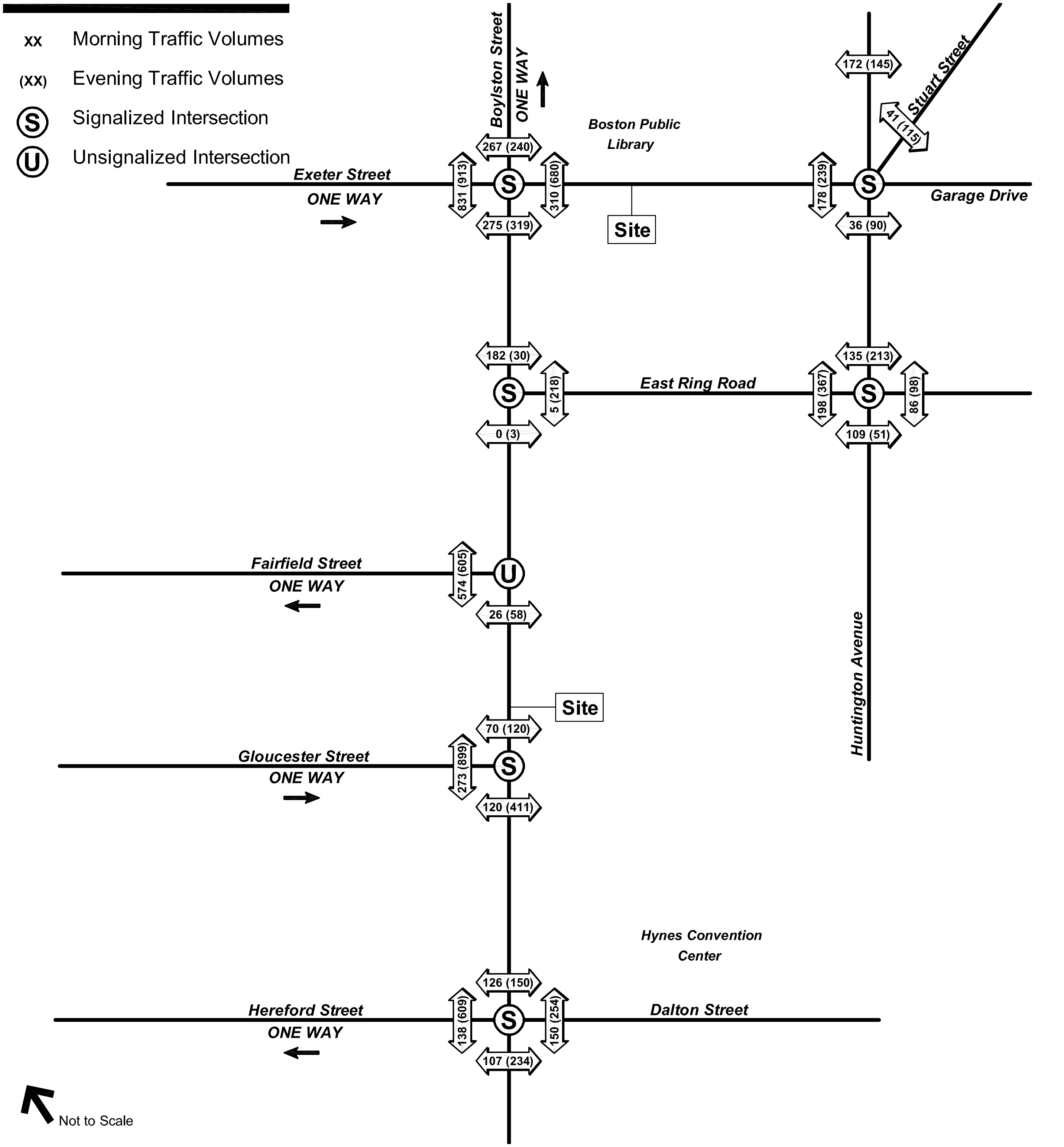


Figure 5-8

2006 Existing Conditions
Weekday Morning and Evening
Peak Hour Pedestrian Volumes

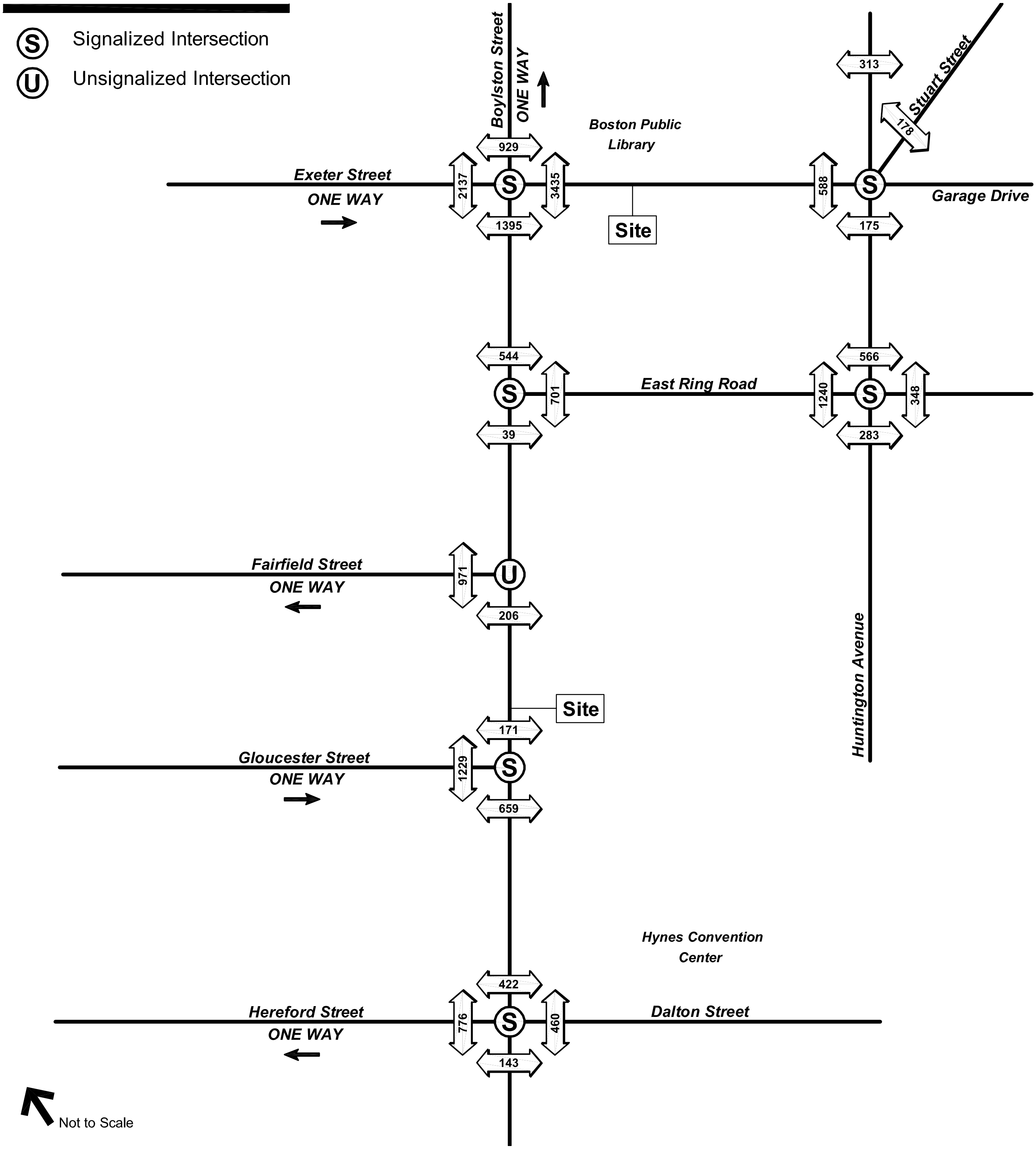


Figure 5-9

2006 Existing Conditions
Saturday
Peak Hour Pedestrian Volumes

dock (Shaw's dock) and 888 Boylston will make use of the Prudential Center North (also referred to as the "D-Block") dock.

Exeter Residences – Shaw's Dock

The residential and retail uses planned for Exeter Residences will be served by the existing Shaw's dock loading area. Currently, this dock area provides approximately five (5) loading bays that serve the existing Shaw's Supermarket and the Gloucester Apartments. The layout of the dock is depicted in **Figure 5-10**.

The loading area includes three docks for WB-55R tractor-trailer vehicles and two live van/small truck spaces. All vehicles drive into the dock and maneuver within the dock area. Adhering to City of Boston guidelines, there is no backing of vehicles into the dock area from the street. The dock area also includes one dumpster.

The evaluation of the Shaw's dock area was conducted considering that the dock area will serve the following uses:

- Existing service to Shaw's Supermarket;
- Existing service to the Gloucester Apartments;
- The proposed Exeter Residences, including its retail service space.

The existing Shaw's dock operations and projected future dock demands were evaluated based on the following sources:

- Prudential FPIR/FEIR studies and generation rates for the proposed retail use;
- Recent VHB loading studies and generation rates for the proposed residential use;
- Existing dock operations at the Shaw's dock including interviews with key operations staff at this facility;
- Residential and retail truck arrival patterns, types, and dwell times observed and documented as part of a survey effort of the Shaw's dock.

Key characteristics used to estimate future loading dock requirements are presented below and summarized in Table 5-2:

Existing Shaw's Dock Operations

Existing Shaw's dock operational characteristics are based on site observations. Random spot observations of dock activity were conducted during mid-morning and mid-day periods to develop a broader understanding of dock operations, including maneuverability, queuing, and pedestrian impacts. No significant changes in dock utilization have occurred since those observations were made. Key operating aspects of the existing dock are summarized as follows:

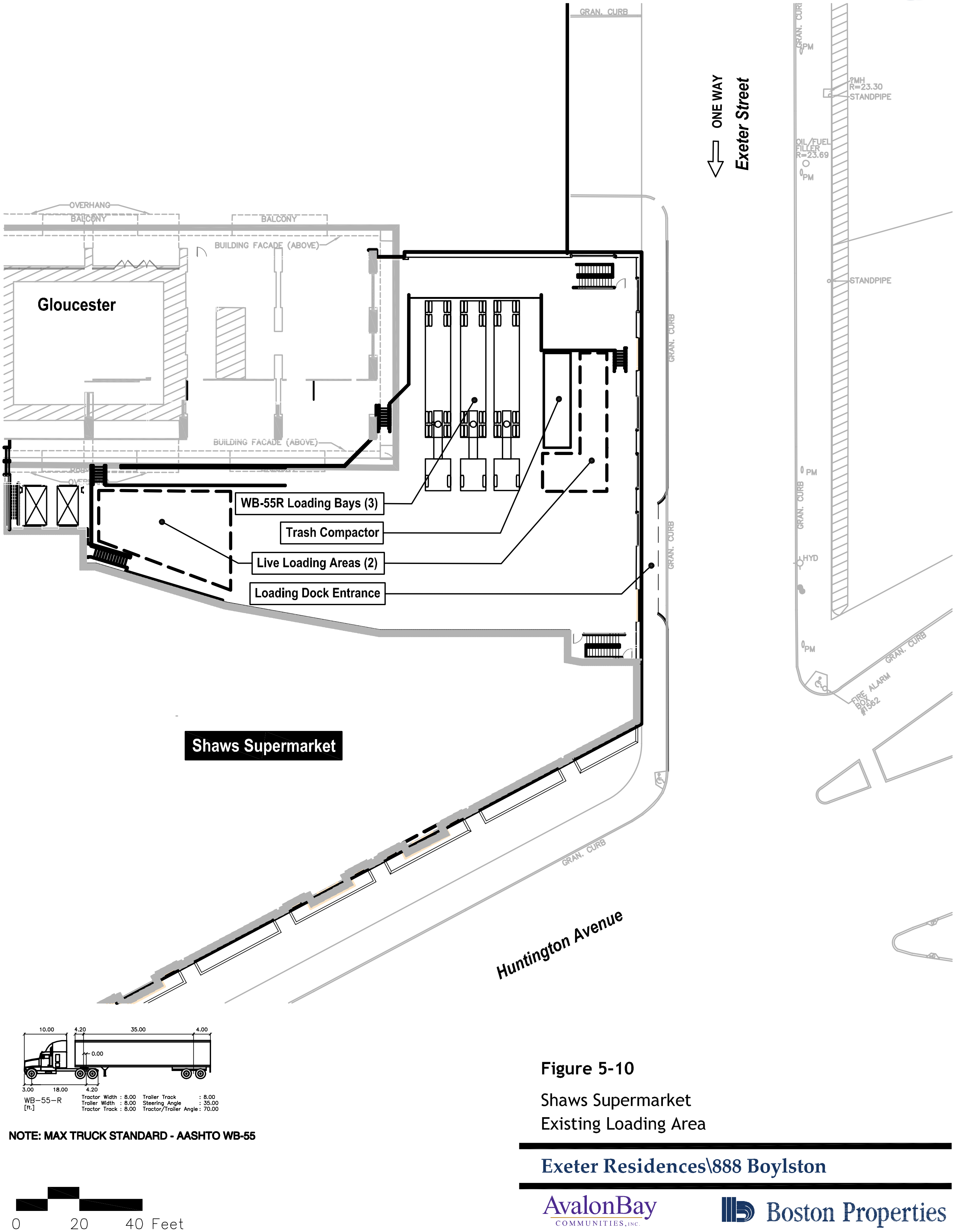


Figure 5-10

Shaws Supermarket
Existing Loading Area

- Shaw's primary dock activity occurs from 4:00 AM to 6:00 AM, with an average weekday total of 40 vehicle arrivals. Tuesday and Thursdays tend to be the busiest weekdays.
- Over 85 percent of deliveries are by small delivery trucks, vans, and courier autos.
- Average dwell times range from 13 minutes for small vehicles (courier, vans) to 15 minutes for tractor-trailers during the weekday morning peak hours. This is consistent with the posted 30-minute time limits for the dock.

Table 5-2 Shaw's Dock Loading Area Use

Area Served By Shaw's Dock	Factor	Peak Daily Deliveries
Proposed Residential - 200 units (Exeter Residences)	0.03 deliveries/day/unit**	6.0
Proposed Retail – 2100 SF (Exeter Residences)	0.12 deliveries/day/1000 SF	0.25
Existing Loading Conditions	Per observations	30
Total		**36.3***

*Future dock requirements are based on 37 peak daily deliveries.
** Residential rate based on recent loading generation study versus the Prudential FPIR/FEIR rate previously used.

Summary of Future Dock Requirements

Projected Shaw's dock requirements are estimated by applying dock operating characteristics for specific use types identified above which will be served by the Shaw's dock. The future operating requirements will be satisfied by further management of the Shaw's dock loading facilities as depicted on the attached conceptual **Figure 5-10**. The existing dock utilizes five (5) loading spaces including:

- Three tractor-trailer docks; and
- Two live loading spaces for use by vans, small trucks, and courier vehicles.

Dock Management - To maximize the efficiency of the docks, dock management will continue to be provided by a dock master. The dock master will be responsible for enforcing dwell times, coordinating with dock users, scheduling deliveries and maintaining the flow of the loading area operation to avoid impacts on areas outside the loading area. Dock management will also address periodic "surges" in activity that may occur, and will serve to provide a "buffer" if actual arrival patterns and/or dwell times vary from those used in the above analysis.

The Proponent will construct a freight elevator that will serve Exeter Residences, which will provide direct access from the loading dock to the parking garage below. This freight elevator will be located entirely within the existing Gloucester Building footprint and will not encroach into the loading dock area. The Proponent will work with Shaw's Supermarket to minimize any disruptions related to the construction of this freight elevator.

At present, a formalized agreement exists between the Proponent and Shaw's Supermarket establishing the operation and use of the dock to support the Gloucester Apartments and the proposed Exeter Residences. The Shaw's Supermarket and the residential units have complementary uses and AvalonBay will coordinate with Shaw's to schedule deliveries to prevent any overcrowding on local streets.

888 Boylston – North Dock

Future loading dock requirements were evaluated based on completion of the Prudential Center Redevelopment program, including the Mandarin Oriental Boston. Consistent with the Development Plan, the retail and office uses planned for 888 Boylston will be served by the existing Prudential Center North dock area as recently expanded and improved in 2005. Currently, this dock area provides approximately ten (10) docks that serve the existing Boylston Arcade retail uses, the Fairfield Apartments and the Mandarin Oriental Boston (under construction). The current dock layout will provide adequate capacity for future operations and is in conformance with the requirements of the Approved Development Plan. The layout of the dock is depicted in **Figure 5-11**.

The loading area includes one dock for WB-50 tractor-trailer vehicles, six docks for straight body trucks (SU 30), one dock for Fairfield Apartments (WB 40), and two live van/small truck spaces. All vehicles drive into the dock and maneuver within the dock area. Adhering to City of Boston guidelines, there will be no backing of vehicles into the dock area from the street. The dock area also includes five dumpsters. This section includes an update to the North dock analysis as presented in the Mandarin Oriental Boston Article 80 document to assess if capacity exists for the additional program associated with 888 Boylston.

The evaluation of the North dock area was conducted considering that the dock area will serve the following uses:

- Existing service to the Fairfield Apartments and the majority of the Prudential Center "Boylston Arcade" Retail;
- Service for the Mandarin Oriental Boston following construction as approved in the Development Plan;
- The proposed 888 Boylston, including their respective retail service space.

To identify loading dock requirements for the proposed full build program of the Prudential Center, including 888 Boylston, the existing dock operations and projected future dock demands were evaluated based on the following sources:

- Prudential FPIR/FEIR studies and generation rates for the proposed retail and office uses;
- Recent VHB loading studies and generation rates for the proposed residential use;
- Existing dock operations at the North dock including interviews with key operations staff at this facility;
- Retail and office truck arrival patterns, types, and dwell times observed and documented as part of a survey effort of the Prudential Center North dock and Tower Dock areas.

Key characteristics used to estimate future loading dock requirements are presented below and summarized in Table 5-3:

Existing North Dock Operations

Existing North dock operational characteristics are based on site observations. Random spot observations of dock activity were conducted during mid-morning and mid-day periods to develop a broader understanding of dock operations, including maneuverability, queuing, and pedestrian impacts. No significant changes in dock utilization have occurred since those observations were made. Key operating aspects of the existing dock are summarized as follows:

- Primary dock activity occurs from 6:00 AM to 2:00 PM, with an average weekday total of 40 vehicle arrivals. This level nearly doubles (70 vehicle arrivals) on Mondays.
- Over 90 percent of deliveries are by small delivery vehicles, vans, and courier autos.
- The majority (80 percent) of deliveries are made prior to 10:00 AM during typical weekdays.

Average dwell times range from 20 minutes for small vehicles (courier, vans) to 28 minutes for tractor-trailers during primary dock hours. This is consistent with the posted 30-minute time limits for the dock.

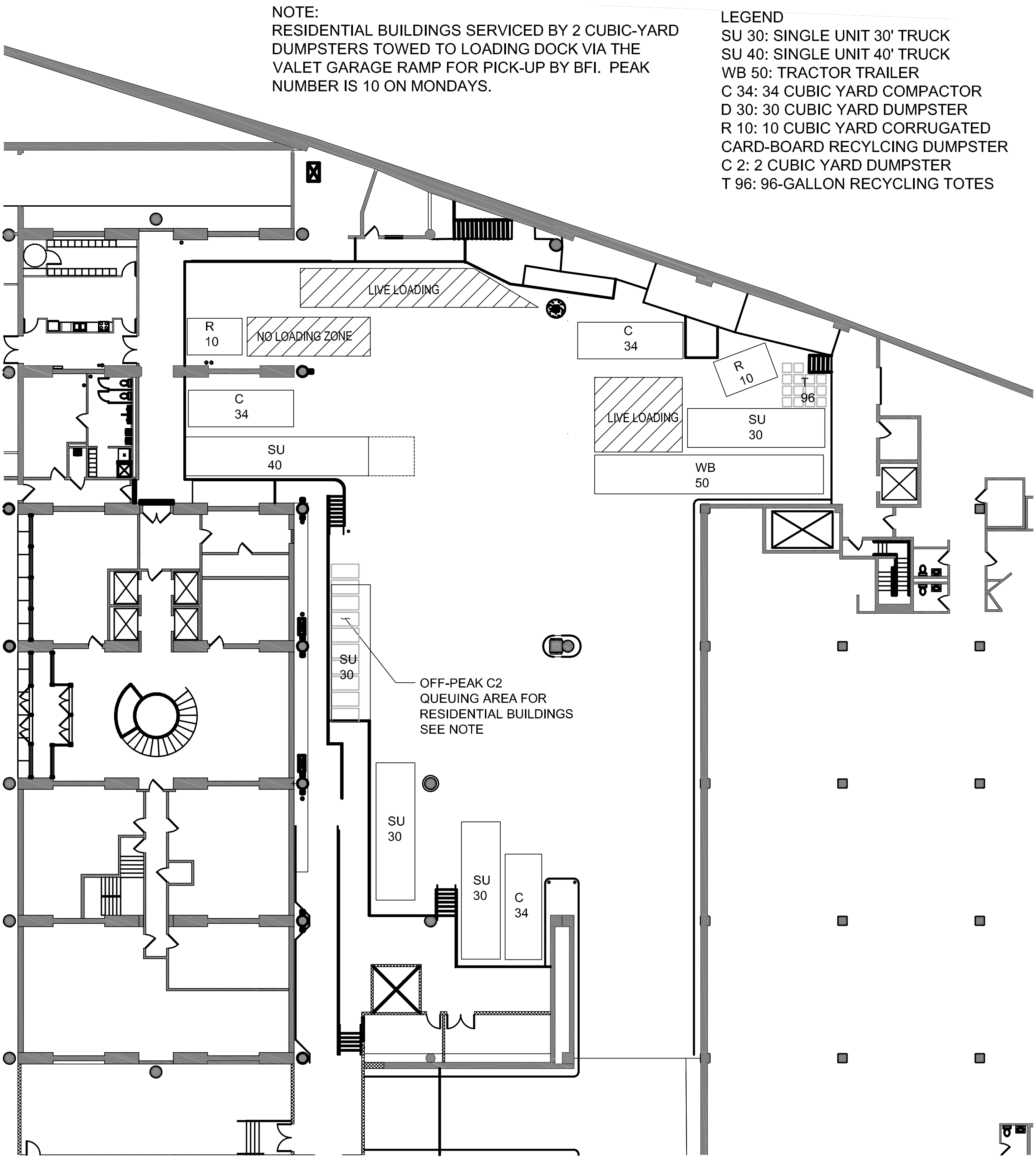


Figure 5-11

Prudential Center
North Loading Dock

Exeter Residences\888 Boylston

AvalonBay Communities, Inc. Boston Properties

Hotel Dock Operations

The Mandarin Oriental Boston is currently under construction. Consistent with the Development Plan we are utilizing the existing Four Seasons Hotel dock operations to project Mandarin Oriental Boston loading operations. Four Seasons Hotel dock operations serve as a conservative guideline to identify dock requirements for the Mandarin Oriental. The Four Seasons dock has two heavily managed single-unit loading bays that serve 288 hotel rooms, function spaces, 100 condominium units, and four restaurants and significant function activity. Key operating parameters for this facility, based on information provided by Four Seasons operations personnel, are as follows:

Peak activity levels

Peak activity levels occur on Tuesdays and Fridays, with up to 40 deliveries between 7:00 AM and 4:00 PM. Weekends typically experience lower activity.

- Average dwell times are 10 to 30 minutes.
- Based on discussions with personnel and observations it is estimated that 85 percent of the deliveries are related to the hotel yield the following factors; 0.12 deliveries/day/room for the hotel and 0.06 deliveries/day/unit for residential.

Residential Operations

Based on more current VHB truck generation surveys from comparable Boston residential developments, a 0.03 deliveries/day/unit factor is applied to the residential component of Exeter Residences and the previously approved Mandarin Oriental Boston allowance of 71 deliveries. Applying the revised residential factor to this allowance decreased the total number of deliveries associated with the Mandarin Oriental Boston by 3.2 peak daily deliveries. Therefore, based on this revision, the North Dock will be analyzed with 68 peak daily deliveries as the previously approved allowance from the 2001 Development Plan in addition to the deliveries generated by the revised Phase 4a building program.

Office & Retail Operations

Office and retail truck generation is based on Prudential FPIR/FEIR rates and recent VHB truck generation surveys. Arrival patterns dwell characteristics and vehicle types are based on detailed surveys conducted at the Prudential Center North dock loading area:

- Office truck generation primarily occurs between 6:00 AM and 4:00 PM.
- Retail truck generation primarily occurs between 6:00 AM and 4:00 PM.
- Peak truck arrivals occur between 9:00 AM- 10:00 AM, which accounts for approximately 17 percent of daily trips made during primary dock hours.
- Average dwell time for all vehicle types is approximately 24 minutes.
- The majority of trucks (75 percent) have dwell times of 30 minutes or less. For these trucks, the average dwell time is 13 minutes.
- Over 90 percent of truck types arriving during primary dock operating hours are small trucks and delivery vehicles. Of these, single-unit trucks represent 54 percent, vans/passenger cars represent 45 percent, and Tractor Trailers represent 1 percent.

Table 5-3 North Dock Loading Area Use

Area Served By North Dock	Factor	Peak Daily Deliveries
Proposed Retail** 1700 SF (888 Boylston)	0.12 deliveries/day/1000 SF	0.20
Proposed Office** 149,000 SF (888 Boylston)	0.12 deliveries/day/1000 SF	17.9
Previously Approved Allowance	Per 2001 development plan	68***
Total		**86.1***

*Future dock requirements are based on 87 peak daily deliveries.
**888 Boylston program changes since previously approved development plan.
*** Previously approved allowance with updated residential generation rate of 0.03 deliveries/day/unit.

Summary of Future Dock Requirements

Projected North dock requirements are estimated by applying dock operating characteristics for specific use types identified above which will be served by the North dock. The operating requirements are satisfied by further management of the North dock loading facilities as depicted on the attached conceptual **Figure 5-11**. The existing dock utilizes 10 loading spaces including:

- One tractor-trailer dock;
- Six single-unit docks;
- One dock area for exclusive use by the Fairfield Apartment complex; and
- Two live loading spaces for use by vans, small trucks, and courier vehicles.

The dock area will also include five dumpsters consistent with the Approved Development Plan. Projected arrival activity and operating requirements are as follows:

Projected Dock Demands - Projected North dock arrival volumes and dock space requirements are discussed below.

- Peak truck volumes to the future (expanded) North dock are expected to be about 90 arrivals during primary weekday dock hours. Nearly all of these vehicles will be single-unit trucks and vans based on current trends. This is an increase of 19 peak daily deliveries from the previous allowance of 71 deliveries approved in the 2001 Development Plan.
- The dock provides one WB-50 (tractor trailer with a 50 foot trailer) loading dock, one WB-40 loading dock (which can also accommodate a WB-50 if the west WB-50 dock is not in use), six loading docks for single unit trucks (SU-30s) and two loading spaces for courier vans, parcel deliveries and smaller vehicles. While some of the docks are designated to accommodate larger trucks that visit less frequently,, they will also accommodate smaller single unit trucks. This distribution accommodates the projected dock needs and provides the flexibility necessary to operate efficiently.
- Design-hour arrivals, the maximum expected arrivals per hour are expected to occur on weekdays during the mid-morning and are estimated to be about 19 percent of the daily volume or 12 trucks.
- Average dock arrivals, assuming a 10 hour day, will be 7 trucks per hour. Utilizing an average dwell time of 24 minutes, approximately five dock spaces will be needed, one dedicated space for the existing residential and four spaces for the balance of users.
- Peak hour dock arrivals are expected to be 12 trucks requiring a minimum of 6 docks. Periodic surges are expected to require nine docks, one dedicated space for the existing residential and eight spaces for the balance of users.

In summary, the current dock layout will provide adequate dock space and is in conformance with the requirements of the Approved Development Plan. Further dock management of internal dock area operations will be implemented to insure accessibility to all dock spaces.

Dock Management - To maximize the efficiency of the docks, dock management will continue to be provided by a dock master. The dock master will be responsible for enforcing dwell times, coordinating with dock users, scheduling deliveries and maintaining the flow of the loading area operation to avoid impacts on areas outside the loading area. Dock management will also address periodic "surges" in activity that may occur, and will serve to provide a "buffer" if actual arrival patterns and/or dwell times vary from those used in the above analysis.

5.5 Future Conditions

Area Developments and Transportation Improvements

This section describes the context of the future area developments and transportation infrastructure improvements that are currently planned, are under design, or are under construction by the City of Boston, the MBTA, or other project proponents that will serve the Project site. Key improvements within the project area include the following:

- Boylston Street Corridor – The roadway improvements as part of the Mandarin Oriental Boston project to the Boylston Street Corridor will provide an improvement to pedestrian safety and flow by moving the existing pedestrian signal at Fairfield Street to the loading area entrance. The Prudential FPIR/FEIR and Development Plan do not incorporate any changes to pedestrian crossings. The signal relocation as planned for the Mandarin Oriental Boston project, will move the crosswalk from Fairfield Street to west of the loading entrance, more closely matching the pedestrian desire path. The relocated signal will also formalize vehicle access to and from the Mandarin Oriental Boston loading area which will also serve as the service access for 888 Boylston.

- New Garage Entrance –A new garage entrance/exit has been established on East Ring Road as part of the Mandarin Oriental Boston which provides direct access to the Green Level parking where the parking nest for the 888 Boylston building is located. The original Boylston Street entrance did not provide direct access to the Green Level whereas the East Ring Road entrance will provide direct access to both the Blue and Green Levels. Blue Level access will be for hotel valet use only.

  The East Ring Road garage entrance location allows more efficient access to the garage than was proposed in the original Development Plan. Vehicles wishing to access the garage from downtown and the MassPike can come via Huntington Avenue and East Ring Road as opposed to circulating around the Prudential Center or through the Back Bay.

  This new garage entrance was also designed to avoid any queuing of vehicles on East Ring Road. The ticket dispensers/card readers for the entrance location are located at the bottom of the ramp on the Green Level providing a stacking area within the garage for ten to twelve cars on the ramp. One entering, one exiting and one reversible lane will be provided so that at peak times, two card reader/ticket dispensers will be available for entering vehicles

- Upon completion of the Mandarin Oriental Boston, the intersection of East Ring Road with Boylston Street will be reconfigured to form a T-type intersection. This reconfiguration will serve to slow traffic and re-align the street edge to match the sidewalk improvements that were part of the Shaw's Supermarket project. This concurrent effort will formalize the street configuration, strengthen the pedestrian corridors and address existing operational issues.

- Dartmouth Street – The City of Boston recently redefined Dartmouth Street as a one way operational roadway, near the library. This reversal in the street direction is anticipated to improve vehicular access and operations along Boylston Street and in the vicinity of the proposed two sites.

Background Traffic

The first step in the 2011 design analysis was to project background traffic volumes that would be expected from other projects in the vicinity of the Prudential Center that will contribute traffic to the network being analyzed. Background traffic volumes include 2006 traffic volumes plus traffic from other planned developments and general growth in traffic through 2011. Background traffic volumes are independent of the Prudential Center Redevelopment program.

Two components were used to determine background traffic growth; application of a general growth rate and inclusion of trips from known planned developments in the immediate project vicinity. The general growth rate accounts for changes in demographics, auto usage and ownership. For this analysis, a conservative background growth rate of one (1) percent per year was applied consistent with other studies performed in the area. The second component was derived from the review of traffic impact studies from planned new major developments in the area, listed in Table 5-4. Vehicle trips generated by the BRA approved projects and developments that are under construction including The Clarendon, Columbus Center and the Mandarin Oriental Boston, are expected to affect the study area intersections along Boylston Street and Huntington Avenue.

Table 5-4 Background Projects

Project	Location	Land Use
The Clarendon	131 Clarendon Street, 390 Stuart Street and 400 Stuart Street	Retail Residential Rental Ownership
Columbus Center	101 Clarendon Street and 100 Berkeley Street	Hotel Retail

		Residential Ownership
Mandarin Oriental Boston	760 Boylston Street	Hotel Residential Retail
Approved 888 Boylston	888 Boylston	Office Retail

Trip Generation

Program-Generated Trips

Once background traffic is developed these volumes are added to the existing condition volumes to establish a baseline traffic network. After this baseline is established, traffic generation for the proposed portions of the Prudential Center Redevelopment is added to model future conditions. Both the approved Development Plan program and the revised program are modeled, as seen in Table 5-5 to evaluate the difference in system performance

Table 5-5
Currently Proposed Development Program

Land Use	Approved Development Plan Program	New Program	Change from the Approved Development Plan
Phase 6 – Exeter Residences			
Residential (approx. 200 units), SF	n/a	253,500	253,500
Retail Space, SF	n/a	2,500	2,500
Parking, spaces	n/a	0	0
Phase 4a – 888 Boylston			
Office Space, SF	219,996	368,996	149,000
Retail Space, SF	48,990	50,690	1,700
Common Space, SF	18,507	19,307	800
Parking, spaces	58	240	182

To assess the impact of the change in the development program, separate travel demand projections by land use (office, retail and residential) were made. Using trip generation rates from the ITE Edition Trip Generation Manual (7^{th} edition) total daily and peak hour person-trips were projected. Mode split factors were then applied to the total person-trip estimates to obtain daily, weekday morning, weekday evening and Saturday peak hour person-trips by mode. Finally, vehicle-occupancy rates (VOR) were applied to the auto person-trip projections to obtain daily and peak hour vehicle-trip generation projections.

Person-Trip Generation

The first step in projecting site-generated trips is to quantify the total number of person-trips generated by the site for the weekday morning, weekday evening and Saturday peak hours. Using the calculation presented in ITE Trip Generation Manual (7th edition), land use code (LUC) 710 for office, LUC 820 for Shopping Center and LUC 220 for apartment were used to determine the ITE generated trips. Even though the proposed Exeter Residences building will comprise of high rise units, the analysis includes trip rates for a regular apartment which is higher than a high rise apartment trip rate. The analyses presented in this section provide a conservative analysis. Then a vehicle occupancy rate (i.e., the average number of people per vehicle) was applied to the ITE generated trips in order to obtain person generated trips. Vehicle occupancy rates were determined for each land use separately based on available information from previously referenced publications/studies and 2000 Journey-to-Work data, and are presented below in Table 5-6.

Table 5-6 summarizes the number of person-trips to be generated by each component for both the Development Plan program and the currently proposed program for the average weekday morning and evening, and Saturday peak hours.

Table 5-6 Person-Trip Generation Summary

	Person-Trips	
Time Period/Use	**Approved Development Plan Program**	**Current Development Program**
MORNING PEAK HOUR		
Exeter Residences Site		
Residential	n/a	122
Retail	n/a	1
Sub-Total	n/a	123
888 Boylston Site		
Office	423	640
Retail	20	21
Sub-Total	443	661
Total	**443**	**784**
EVENING PEAK HOUR		
Exeter Residences Site		

Residential	n/a	154
Retail	n/a	5
Sub-Total	n/a	159
888 Boylston Site		
Office	390	590
Retail	97	100
Sub-Total	487	690
Total	**487**	**849**
SATURDAY PEAK HOUR		
Exeter Residences Site		
Residential	n/a	122
Retail	n/a	6
Sub-Total	n/a	128
888 Boylston Site		
Office	84	128
Retail	130	135
Sub-Total	214	263
Total	**214**	**391**

Mode Share and Vehicle Occupancy Rates

The next step in projecting site-generated trips is to quantify the mode use of persons entering or exiting the site. For this analysis, the mode shares were determined separately for each land use component of the program. The primary source used for the mode share information was data supplied by the Boston Transportation Department Mode Share split for Area 4.

Table 5-7 presents the mode share assumptions and vehicle occupancy rates for each use.

Table 5-7 Mode Shares

Component	Walk	Public Transportation	Auto	Vehicle Occupancy Rate
Retail	36%	31%	33%	1.2
Office	25%	38%	37%	1.2
Residential	64%	15%	21%	1.2

Source: :Prudential Center Redevelopment DEIR, April 1989 and the Mandarin Oriental Boston NPC/PNF January 2002

Trip Generation Estimate

The final steps in estimating the expected site-generated vehicle trips are to apply the mode share to the calculated site-generated person trips, and then to apply a vehicle occupancy rate (i.e., the average number of people per vehicle) to the auto person-trips. Vehicle occupancy rates were determined for each land use separately based on available information from previously referenced publications and 2000 Journey-to-Work data, and are presented above in Table 5-7. A summary of the resulting vehicle trips is presented in Table 5-8.

Table 5-8 Vehicle-Trip Generation Summary

	Vehicle-Trips	
Time Period/Use	Approved Development Plan Program	Current Development Program
MORNING PEAK HOUR		
Exeter Residences Site		
Residential	n/a	21
Retail	n/a	0
Sub-Total	n/a	21
888 Boylston Site		
Office	131	197
Retail	6	6
Sub-Total	137	203
Total	**137**	**225**
EVENING PEAK HOUR		
Exeter Residences Site		
Residential	n/a	26
Retail	n/a	2
Sub-Total	n/a	28
888 Boylston Site		
Office	121	182
Retail	27	28
Sub-Total	148	210
Total	**148**	**238**
SATURDAY PEAK HOUR		
Exeter Residences Site		
Residential	n/a	27
Retail	n/a	3
Sub-Total	n/a	30
888 Boylston Site		
Office	37	56

Retail	36	37
Sub-Total	73	93
Total	**73**	**123**

The trip generation estimates presented above takes into account the reduction in trips due to pass-by or internal trip reduction. In particular, the retail component is expected to have some portion of trips resulting from passers-by or internal trips. A twenty-five (25) percent reduction was applied to the retails trips to adjust for passer-by and internal trips which are based on ITE's survey data that balances volumes by constraining internal trip making to levels that are realistic for the given mix of land uses. This is also consistent with standard engineering practices and the EOEA/EOTC guidelines. It should be noted that the vehicle trips generated for both the projects are expected to be much lesser given the fact that the Prudential Center environment is very conducive to pedestrian and transit modes.

Comparison to Prudential Center Approved Development Plan

Table 5-9, 5-10 and 5-11 present a comparison of the vehicle trip generation for the Exeter Residences Project only, the 888 Boylston Project only, and Exeter Residences and 888 Boylston projects together, based on the Approved Development Plan program for the site and the current program for the site. For the morning peak hour, the current program is projected to generate approximately 21 vehicles trips (Exeter Residences only), 67 vehicle trips (888 Boylston) and 88 vehicle trips (Exeter Residences and 888 Boylston together) more than the Approved Development Plan program. For the evening peak hour, the current program is projected to generate approximately 28 vehicle trips (Exeter Residences only), 63 vehicle trips (888 Boylston), 90 vehicle trips (Exeter Residences and 888 Boylston together) more than the approved plan. During the Saturday peak, approximately 30 additional vehicle trips (Exeter Residences only), 20 additional vehicle trips (888 Boylston), 50 additional vehicle trips (Exeter Residences and 888 Boylston together) will be generated.

As presented in Table 5-11, the additional peak hour trips represent 4.9 and 4.5 percent, respectively, of the total morning and evening peak hour trips generated by the entire Prudential Center Redevelopment Plan.

Table 5-9 Vehicle-Trip Generation Comparison Approved Development Plan Program vs. Exeter Residences Only

	Approved Prudential Center Development Plan	Approved Program – Phase 6	Current Program Phase 6	Difference	% Change from Development Plan Program
MORNING					
Enter	1,377	0	4	4	0.3%
Exit	436	0	17	17	3.9%
Total	1,813	0	21	21	1.2%
EVENING					
Enter	493	0	18	18	3.7%
Exit	1,538	0	10	10	0.7%
Total	2,031	0	28	28	1.4%
SATURDAY					
Enter	n/a	0	15	15	n/a
Exit	n/a	0	15	15	n/a
Total	n/a	0	30	30	n/a

Table 5-10 Vehicle-Trip Generation Comparison Approved Development Plan Program vs. 888 Boylston Only

	Approved Prudential Center Development Plan	Approved Program Phase 4a	888 Boylston Program Phase 4a	Difference	% Change from Development Plan Program
MORNING					
Enter	1,377	118	177	59	4.3%
Exit	436	18	26	8	1.8%
Total	1,813	136	203	67	3.7%
EVENING					
Enter	493	33	44	11	2.2%
Exit	1,538	114	166	52	3.4%
Total	2,031	147	210	63	3.1%
SATURDAY					
Enter	n/a	38	49	11	n/a
Exit	n/a	34	43	9	n/a
Total	n/a	72	92	20	n/a

Table 5-11 Vehicle-Trip Generation Comparison Approved Development Plan Program vs. Full Development Program

	Approved Prudential Center Development Plan	Approved Program – Phase 4a	Full Program Phases 6 & 4a	Difference	% Change from Development Plan Program
MORNING					
Enter	1,377	118	181	63	4.6%
Exit	436	18	43	25	5.7%
Total	1,813	136	224	88	4.9%
EVENING					
Enter	493	33	62	28	5.9%
Exit	1,538	114	176	62	4.0%
Total	2,031	147	238	90	4.5%
SATURDAY					
Enter	n/a	38	64	26	n/a
Exit	n/a	34	58	24	n/a
Total	n/a	72	122	50	n/a

Trip Distribution

The next step in developing design year (2011) Build traffic volumes is to determine the trip distribution of program-related traffic and assign these trips to the local roadway network. The distribution for all other uses was taken from the Prudential Center Redevelopment FEIR. Table 5-12 presents the overall regional trip distribution.

Table 5-12 Regional Trip Distribution

Origin/Destination	Split*
North	32%
South	48%
West (Local)	3%
West (Massachusetts Turnpike)	17%
Total	**100%**

* Distribution taken from the Mandarin Oriental Boston NPC/PNF 2002

Once the general trip distribution was determined, the traffic was assigned to specific travel routes based on the following travel condition factors:

- Observed traffic flow conditions on available routes

- Overall efficiency of the adjacent roadway system
- The assumption that most motorists will seek the fastest and most direct route to and from the site

Considering the above travel conditions, Table 5-13 as well as **Figure 5-12**, present the expected local trip patterns of the site-generated traffic.

Table 5-13 Projected Vehicle Travel Patterns

Origin/Destination	Enter	Exit
North	Storrow Drive westbound to Downtown exit to Beacon Street westbound to Exeter Street. southbound to site	Boylston Street eastbound to Berkeley Street northbound to Storrow Drive eastbound to the John Fitzgerald Expressway (I-93) northbound
South	Massachusetts Avenue northbound to Boylston Street eastbound to site	Huntington Avenue. westbound to Massachusetts Avenue southbound to the John Fitzgerald Expressway (I-93) southbound
West (Local)	Storrow Drive eastbound to Fenway exit to Boylston Street eastbound to site	Boylston Street eastbound to Berkeley Street to Storrow Drive westbound
West (Massachusetts Turnpike)	Massachusetts Turnpike eastbound to either; Huntington Avenue westbound to Belvidere Street north-westbound to Dalton Street northbound to Boylston Street eastbound to site, or Stuart Street Eastbound to Dartmouth Street Northbound, to Huntington Avenue Westbound to East Ring Road to site.	Boylston Street eastbound to Exeter Street southbound to Stuart Street eastbound to Dartmouth Street northbound to the Massachusetts Turnpike westbound, OR Boylston Street eastbound to Dartmouth Street northbound to Newbury Street westbound to Massachusetts Turnpike westbound

Figure 5-12

Trip Distribution Map

Exeter Residences\888 Boylston

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2011 Build Condition Peak Hour Traffic Volumes

The site-generated traffic volumes, shown in **Figures 5-13** and **5-14**, were assigned to the roadway network and combined with the background traffic volumes to develop the 2011 Build peak hour traffic volume networks. **Figures 5-15** and **5-16** illustrate the 2011 Build weekday morning, weekday evening and Saturday peak traffic volumes for the Development Plan program, and **Figures 5-17** thru **5-22** illustrate the volumes for the currently proposed program.

2001 Build Condition Traffic Operations

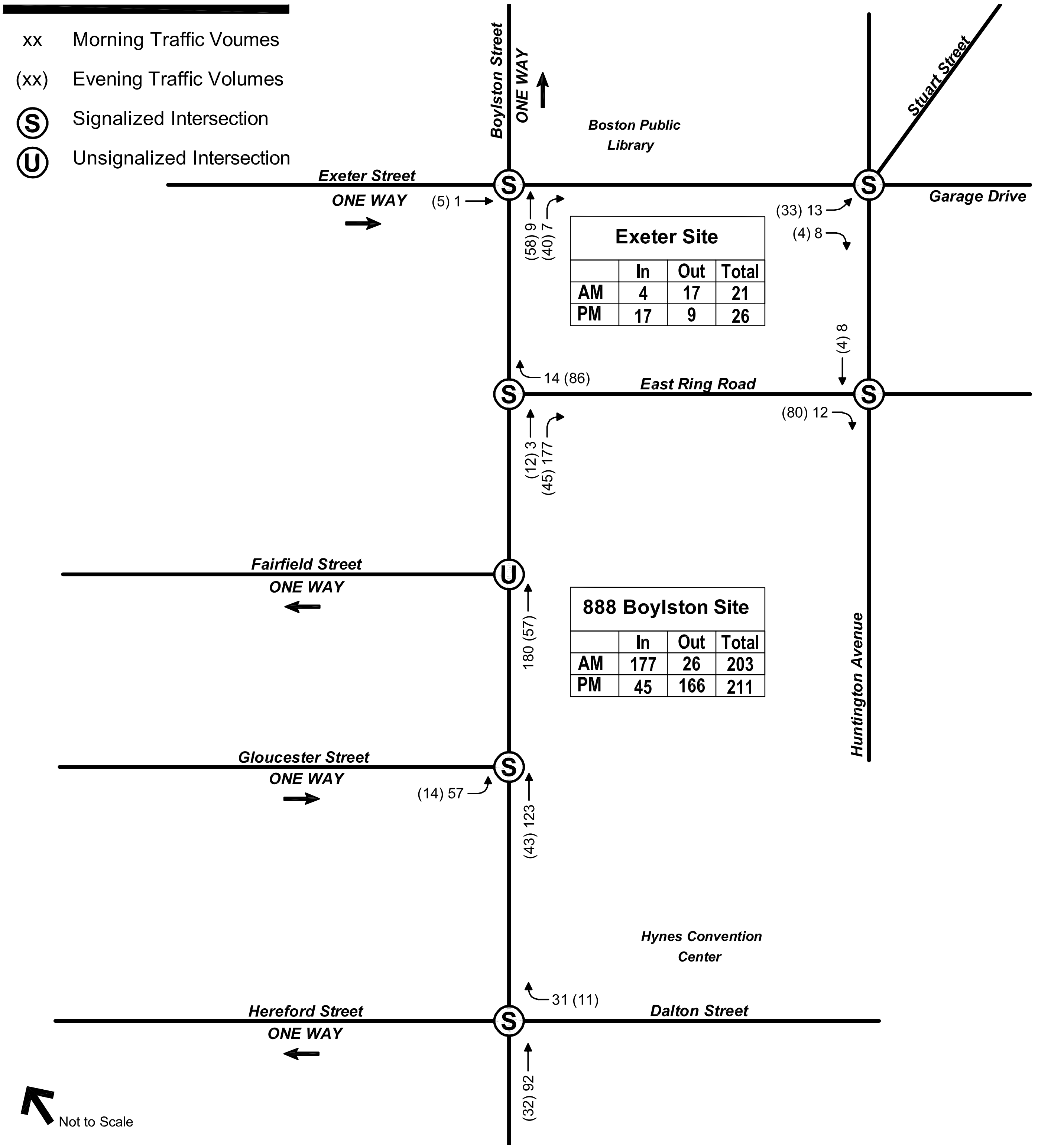
Measuring existing traffic volumes and projecting additional future traffic volumes quantifies traffic flow within the study area. To assess quality of flow, roadway capacity analyses were conducted with respect to 2006 Conditions and projected 2011 Build traffic volume conditions for both the original Prudential Center Development Plan and current proposed programs for the site. Capacity analyses provide an indication of how well the roadway facilities serve the traffic demands placed upon them. Roadway operating conditions are classified by calculated levels-of-service.

Level-of-Service Criteria

Level-of-service (LOS) is the term used to denote the different operating conditions that occur on a given roadway segment under various traffic volume loads. It is a qualitative measure of the effect of a number of factors including roadway geometry, speed, travel delay, freedom to maneuver and safety. Level-of-service provides an index to the operational qualities of a roadway segment or an intersection. Level-of-service designations range from A to F, with LOS A representing the best operating conditions and LOS F representing the worst operating conditions. The evaluation criteria used to analyze area intersections and roadways are based on the 2000 *Highway Capacity Manual* (HCM)[1] and the latest version of the SYNCHRO traffic software (version 6.0), and are included in the Appendix. LOS D or better are considered to be acceptable Levels of Service.

Level-of-service designation is calculated differently for signalized and unsignalized intersections and for roadway links. For signalized intersections, the analysis considers the operation of each lane or lane group entering the intersection and the

[1] Transportation Research Board, Highway Capacity Manual, Special Report 209, Washington, D.C., 2000



Exeter Site

	In	Out	Total
AM	4	17	21
PM	17	9	26

888 Boylston Site

	In	Out	Total
AM	177	26	203
PM	45	166	211

Figure 5-13

Site Generated Trips
Weekday Morning and Evening
For the Currently Proposed Program

Exeter Residences\888 Boylston

AvalonBay COMMUNITIES, INC. Boston Properties

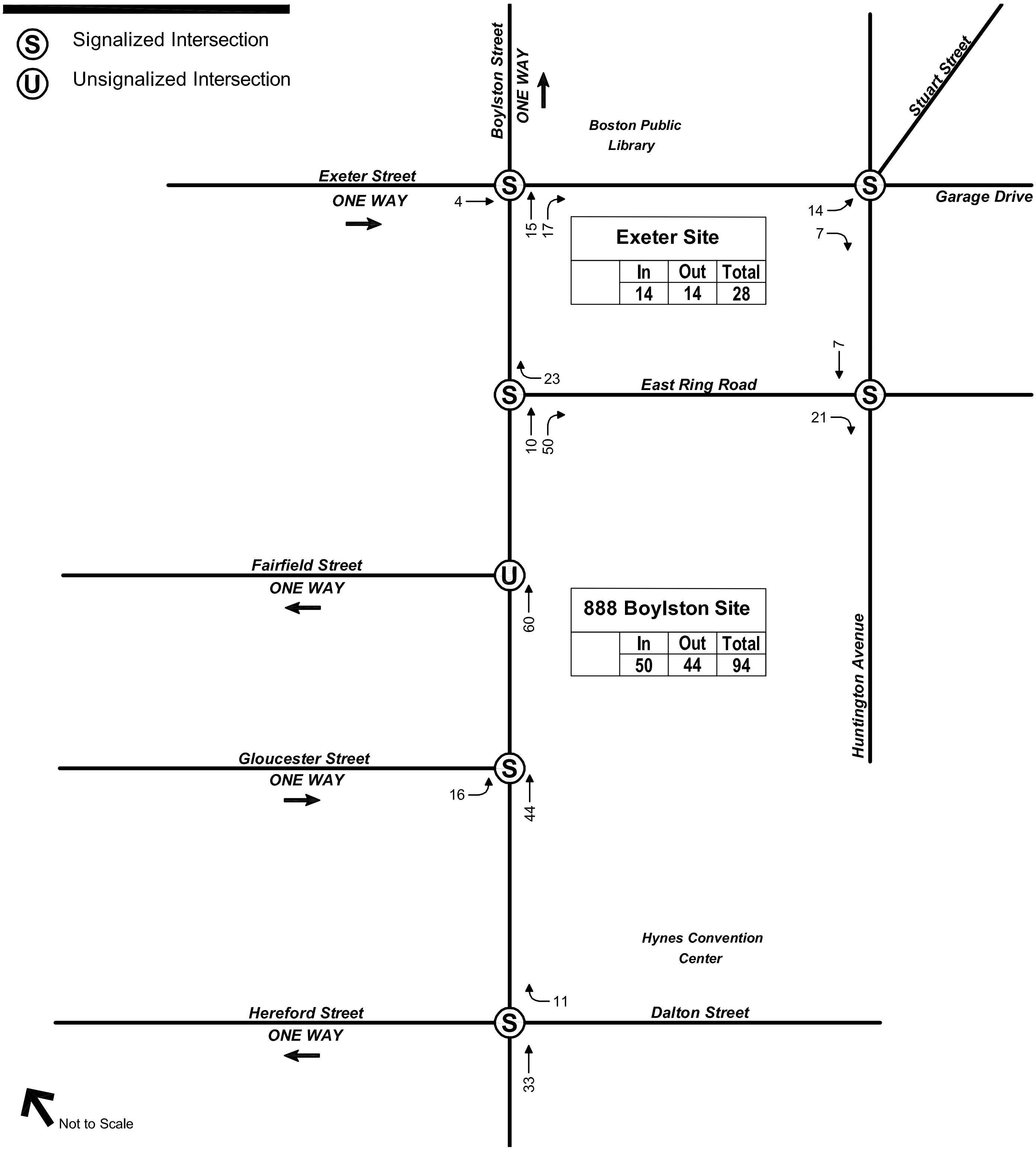


Figure 5-14

Site Generated Trips
Saturday
For the Currently Proposed Program

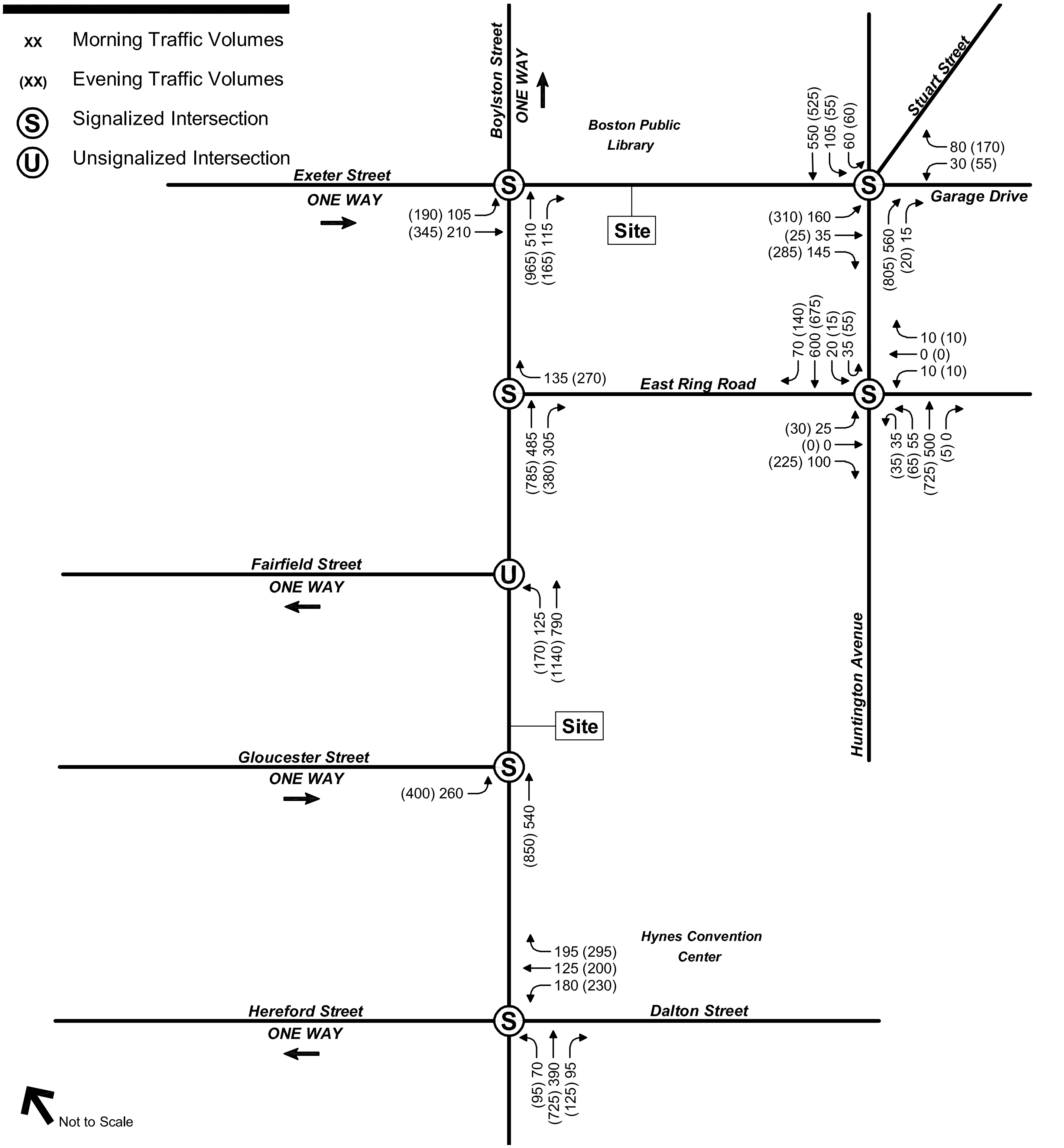


Figure 5-15

2011 Build Condition
Weekday Morning and Evening
Peak Hour Traffic Volumes
For the FEIR Development Program

Exeter Residences\888 Boylston

AvalonBay Communities, Inc.   Boston Properties

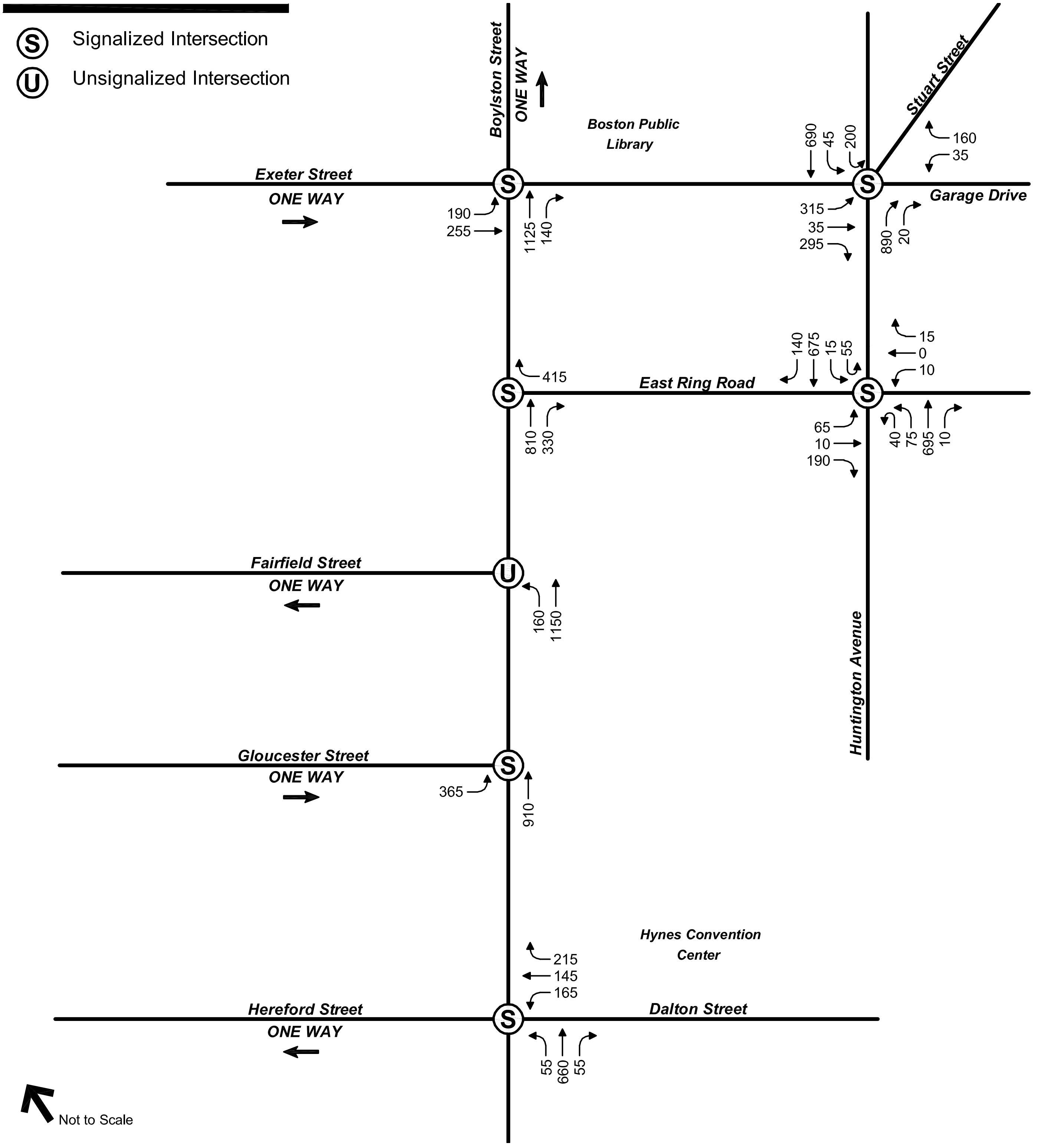


Figure 5-16

2011 Build Condition
Saturday
Peak Hour Traffic Volumes
For the FEIR Development Program

Exeter Residences\888 Boylston

AvalonBay Communities, Inc. Boston Properties

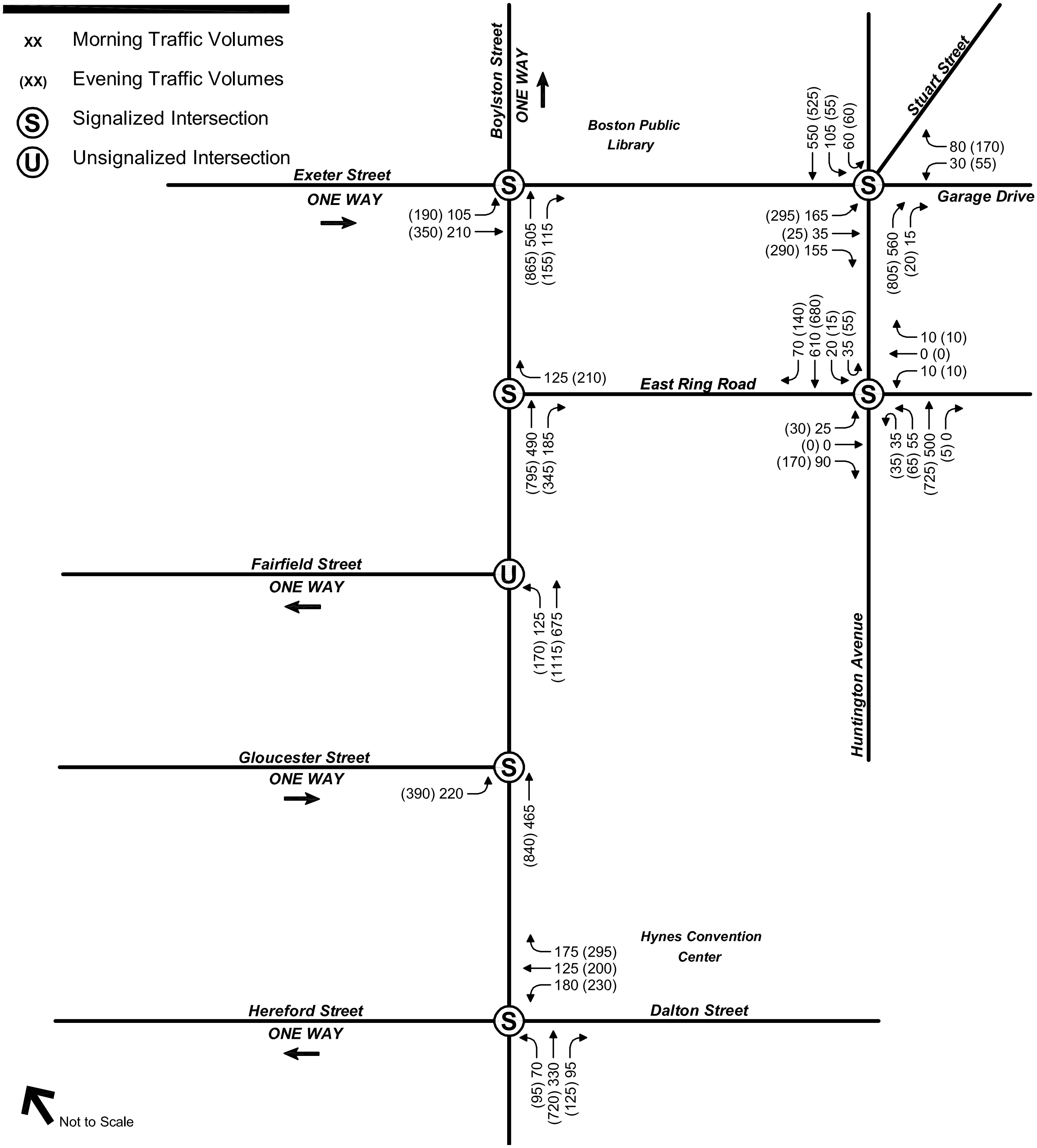


Figure 5-17

2011 Build Condition Exeter Residences
Weekday Morning and Evening
Peak Hour Traffic Volumes

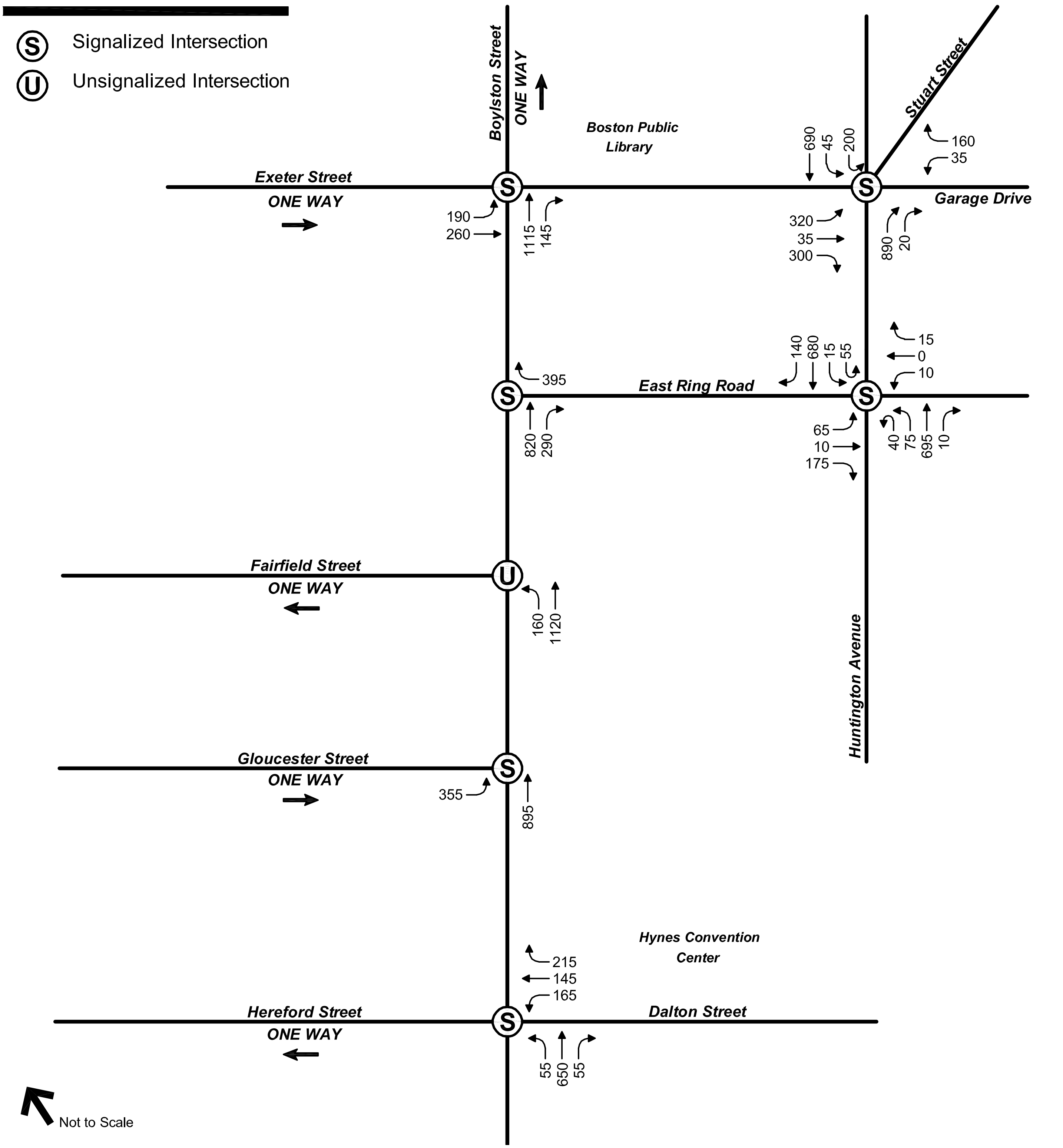


Figure 5-18

2011 Build Condition Exeter Residences
Saturday
Peak Hour Traffic Volumes

Exeter Residences\888 Boylston

AvalonBay Communities, Inc.   Boston Properties

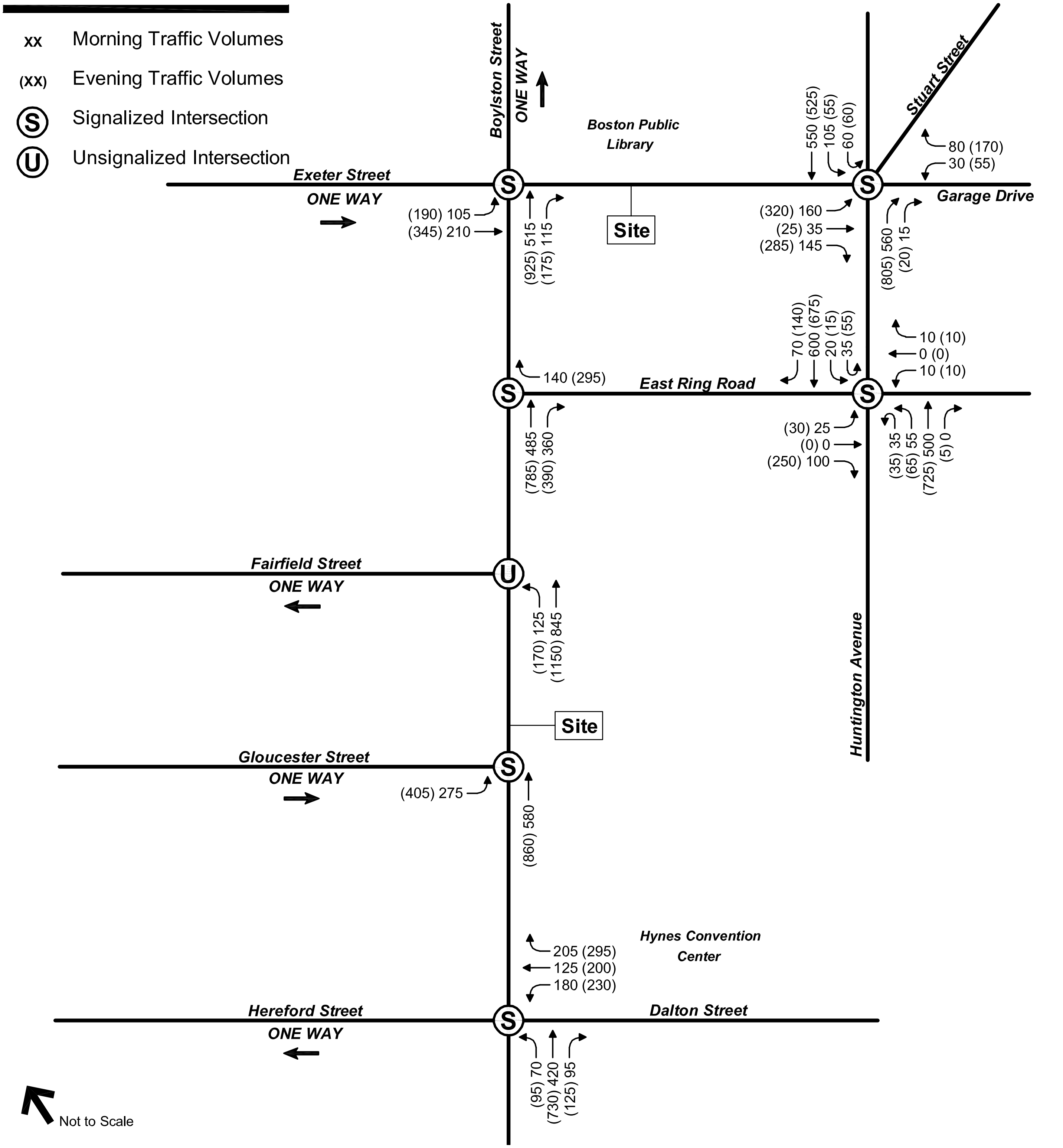


Figure 5-19

2011 Build Condition 888 Boylston
Weekday Morning and Evening
Peak Hour Traffic Volumes

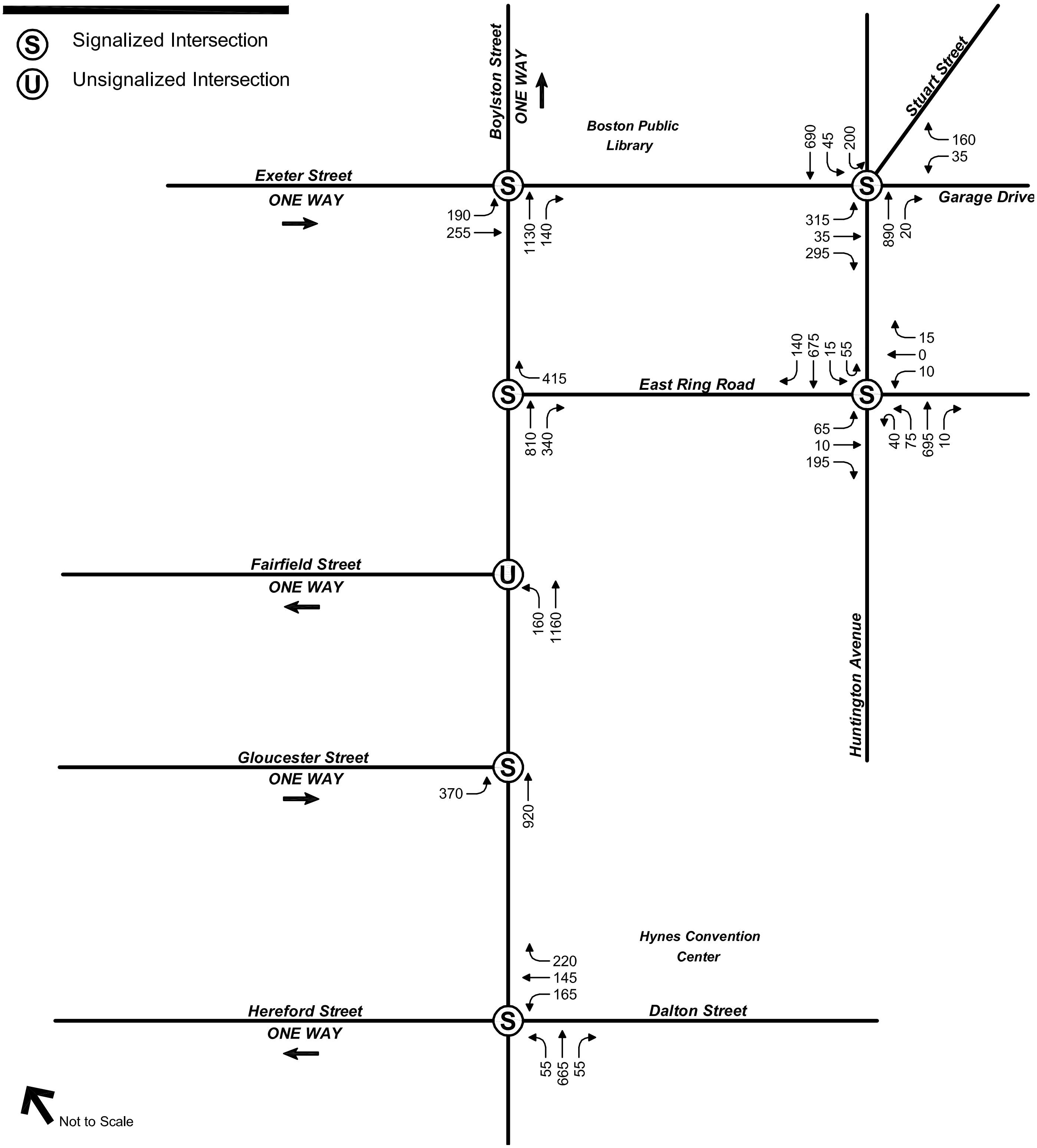


Figure 5-20

2011 Build Condition 888 Boylston
Saturday
Peak Hour Traffic Volumes

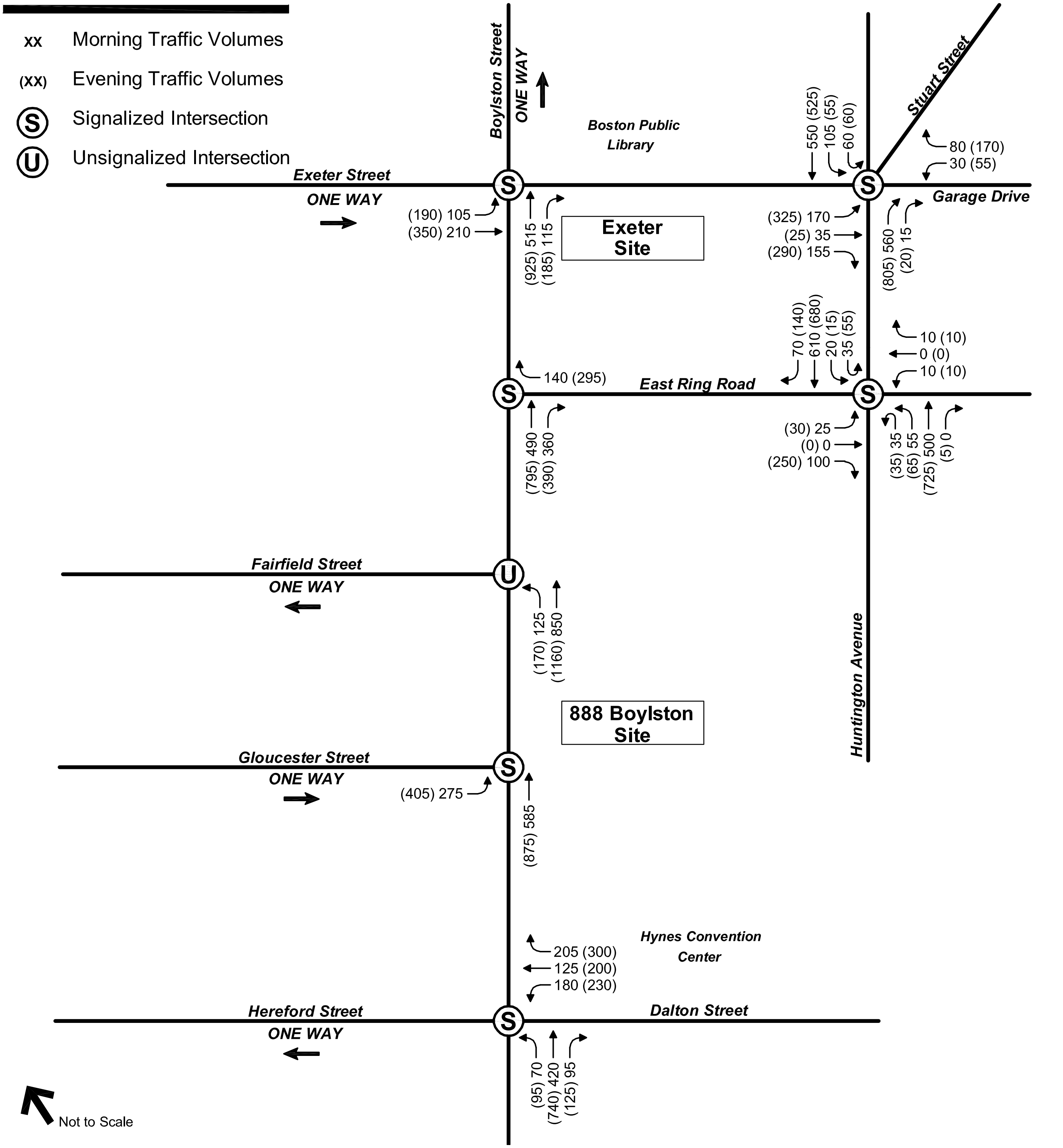


Figure 5-21

2011 Full Build Condition
Weekday Morning and Evening
Peak Hour Traffic Volumes

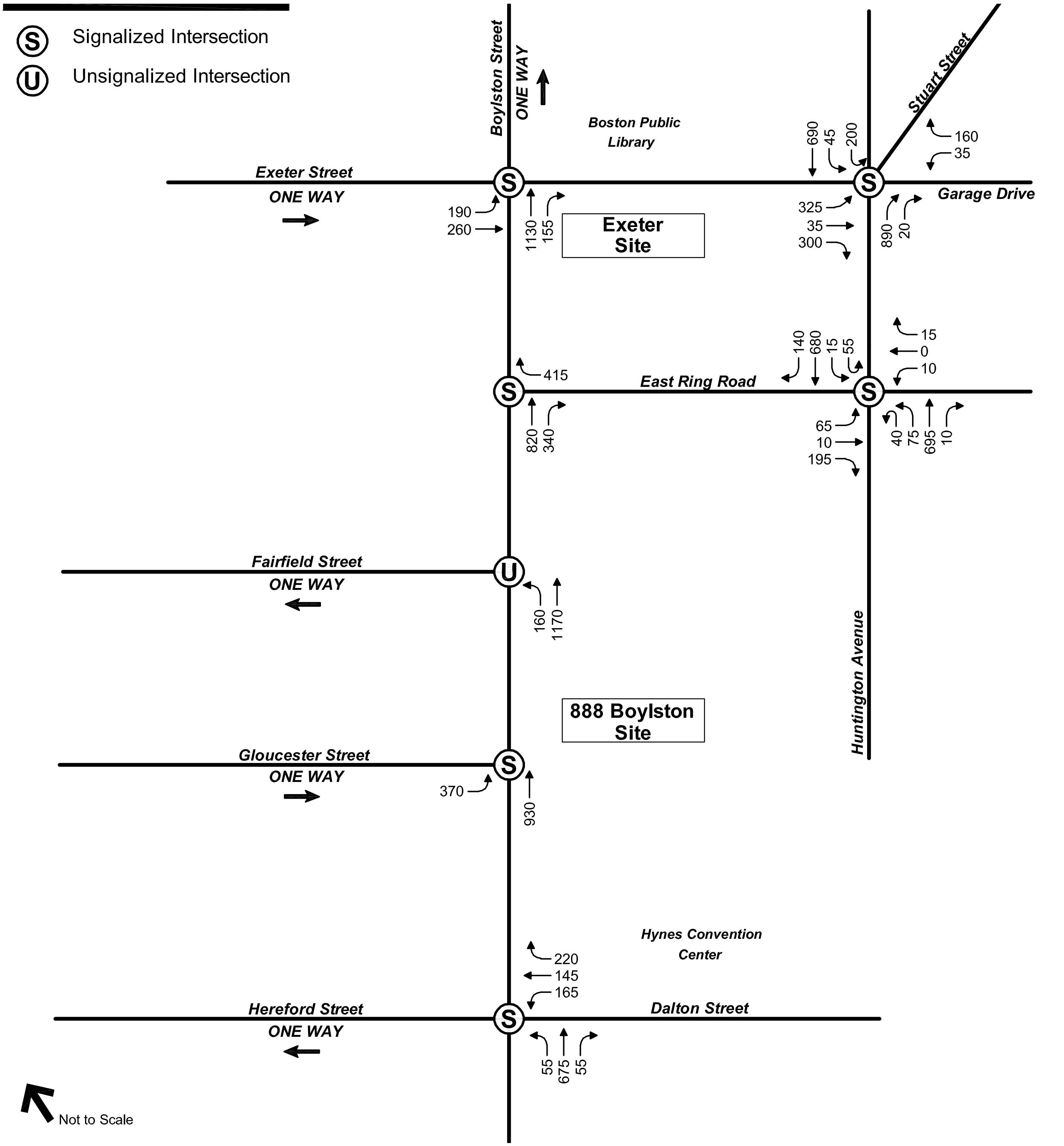


Figure 5-22

2011 Full Build Condition
Saturday
Peak Hour Traffic Volumes

level-of-service designation is for overall conditions at the intersection. For unsignalized intersections; however, the analysis assumes that traffic on the mainline is not affected by traffic on the side streets. The level-of-service is only determined for left turns from the main street and all movements from the minor street. The overall level-of-service designation is for the most critical movement which is most often the left turn out of the side street.

Signalized Intersections

Capacity analyses for the six signalized intersections within the study area were conducted for both the original development program and current development program. Three scenarios were tested for the current development program – the Exeter Residences Project only; the 888 Boylston Project only; and both projects together. Tables 5-14, 5-15 and 5-16 summarize the results of the signalized intersection capacity analyses for these three scenarios and compare them to what was approved under phase 4a of the Prudential Redevelopment Plan. Under the first scenario (Exeter Residences Project only), signalized intersections operate at an acceptable level of service (LOS C or better) except for the intersection of Huntington Avenue at Exeter Street which will operate at LOS D during the Saturday midday peak hour. The intersection of Boylston Street at Dalton Street operates at LOS F under the Approved Development Plan and will continue to operate at LOS F during the 2011 evening peak hour under all three scenarios.

The signalized intersections for scenario two (888 Boylston Project only) will operate at a level of service (LOS C or better), except for the intersection of Huntington Avenue and Exeter Street which is expected to operate at LOS D.

For the signalized intersection for the third scenario, with both the Exeter Residences project and 888 Boylston project, is expected to operate with an acceptable level of service (LOS D or better) except for the intersections along Huntington Avenue which will operate at LOS E. The Boylston Street at Dalton Street intersection will continue to operate at LOS F under scenario three. These failing conditions already exist under the Approved Development program and the traffic increase associated with the current development program will not result in significant impacts to study area intersections compared with the Approved Development program. No downgrade of LOS is anticipated due to the net increase in traffic from the Exeter Residences and 888 Boylston projects.

With signal timing modifications, all signalized study area intersections along Boylston Street and Huntington Avenue are projected to operate at an acceptable level of service (LOS D or better) under the currently proposed development program except the Boylston Street/ Dalton Street intersection which will operate at LOS F.

Table 5-14
2011 Build Condition Capacity Analysis Summary (Signalized Intersections)

	2011 Build Condition with Exeter Residences Project Only					
	With Approved Development Program [1]			With Current Development Program		
	V/C*	Delay**	LOS***	V/C	Delay	LOS
MORNING PEAK HOUR						
Boylston Street/ Dalton Street/ Hereford Street	0.53	31.3	C	0.53	31.3	C
Boylston Street/ Gloucester Street	0.19	14.9	B	0.19	14.9	B
Boylston Street/ East Ring Road	0.36	8.0	A	0.36	8.0(8.3)	A
Boylston Street/ Exeter Street	0.33	17.1	B	0.33	17.0(16.9)	B
Huntington Avenue / Exeter Street / Stuart Street	0.49	25.3	C	0.50	25.8(22.7)	C
Huntington Avenue / East Ring Road / Harcourt Street	0.55	36.5	D	0.56 (0.34)	37.2(12.3)	D (B)
EVENING PEAK HOUR						
Boylston Street/ Dalton Street/ Hereford Street	0.87	92.1	F	0.88	94.4	F
Boylston Street/ Gloucester Street	0.33	17.8	B	0.34	17.8	B
Boylston Street/ East Ring Road	0.60	18.7	B	0.61	18.9(17.3)	B
Boylston Street/ Exeter Street	0.53	21.3	C	0.53	21.2(20.6)	C
Huntington Avenue / Exeter Street / Stuart Street	0.65	29.4	C	0.65	29.9(25.0)	C
Huntington Avenue / East Ring Road / Harcourt Street	0.61	35.1	D	0.61(0.39)	35.2(13.4)	D (B)
SATURDAY PEAK HOUR						
Boylston Street/ Dalton Street/ Hereford Street	0.67	29.2	C	0.69	25.7	C
Boylston Street/ Gloucester Street	0.34	14.0	B	0.33	14.0(13.9)	B
Boylston Street/ East Ring Road	0.67	33.9	C	0.76	34.7(20.3)	C
Boylston Street/ Exeter Street	0.53	13.7	B	0.54	13.9(14.6)	B
Huntington Avenue / Exeter Street / Stuart Street	0.86	67.7	E	0.87	70.9(53.4)	E (D)
Huntington Avenue / East Ring Road / Harcourt Street	0.86	62.7	E	0.86(0.59)	62.8(17.8)	E (B)

Based on SYNCHRO software
1 Includes background projects The Columbus Center, The Clarendon , and Mandarin Oriental Boston and Approved 888 Boylston,
* Volume-to-Capacity ratio.
** Average vehicle delay expressed in seconds per vehicle.
*** Level-of-service.
(xx) Results with signal timing modifications

Table 5-15
2011 Build Condition Capacity Analysis Summary (Signalized Intersections)

	2011 Build Condition with 888 Boylston Project Only					
	With Approved Development Program [1]			With Current Development Program		
	V/C*	Delay**	LOS***	V/C	Delay	LOS
MORNING PEAK HOUR						
Boylston Street/ Dalton Street/ Hereford Street	0.53	31.3	C	0.56	31.2	C
Boylston Street/ Gloucester Street	0.19	14.9	B	0.20	14.8	B
Boylston Street/ East Ring Road	0.36	8.0	A	0.38	8.1(8.5)	A
Boylston Street/ Exeter Street	0.33	17.1	B	0.33	16.9(16.8)	B
Huntington Avenue / Exeter Street / Stuart Street	0.49	25.3	C	0.49	25.2(23.1)	C
Huntington Avenue / East Ring Road / Harcourt Street	0.55	36.5	D	0.55(0.34)	36.5(11.6)	D (B)
EVENING PEAK HOUR						
Boylston Street/ Dalton Street/ Hereford Street	0.87	92.1	F	0.87	91.9	F
Boylston Street/ Gloucester Street	0.33	17.8	B	0.34	18.0	B
Boylston Street/ East Ring Road	0.60	18.7	B	0.63	22.1(20.8)	C
Boylston Street/ Exeter Street	0.53	21.3	C	0.54	20.4(20.6)	C
Huntington Avenue / Exeter Street / Stuart Street	0.65	29.4	C	0.65	23.4(28.4)	C
Huntington Avenue / East Ring Road / Harcourt Street	0.61	35.1	D	0.58(0.39)	32.7(18.1)	C (B)
SATURDAY PEAK HOUR						
Boylston Street/ Dalton Street/ Hereford Street	0.67	29.2	C	0.68	29.8	C
Boylston Street/ Gloucester Street	0.34	14.0	B	0.34	14.2	B
Boylston Street/ East Ring Road	0.67	33.9	C	0.68	34.0(32.2)	C

Boylston Street/ Exeter Street	0.53	13.7	B	0.53	13.7	B
Huntington Avenue / Exeter Street / Stuart Street	0.86	67.7	E	0.86	56.6(51.3)	E (D)
Huntington Avenue / East Ring Road / Harcourt Street	0.86	62.7	E	0.81(0.59)	34.4(22.2)	C

Based on SYNCHRO software
1 Includes background projects The Columbus Center, The Clarendon and Mandarin Oriental Boston
* Volume-to-Capacity ratio.
** Average vehicle delay expressed in seconds per vehicle.
*** Level-of-service.
(xx) Results with signal timing modifications

Table 5-16
2011 Build Condition Capacity Analysis Summary (Signalized Intersections)

	2011 Build Condition with both Exeter Residences and 888 Boylston Projects					
	With Approved Development Program 1			With Current Development Program		
	V/C*	Delay**	LOS***	V/C	Delay	LOS
MORNING PEAK HOUR						
Boylston Street/ Dalton Street/ Hereford Street	0.53	31.3	C	0.53	31.3	C
Boylston Street/ Gloucester Street	0.19	14.9	B	0.19	14.9	B
Boylston Street/ East Ring Road	0.36	8.0	A	0.36	8.0(8.4)	A
Boylston Street/ Exeter Street	0.33	17.1	B	0.33	17.1(16.9)	B
Huntington Avenue / Exeter Street / Stuart Street	0.49	25.3	C	0.49	25.3(23.1)	C
Huntington Avenue / East Ring Road / Harcourt Street	0.55	36.5	D	0.55 (0.34)	36.5(11.7)	D (B)
EVENING PEAK HOUR						
Boylston Street/ Dalton Street/ Hereford Street	0.87	92.1	F	0.89	94.4	F
Boylston Street/ Gloucester Street	0.33	17.8	B	0.35	18.0	B
Boylston Street/ East Ring Road	0.60	18.7	B	0.64	20.6(20.9)	C
Boylston Street/ Exeter Street	0.53	21.3	C	0.55	20.8(20.4)	C
Huntington Avenue / Exeter Street / Stuart Street	0.65	29.4	C	0.66	30.3(28.7)	C
Huntington Avenue / East Ring Road / Harcourt Street	0.61	35.1	D	0.61 (0.40)	35.4(18.0)	D (B)

SATURDAY PEAK HOUR						
Boylston Street/ Dalton Street/ Hereford Street	0.67	29.2	C	0.69	29.8	C
Boylston Street/ Gloucester Street	0.34	14.0	B	0.35	14.1	B
Boylston Street/ East Ring Road	0.67	33.9	C	0.69	36.4(35.2)	D
Boylston Street/ Exeter Street	0.53	13.7	B	0.54	13.8	B
Huntington Avenue / Exeter Street / Stuart Street	0.86	67.7	E	0.87	70.9(41.8)	E (D)
Huntington Avenue / East Ring Road / Harcourt Street	0.86	62.7	E	0.87 (0.59)	63.4(23.2)	E (C)

Based on SYNCHRO software
1 Includes background projects The Columbus Center, The Clarendon and Mandarin Oriental Boston
* Volume-to-Capacity ratio.
** Average vehicle delay expressed in seconds per vehicle.
*** Level-of-service.
(xx) Results with signal timing modifications

Un-Signalized Intersections

There are no controls at the unsignalized Boylston Street/Fairfield Street intersection. Boylston Street eastbound through and left-turning traffic are only required to stop for pedestrians in the crosswalk. The Fairfield leg of the intersection travels southbound away from the intersection. Since there is no major conflicting movement that will affect the operation of the intersection, unsignalized capacity analysis was not performed for this intersection.

■

Site Access / Parking

Vehicle Access and Circulation

Parking for both the Exeter Residences and 888 Boylston will be provided within the limits of the existing Prudential Center Garage. No changes to the entry locations are proposed. Access to the residential units parking for Exeter Residences will be via Exeter Street where vehicles will arrive and enter the parking lot and loop around to the Green Lot, whereas parking access for the 888 Boylston building will be a more direct access off East Ring Road.

Similarly, loading and service access for both of the new buildings will be provided in existing loading docks. The Exeter Residences will utilize the existing loading dock in the Fairfield building and Shaw's Supermarket building on Exeter Street. The

888 Boylston building will share the North Loading Dock with the adjacent Mandarin Oriental Boston and existing retail uses.

Loading and parking access for the Exeter Residences and 888 Boylston buildings is consistent with the approved Development Plan.

Parking Demand

As part of the Approved Development Plan a total of up to 986 spaces were allocated and reserved for residential use at the Prudential Center. Based on current use patterns these spaces will be sufficient to support both the existing residential uses on-site and the Exeter Residences. The Gloucester, Fairfield and Boylston residential buildings within the Prudential Center are owned and operated by AvalonBay. AvalonBay will be the owner of the Exeter Residences. AvalonBay anticipates using these reserved residential spaces that have already been approved under Prudential Center Master Plan through the Boston Air Pollution Control Commission. Approximately 140 of these spaces will be used for the Exeter Residences building.

Upon the construction of Exeter Residences building, parking spaces for the Exeter Residences will be established through a combination of expanding the existing garage nests and managed parking techniques. This parking will utilize managed areas consistent with the parking management plan being implemented in the garage as a whole. No on-street parking will be permitted in front the proposed Exeter Residences building.

The current development program for 888 Boylston proposes a total of 240 parking spaces to be used by the office and retail components. The current development program will provide 0.65 spaces per 1000 square feet of office space.

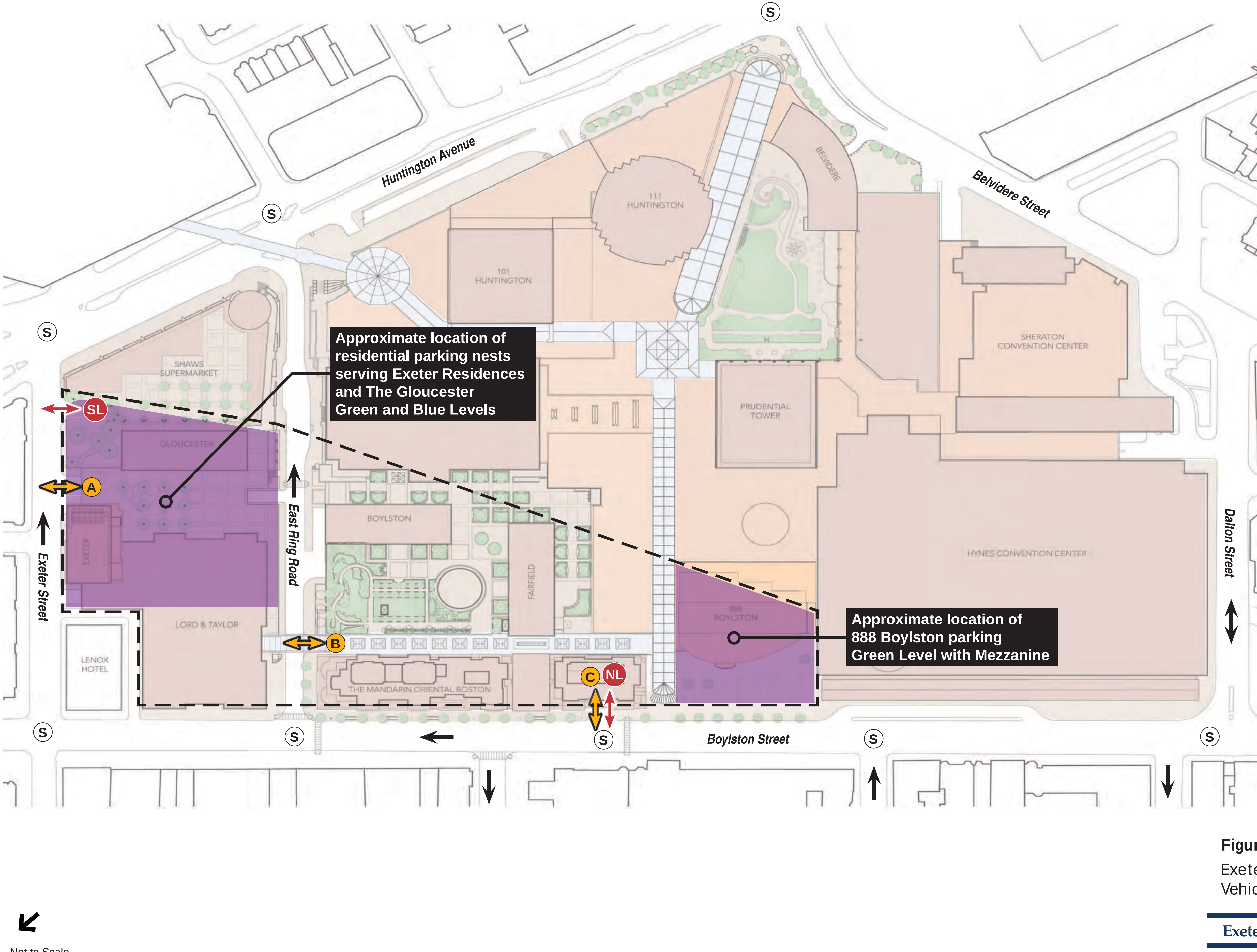
All parking necessary to support the 888 Boylston building program will be provided within the existing garage limits. The existing Green level of the Prudential Center parking garage was constructed with an 18' floor to floor dimension within the footprint of 888 Boylston. The revised building envisions insertion of a mezzanine parking deck within this space, increasing the parking capacity of the garage within the building footprint. The mezzanine deck would be valet accessible only, allowing for a typical managed parking operation. Access will be via a ramp from the Green level only, and no additional access ramps or curb cuts from the street are planned. A forty (40) feet No-standing and No-Stopping curb area is proposed in front of the 888 Boylston building entrance to accommodate pick-up and drop-off activities for 888 Boylston and the Prudential Center Arcade.

A total of 58 spaces were approved for Phase 4a under the original program. Based on market demands 182 additional spaces will be necessary to support the proposed building as a whole. Additional spaces will be realized through construction of a parking mezzanine level directly below the 888 Boylston building and through management and reconfiguration of existing parking spaces. The approved Development Plan does not provide sufficient parking to meet the parking space needs of the proposed 888 Boylston building program. The 240 proposed spaces will be located in a nested area separated from the remainder of the garage by access control such as card readers. The Approved Prudential Center Development Plan including the Mandarin Oriental Boston, has 986 spaces for residential, 2067 commercial spaces and 867 reserved as employee/tenant spaces for a total of 3920 spaces. With the addition of 182 spaces as part of the 888 Boylston program and 140 spaces as part of the Exeter Residences program, the total parking spaces available within the Prudential Center parking garages will be 4242 spaces (1186 residential, 2067 commercial, 1049 employee/tenant). **Figure 5-23** illustrates the access and egress points for parking for the proposed two buildings.

Pedestrians

The original Development Plan for the Prudential Center Redevelopment project includes a comprehensive set of pedestrian ways that provide access and circulation to and through the area. The current proposal generally supports and maintains the previously planned pedestrian routes and patterns, with some modification that will enhance pedestrian access and safety in the area. The Exeter Residences will include streetscape improvements along Exeter Street to create a sense of arrival through location of the building entry, and landscaping improvements. The most prominent changes along Boylston Street include improvements to the sidewalk in front of the proposed 888 Boylston site to create an inviting public plaza.

Both site plans recognize the importance of the pedestrian routes that traverse the Prudential Center creating links between the Back Bay and South End/St. Boltoph neighborhoods. The Exeter Residences will offer a means to connect the Prudential Center level plaza to Exeter Street below. The 888 Boylston building will be integral with the existing Prudential pedestrian arcade to support this route for users of the building.



Loading/Service Areas

SL Shaw's Loading Dock
Forward-In/Forward-Out for trucks up to WB-50 (semi-trucks with 1 42.5' trailer). This Dock is shared between Shaw's Supermarket, Gloucester Apartments and Avalon Exeter.

NL North Loading Dock
Forward-In/Forward-Out access for trucks up to WB-50. Serves the North Arcade retail, The Fairfield, Mandarin Oriental Boston and 888 Boylston.

Prudential North Garage - Entrys and Exits

A Access in and out to Blue, Green and Platinum Levels. Key card and ticket cashier for cash spaces access. Primary entry/exit for Avalon Exeter.

B Key card and ticket access into Green and Platinum Leves. Valet-only access to Blue Level (Mandarin Oriental Nest). Only key card access out. Primary entry/exit for 888 Boylston reserved parking.

C Exit only for Mandarin Oriental Valet Nest. Valet Key card only.

North Garage Parking Levels

North Garage Parking Levels
Blue
Green
Platinum
(Mandarin Oriental Boston only)

Figure 5-23
Exeter Residences and 888 Boylston Vehicular Access Plan

Prudential Center Redevelopment - Development Plan

The original Development Plan for pedestrian access design includes a network of indoor and outdoor pedestrian ways that greatly augment the pedestrian environment by allowing easy circulation through the site and providing connections to open spaces and retail development. The planned pedestrian improvements under the original Development Plan provided indoor, climate controlled arcades and improvements to sidewalks on adjacent streets as follows:

- **North-South pedestrian routes:**

  - The arcade completed in connection with 111 Huntington Avenue provides a direct indoor connection at the MBTA's Prudential stop on the E-Branch of the Green Line. This serves as the main public link between Boylston Street and Huntington Avenue at Belvidere Street while providing a major north-south indoor connection to the arcade east of the Prudential Tower.
  - Improvements were made to sidewalks on East Ring Road as part of the Shaw's supermarket construction to widen pedestrian areas, slow traffic and provide safer street crossings.
  - The establishment of an interior stair along the Boylston Street frontage provides a north-south access to the central court area near the Boylston and Fairfield residential buildings.

- **East-West pedestrian routes:**

  - As part of the Mandarin Oriental Boston, a pedestrian connection will be created parallel to Boylston Street at deck level, beginning at the existing bridge over East Ring Road on the upper level of Lord & Taylor and extending to the major north-south indoor arcade located east of the Prudential Tower. This pedestrian connection will be enclosed, in conformance with the Development Plan.
  - Reconstruction of the Boylston Street sidewalk in conjunction with the creation of retail uses at street level.

Changes to the Development Plan

The current proposal retains the pedestrian ways specified under the Approved Development Plan while providing improvements to the pedestrian environment through the sidewalk improvements along the Exeter Street and Boylston Street fronting the sites and in the vicinity of the proposed garage entrance on Exeter Street.

Pedestrian Trip Generation Impact of Current Proposal

The current residential, retail and office plan for the Exeter Residences and 888 Boylston sites is expected to generate approximately 246, 284 and 159 additional pedestrian trips during the weekday morning, weekday evening and Saturday peak hours, respectively. This represents an increase of 35.7% over the total Approved Development Plan program in the morning peak hour and 21.4% in the evening peak period.

Table 5-17 Pedestrian-Trip Generation Comparison Development Plan Program vs. Current Program

	Prudential Center Approved Development Program	Approved Program Phase 4a	Current Program Phase 4a	Current Program Phase 6	Current Program Phase s 4a & 6
MORNING					
Enter	186	97	145	16	161
Exit	77	15	22	63	85
Total	263	112	167	79	246
EVENING					
Enter	176	33	43	65	107
Exit	401	99	141	35	177
Total	577	132	184	100	284
SATURDAY					
Enter	n/a	43	50	32	82
Exit	n/a	39	45	32	77
Total	n/a	82	95	64	159

T

The increase in pedestrian trips associated with the Exeter Residences and 888 Boylston should be easily accommodated by the existing pedestrian facilities existing in and around the Prudential Center and future improvements by the Mandarin Oriental Boston, 888 Boylston and Exeter Residences. Comparing with the overall existing pedestrian traffic along Boylston Street, the additional pedestrian trips due to the proposed sites represents approximately 7.2% increase during the morning peak hour and an approximate increase of 6.3% during the evening peak hour.

Figures 5-24 and **5-25** show the 2011 Build Condition weekday morning, weekday evening and Saturday midday peak hour pedestrian volumes for the currently proposed projects.

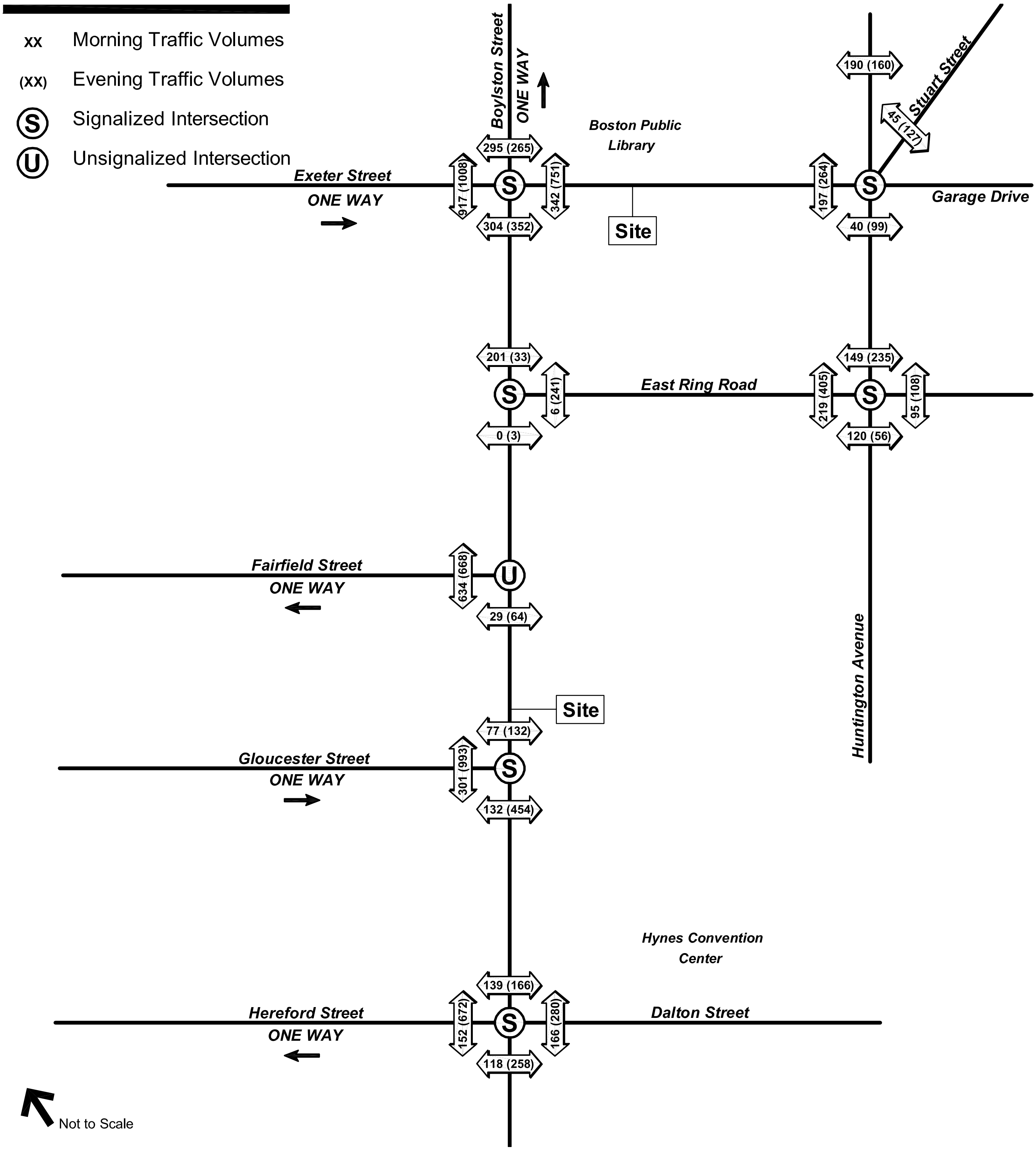


Figure 5-24

2011 Build Condition
Weekday Morning and Evening
Peak Hour Pedestrian Volumes for
Currently Proposed Project

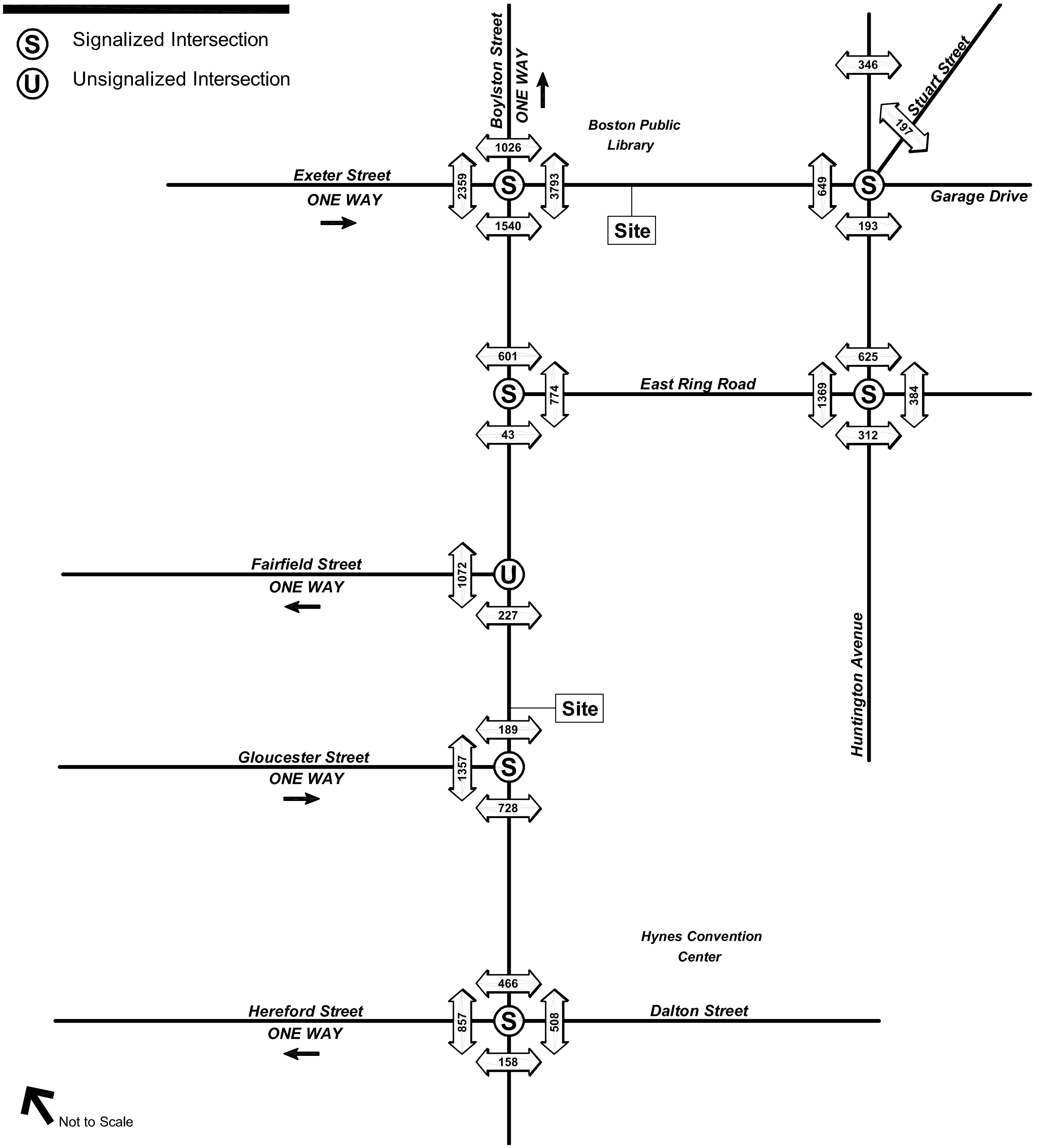


Figure 5-25

2011 Build Condition
Saturday
Peak Hour Pedestrian Volumes for
Currently Proposed Project

Exeter Residences\888 Boylston

AvalonBay COMMUNITIES, INC. Boston Properties

Public Transportation

The Development Plan for the Prudential Center Redevelopment project included extensive analysis of the existing transit system and planned improvements to make the system more attractive and easier to use. The report also examined the extent to which the entire Prudential Center Redevelopment project would impact the system in future years. As presented in the Mandarin Oriental Boston NPC/PNF January 2002, it was projected that total ridership on all peak load segments would be at or below planning capacity in the evening peak hour in 1999, and that the impact of the Prudential Center Redevelopment project on the transit system's peak load segments would be no more than one percent of the planning capacity of each line. Table 5-18 summarizes the impacts of the Exeter Residences and 888 Boylston on transit ridership as compared to the original redevelopment program.

Table 5-18 Transit-Trip Generation Comparison Development Plan Program vs. Current Program

	Development Plan	Approved Phase 4a Program	Current Phase 4a Program	Current Phase 6 Program	Current Phases 4a and 6 Program
MORNING					
Enter	2,811	145	218	4	222
Exit	263	22	32	15	46
Total	3,074	167	246	19	268
EVENING					
Enter	552	40	53	16	69
Exit	3,173	139	203	9	211
Total	3,725	179	256	25	280
SATURDAY					
Enter	n/a	25	31	15	46
Exit	n/a	22	28	15	42
Total	n/a	47	59	30	88

The Exeter Residences and 888 Boylston projects together will increase the planned transit ridership for the entire redevelopment program by 3.1% during the morning peak and 2.6% during the evening peak. This increase should not have a significant impact on overall peak hour transit ridership as there is sufficient capacity within the MBTA transit services to accommodate this increase.

Changes to the Development Plan

The re-design of Boylston Street under the Mandarin Oriental Boston required the relocation of one MBTA bus stop that is served by the bus Routes 39 and 55. This new location is expected to be designed in front of the 888 Boylston office building and will be closer to the arcade entrance. It is anticipated that this design will be implemented upon completion of the construction of the Mandarin Oriental Boston which will provide convenient access to bus services for the 888 Boylston site.

5.6 Proposed Improvements

The Proponent will commit to providing the following mitigation related to signal timing and coordination modifications to improve pedestrian safety and vehicular operations along the Boylston Street and Huntington Avenue within the project limits:

Huntington Avenue at Exeter Street and Stuart Street

- Adjust Pedestrian timings to provide sufficient time for pedestrian to cross Huntington Avenue
- Develop and program backup timings and time of day event programming into local controller to match BTD's Urban Traffic Control System (UTCS) programming.
- Coordinate with *MassHighway* and the City of Boston to implement a right turn on red for Exeter Street right turning movements into southbound Huntington Avenue.

Huntington Avenue at East Ring Road

- Perform electrical testing of loop detectors to determine status of loop detectors. (Intersection is currently operating pre-timed as all fuses are missing from detector amplifiers. Due to this existing defective condition, the intersection is not operating at its optimal level). Providing loops that are operational will enable this intersection to operate efficiently.
- Review and modify central UTCS timings to comply with fixed internal restrictions on local controllers
- Intersection is operating "Manual Free". Repair communication to get intersection operating on central UTCS.
- Develop backup coordination and time-of-day programming consistent with central UTCS programming and implement in local controller.

Huntington Avenue and Boylston Street Signal Timing Improvements

- Adjust and modify signal timings along Boylston Street and Huntington Avenue for the study area intersections to comply with recent changes to timings as part of the traffic analyses for Exeter Residences and 888 Boylston projects site generated trips.
- Provide signage related to parking restrictions and commercial loading along the frontage of the two proposed sites.

5.7 Transportation Demand Management

The Transportation Access Plan for the Prudential Center Redevelopment has established a comprehensive TDM program for the Prudential Center. Based on the transportation analysis provided above, the Exeter Residences and the proposed change in the program for the 888 Boylston will have only minor impact on the transportation system and will not require any changes in the previously approved transportation mitigation measures, except as suggested as part of the proposal discussed in this report. In conjunction with the standing TAPA for the Prudential Center Development site, the Proponent (or its successors and assignees) will commit to implementing the following TDM elements and activities to reduce Single Occupancy Vehicles and encourage transit use:

Exeter Residences TDM Programs

- The existing TAPA agreement for Prudential Center will be amended to reflect the addition of the Exeter Residences residential building and outline the TDM measures to be implemented by AvalonBay for residents of the new building.
- Provide transit information on-site such as MBTA and water shuttle information on the building owners or building management's web site and/or mailings and newsletter to residents.
- MBTA transit passes will be sold to residents on-site.
- Coordinate with neighboring residential in the Prudential Center to make available carsharing options such as zip-car for residents.
- Provide secure bicycle racks and storage area protected from elements, as necessary to meet demand.
- Pedestrian shopping trips will occur if retail tenants provide a variety of essential products and services. AvalonBay will seek to attract retail tenants such as grocery, dry cleaners, day care, pharmacy, ATM/branch, video rental and mail boxes, etc. to promote the retail environment.

888 Boylston TDM Programs

- Boston Properties will continue to participate in the ABC TMA for Prudential Center including 888 Boylston.
- The Transportation Coordinator will provide TDM programs and services and coordinate the provision of ABC TMA programs to tenants and employees of 888 Boylston.
- The Transportation Coordinator will encourage office tenants to offer employees compressed work weeks, flextime, staggered work hours and telecommuting programs and transit subsidies.
- On-site sale of MBTA T passes and T visitor passes will continue at the Prudential Center.
- Prudential Center will continue to provide a link to MBTA transit information on its website.
- The Transportation Coordinator will provide new tenant orientation materials and newsletters for distribution to employees of 888 Boylston.
- Tenants will be encouraged to offer subsidies of MBTA passes and private commuter bus and boat fares in the amount of 25% to all employees.
- Information for marketing materials, bike maps, T-schedules will continue to be provided at the Prudential Center's customer service desk located in the Center Court area of the arcades.
- The Transportation Coordinator will encourage tenants to establish pre-tax payroll deduction plan for sale of MBTA passes to all employees.
- The Transportation Coordinator will work through the ABC TMA to provide employee matching vanpools and carpools.
- Preferential carpool and vanpool parking for employees of 888 Boylston will be provided.
- A Guaranteed Ride Home program for non-drivers and van/carpool users will be provided to employees through the ABC TMA.
- Provide parking spaces in the Prudential Center garage for employee and resident car sharing, such as Zipcar.
- Provide secure bicycle racks protected from elements, as necessary to meet demand.
- Encourage tenants to provide shower and locker facilities for employees to facilitate walking and bicycle commuting.
- Provide an annual transportation fair for office tenants for learning about the transportation options at Prudential Center.

5.8 Construction Management

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Construction Impacts

The activities that will be necessary to construct the proposed buildings will be similar to the originally approved uses under the Development Plan. Construction workers and construction trucks are not expected to have significant impacts on traffic conditions on surrounding streets during construction. Typical work hours for construction personnel are from 7:00 AM to 3:30 PM and most workers would not travel during peak traffic periods. In addition, because no free parking would be provided on-site and the site is well served by transit, a large percentage of workers are expected to carpool or use transit. The impact of construction trucks on the evening peak hour is expected to be insignificant because most deliveries would be completed before the end of the workday at 3:30 PM. Morning impacts would be slightly greater, but deliveries are spread uniformly during the workday.

Truck routes will be designated to keep trucks on main thoroughfares, and out of residential areas. Further requirements are presented in the Prudential Transportation Access Plan Agreement (TAPA). In addition, Construction Management Plans reflecting experience for 111 Huntington Avenue and the Mandarin Oriental Boston will be utilized to minimize impact. In conformance with the components of the Construction Traffic Management Plan included in the redevelopment DPIR/DEIR and the requirements outlined in the Prudential TAPA, the following elements will be addressed in the final Construction Management Plan:

- Designation of truck routes for deliveries
- Identification of truck waiting areas
- Definition of street and sidewalk occupancies
- Protection and delineation of pedestrian walkways
- Definition of worker parking parameters and measures to maximize related use of public transportation
- Police officer for traffic management
- Interim Traffic operation improvements
- Location of tower cranes
- Definition of work hours
- Location and sizing of staging areas for on-site storage of construction materials
- Construction graphics program
- Coordination with ongoing construction activities in the Prudential Center area

6

Environmental Protection

6.1 Wind

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Introduction

Pedestrian level winds conditions were evaluated as part of the analysis completed in preparation of this PNF/NPC document in anticipation of the BRA requiring a quantitative study as required by Section 80B2 of the Boston Zoning Code. The objective of the wind study was to assess the potential effect of the proposed development on local wind conditions in pedestrian areas around the study site and provide recommendations for minimizing adverse effects, if any.

The study involved wind simulation on a 1:400 scale model of the project area. The simulations were conducted by Rowan, Williams Davies and Irwin in a boundary-layer wind tunnel for the purpose of estimating local wind speed conditions under the Approved Development Plan and the Proposed Program. While the existing pedestrian level wind conditions were also examined, these results are not presented in detail because the base condition (Approved Development Plan) presumes the construction of the previously approved 11-story building at 888 Boylston Street. The study identifies potential impacts resulting from the project and potential mitigation, if necessary and appropriate.

The study modeled the ground level wind conditions at 89 locations including pedestrian routes and surrounding public streets from Dalton Street to the Boston Public Library and from Huntington Avenue to Newbury Street. The study locations were reviewed by the BRA prior to conducting the study.

The results of the wind tunnel study were compared to the BRA recommended criteria for evaluating pedestrian level winds.

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Overview

Major buildings, especially those that extend above their surrounding, often cause increased local wind speeds at the pedestrian level. Typically, wind speeds increase with elevation above the ground surface, and taller buildings intercept these faster winds and deflect them down to the pedestrian environment. The funneling of wind through gaps between buildings and the acceleration of wind around corners of buildings may also cause an increase in wind speed. Conversely, if a building is surrounded by others of equivalent height, it may be protected from prevailing upper-level winds, resulting in no significant changes to the local pedestrian-level wind environment. The most effective way to assess potential pedestrian-level wind impacts around a proposed new building is to conduct scale model tests in a wind tunnel. For that reason, RWDI has conducted the tests which are reported in this section.

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

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Methodology

Information concerning the site and surroundings were derived from site photographs, information on surrounding buildings supplied by the architect, and site plans and elevations of the proposed development provided by the design team.

The following configurations were simulated:

- Existing Conditions – includes existing buildings on and around the site;
- Approved Development Plan – includes existing buildings on and around the site and the approved construction of the 11-story building at 888 Boylston Street;
- Proposed Program – includes the proposed design of the existing site surroundings.

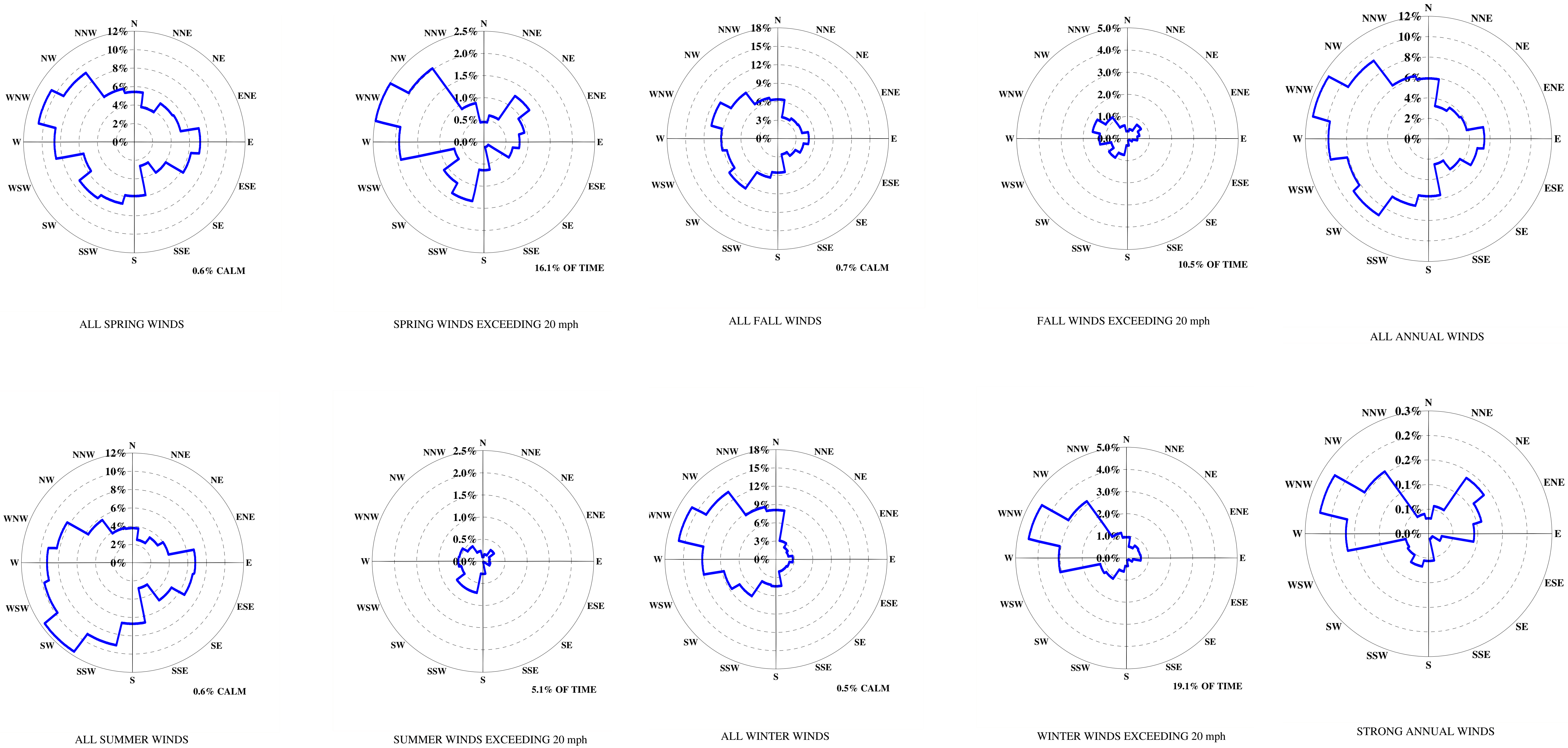

Figure 6-1

Directional Distribution (%) of Winds (Blowing From)

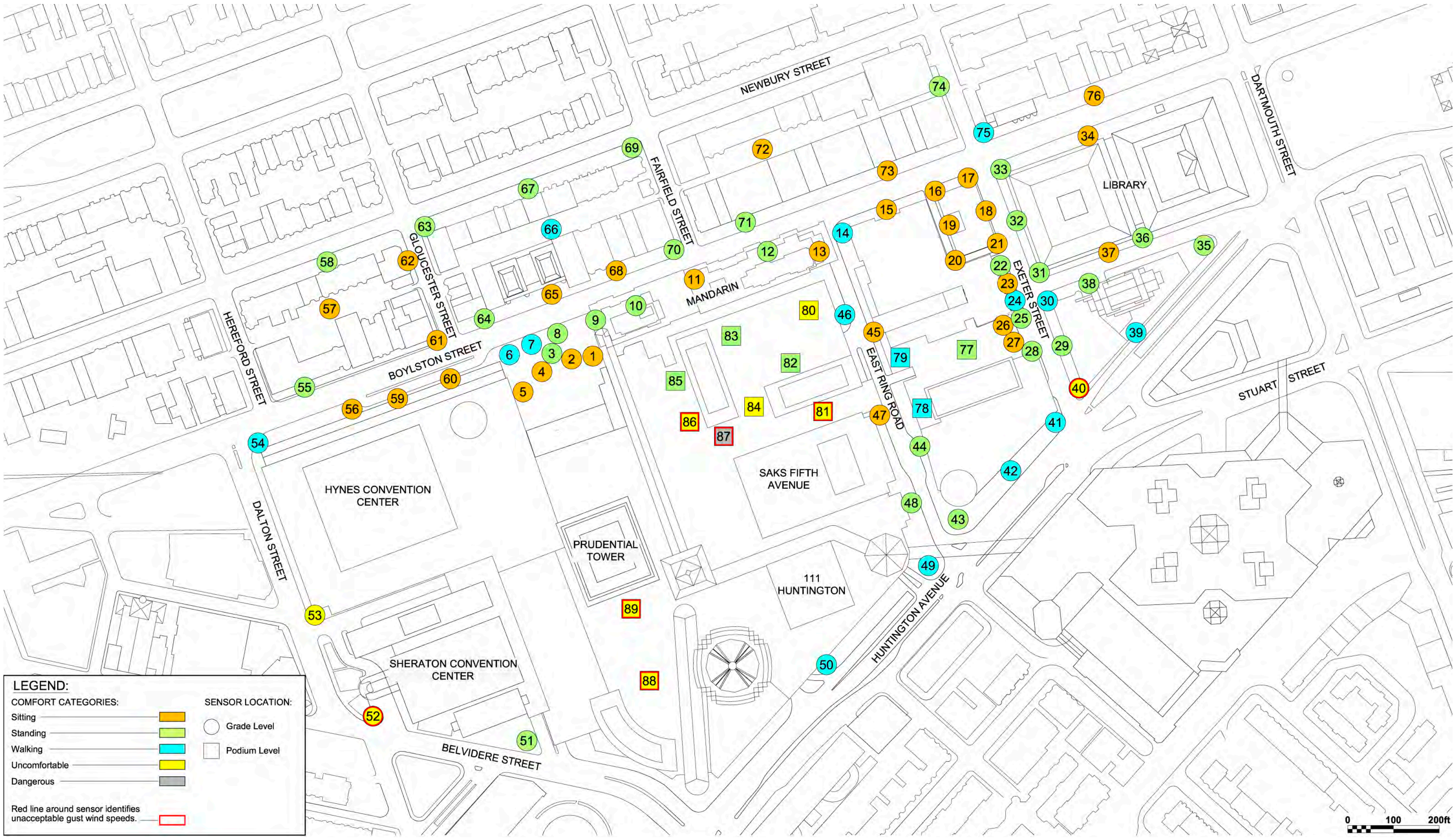

Figure 6-2

Pedestrian Wind Conditions
Existing

Figure 6-3

Pedestrian Wind Conditions
Approved Development Plan

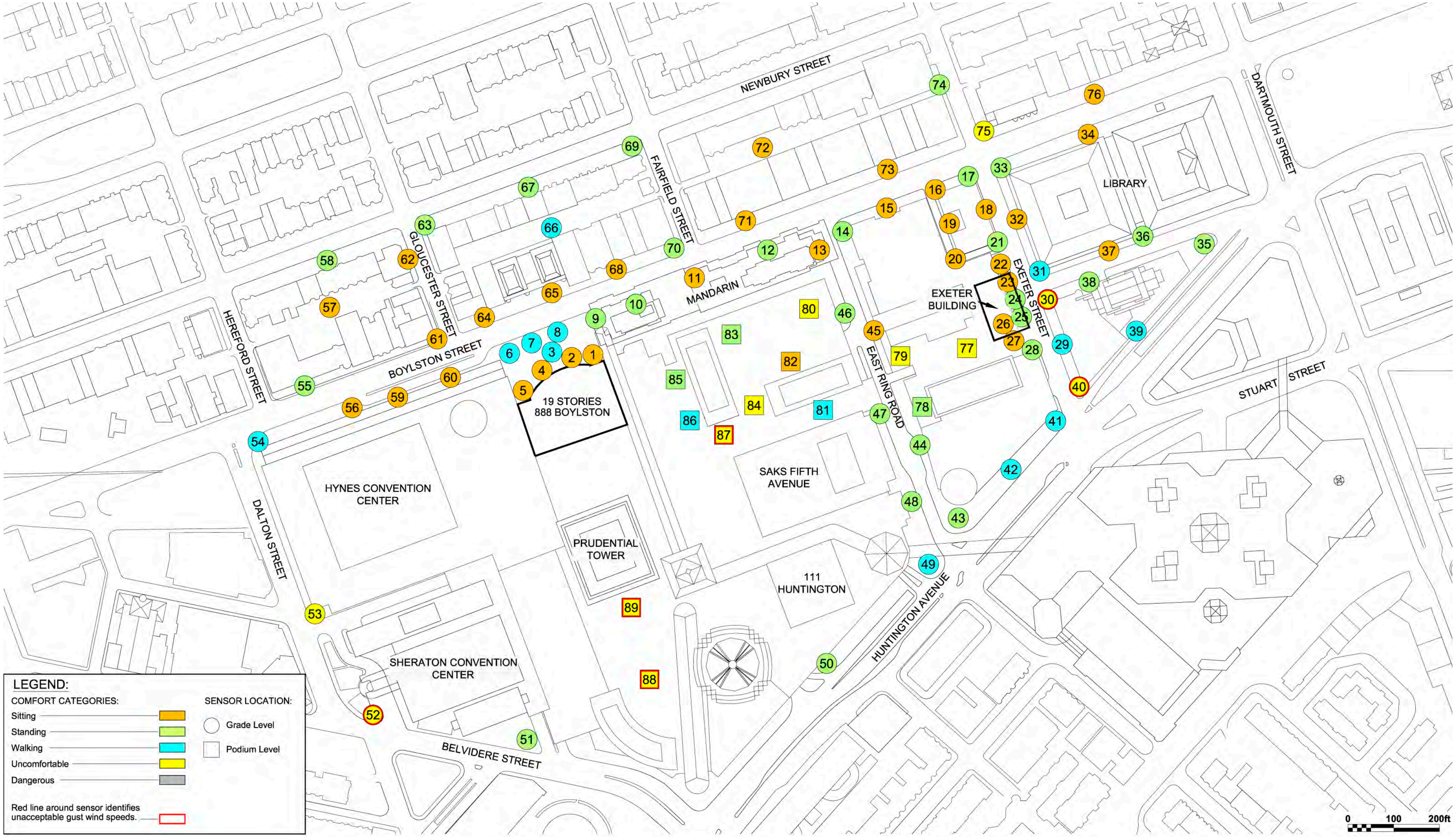

Figure 6-4

Pedestrian Wind Conditions
Proposed

The scale model was equipped with specifically designed wind speed sensors that were connected to the wind tunnel's data acquisition system to record the mean and fluctuating components of wind speed at a full-scale height of five feet above grade in pedestrian areas throughout the study site. Study locations were selected by RWDI based on their extensive experience in modeling pedestrian level wind conditions in Boston. Specific study locations were selected to adequately model conditions at potentially windy or high pedestrian traffic locations. The horizontal extent of the study area was selected to capture any locations likely to be affected by the Proposed Program. This methodology was confirmed by comparing the modeled conditions at the perimeter of the study area under the Approved Development Plan and the Proposed Program. As shown on **Figures 6-3** and **6-4**, none of the study locations at the edge of the study area showed a change between these two study conditions. See Appendix F for RWDI's confirmation of this conclusion.

Wind speeds were measured for 36 wind directions, in 10 degree increments, starting from true north (see **Figure 6-1**). The measurements at each sensor location were recorded in the form of ratios of local mean and gust speeds to the reference wind speed in the free stream above the model. The results were then combined with long-term meteorological data, recorded during the years 1945 to 1998 at Boston's Logan International Airport, in order to predict full scale wind conditions. The analysis was performed separately for each of the four seasons and for the entire year.

This study involved state-of-the-art measurements and analysis techniques to predict wind conditions at the study site. However, some uncertainty remains in predicting wind comfort, and this must be kept in mind. For example, the sensation of comfort among individuals can be quite variable. The comfort limits used in this report represent an average for the total population. Also, unforeseen changes in the project area, such as the construction or removal of buildings, can affect the conditions experiences at the site. Finally, the predictions of wind speeds are necessarily a statistical procedure. The wind speeds reported are for the frequency or occurrence stated (on percent of the time). Higher wind speeds will occur but on a less frequent basis.

Pedestrian Wind Comfort Criteria

The BRA has adopted two standards for assessing the relative wind comfort of pedestrians. First, the BRA wind design guidance criterion states that an effective gust velocity (hourly mean wind speed + 1.5 times the root-mean-square wind speed) of 31 mph should not be exceeded more than one percent of the time. The second set of criteria used by the BRA to determine the acceptability of specific location is based on the work of Melbourne. This set of criteria is used to determine the relative level of pedestrian wind comfort for activities such as sitting, standing or walking. The criteria are expressed in terms of benchmarks for the 1-hour mean wind speed exceeded 1% of the time (i.e., the 99-percentile mean wind speed). They are as follows in Table 6-1.

Table 6-1
BRA Mean Wind Criteria*

Melbourne Category	Description	Criteria*
1. Comfortable for Sitting	Recommended for outdoor cafes and amenities that promote sitting.	≤12 miles per hour
2. Comfortable for Standing	Appropriate at major building entrances, bus stops or other areas where people may want to linger but not necessarily sit for extended periods of time.	>12 and ≤15 miles per hour
3. Comfortable for Walking	Appropriate from sidewalks, plazas, parks where people are more likely to be active and receptive to some wind activity.	>15 and ≤19 miles per hour
4. Uncomfortable for Walking	Considered a nuisance for some activities, but can be acceptable, depending upon the season and use of an area.	>19 and ≤27 miles per hour
5. Dangerous	Wind speeds can adversely affect a pedestrian's balance and footing.	> 27 miles per hour

* Applicable to the hourly mean wind speed exceeded 1 percent of the time.
Source: Boston Redevelopment Authority

The wind climate found in a typical downtown location in Boston is generally comfortable for the pedestrian use of sidewalks and thoroughfares and meets the BRA effective gust velocity criterion of 31 mph. However, without any mitigation measures; the general wind climate in Boston is likely to be frequently uncomfortable for more passive activities such as sitting.

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Test Results

The following sections describe the expected pedestrian level wind conditions in the Existing, Approved Development Plan and Proposed Program conditions. Related figures can be found in the Appendix under Pedestrian Level Wind Analysis.

Existing Conditions and Approved Development Plan

Existing conditions were examined to confirm that no significant changes in pedestrian level winds were expected as a result of the Approved Development Plan. As expected the results for the existing conditions (See **Figure 6-2**) and the Approved Development Plan (**Figure 6-3**) were nearly identical. As expected, the only discernable change in pedestrian level winds resulting from the Approved Development Plan was near the proposed entrance to 888 Boylston which was predicted to experience a decrease in annual wind speed of approximately 4 mph, resulting in slightly improved conditions at this location. With the exception of this one sensor at the entrance to 888 Boylston Street, the following description of the Approved Development Plan also apply to the existing conditions.

In the analysis of the Approved Development Plan, all studied locations met the BRA's safety criteria. Five locations were found to be both uncomfortable and have effective wind gust speeds greater than the 31 mph BRA criteria in the Approved Development Plan. Four of these locations (sensors 84, 87, 88 and 89) are located on private landscaped areas within the Prudential Center grounds. Location 84 is located between the Fairfield and Boylston residential buildings within an open courtyard adjacent to Saks Fifth Avenue. Locations 88 and 89 are in South Garden west of the Huntington Arcade.

Location 40, located on a public sidewalk in the northeast quadrant of the intersection of Huntington Avenue and Exeter Street, was estimated to have uncomfortable conditions on an annual basis.

These conditions are not unexpected within the multi-tower Prudential Center grounds. The 26 acre area is dominated by 8 buildings greater than 20 stories and a streetscape and pedestrian environment typical of an urban setting with extensive open areas and few large trees.

Despite the urban conditions and scale of the project area, the majority of studied locations (70 percent) experienced conditions generally suitable for walking or standing, consistent with long-standing uses of these public and private pedestrian spaces. An additional 20 percent of the locations were expected to have even lower wind speeds and were estimated to be comfortable for sitting. A total of 9 locations of the 89 studied were expected to have uncomfortable conditions at least 1 percent of the year.

Proposed Program

In the Proposed Program, the pedestrian level wind conditions remained essentially unchanged over the project area when compared with the Approved Development Plan. **Figure 6-4** depicts the proposed conditions in relation to the BRA comfort categories. As expected in an urbanized area with numerous high-rise buildings, there are some locations in the study area that will experience increased modeled wind speeds. Other areas are predicted to have reduced wind speeds and generally improved conditions. Overall, the proposed project will not significantly affect pedestrian level winds in the vicinity of the project.

Greater than 94 percent of the locations studied are expected to experience a modeled change in wind speed of less that 2 mph. It is unlikely that most individuals could perceive a change of less than 2 mph, whether an increase or decrease. Accordingly, for the purposes of this study, we treat these locations as unchanged.

When comparing the Approved Development Plan and the Proposed Program, 78 locations (88 percent) were unchanged, 5 locations (6 percent) were expected to have an increase in pedestrian level winds and 6 locations (7 percent) were expected to experience a decrease in annual winds. Pedestrian level winds within the public and private pedestrian spaces within the Prudential Center remained the same or improved slightly. The dangerous condition predicted at location 87 under the Approved Development Plan was expected to experience a 4 mph decrease in annual wind speed and a 5 mph decrease in the effective gust speed thereby eliminating the dangerous condition at this location. Other locations within the center which were expected to improve include a group of 5 locations near the base on the Fairfield and Boylston residential buildings. These locations (81, 82, 84, 86, and 87) are expected to experience an average decrease of approximately 3 mph annual wind speed and effective gust speed, improving the pedestrian wind speed conditions in this area.

Two locations (7 and 16) are expected to experienced increases of 3 mph annually but will remain were expected to have relatively low pedestrian wind speeds and remained comfortable for walking or sitting respectively. Locations 30, 77 and 79 will experience more moderate increases of 4 to 8 mph annually and will fall within the BRA's uncomfortable category. Locations 77 and 79 are expected to have annual wind speeds of 21 and 22 mph respectively, slightly exceeding the upper threshold for the "comfortable for walking" category. Location 30 is expected to experience wind speeds of approximately 24 mph or greater for only 1 percent of the year. Location 30 is also expected to exceed the BRA Effective Gust Criteria by 3 mph. This location is on the sidewalk in the south east corner of the intersection of Blagden and Exeter Streets on the opposite corner from the proposed Exeter Residences. The predicted conditions, while statistically an increase from the Approved Development Plan, are similar to those predicted to occur at location 40 under all study conditions. Both of these windier conditions – which are predicted to occur only 1 percent of the year – are on the eastern sidewalk on the short block between Huntington and Blagden Streets. The western sidewalk, adjacent to the proposed Exeter Residences will experience consistently slower wind speeds and will have an average annual wind speed of only 13 mph, thereby providing pedestrians with a less windy choice for walking on Exeter Street.

Mitigation

The proposed project will have a minor influence on pedestrian level winds in the public and private spaces near the site. The urban nature of the site and the presence of numerous tall buildings contribute to a moderately windy pedestrian environment, an environment that would be present even if the project were not constructed. While overall the project will have no discernable negative effect on the pedestrian wind environment, there are five specific locations of the 89 tested (6 percent) that are expected to have any increase in wind speed of 3 to 8 mph. Locations 7 and 16 will remain comfortable for sitting or standing, consistent with existing and planned pedestrian uses in these areas and do not require mitigation. Locations 77 and 79, located within the public plaza north of the Gloucester residential building are expected to experience wind speeds that just exceed the BRA's comfortable for walking criteria. Potential mitigation for this area may include appropriately-sized landscape elements designed to intercept pedestrian level winds and/or additional potted trees. While it may be desirable to reduce the project's effect on this small area, these slightly windy areas are not uncommon or unexpected within the urbanized Prudential Center project area. The predicted annual wind speeds of 21 and 22 mph are consistent with existing annual wind speeds on these upper level landscaped areas and are not expected to negatively influence pedestrian use of these areas.

The predicted annual wind speeds at Location 30 is approximately 24 mph, the approximate midpoint of this comfort category. This potentially uncomfortable condition is expected to occur during the spring, winter and fall seasons. This pedestrian level wind condition is also consistent with the project's urban setting and existing conditions in the project area. This predicted change in wind speed is not expected to alter pedestrian use of the Exeter Street sidewalk. Potential mitigation measures considered to reduce wind speeds on windy days include the installation of additional street trees, canopies and encouraging pedestrians to use the western, less windy sidewalk.

The proponent will continue to investigate potential measures to improve the pedestrian level wind conditions in this area during the final design phase of the project in consultation with the Boston Environment Department and the BRA, as appropriate.

6.2 Shadow Analysis

Regulatory Context

As required by Section 80B-2 of the City of Boston Zoning Code for Large Project review, the Proponent has anticipated the need to complete a shadow study to ascertain the potential new shadow impacts resulting from the project. This study has particular emphasis on sidewalks, parks and other public open spaces. As contemplated by Section 80B2 (b) of the code, the shadow study for the project compares the Proposed Program and Approved Development Plan conditions.

Methodology

The following shadow study has been prepared using methodologies consistent with accepted practices for such studies completed under Article 80 review. The analysis provides a comparison of the Approved Development Plan and Proposed Program conditions. This is accomplished by using a three-dimensional CAD model of the project area using data provided by the BRA, updated as necessary to include recently completed projects and in the case of the Approved Development Plan and Proposed Program conditions, to include any approved projects within the study area. As there are no planned mid or high rise developments within the several blocks in the Project, existing conditions are considered equivalent to the Approved Development Plan condition for the purposes of this study. The study was completed using standard sun altitude and azimuth data for each study date estimated to occur at latitude and longitude 42.36°N, 71.06°W (Table 5-1) according to Appendix 6 of BRA Development Guidelines.

Table 6-2 Azimuth and Altitude Data

Date	Local Time	Solar Position	
		Altitude	Azimuth
March 21	9:00 AM	33.0	125.7
(Eastern Standard Time)	12:00 PM	48.0	-176.9
	3:00 PM	30.5	-121.8
June 21	9:00 AM	39.9	93.5
(Daylight Savings Time)	12:00 PM	68.8	149.4
	3:00 PM	56.5	-113.7
	6:00 PM	23.9	-79.3
September 21	9:00 AM	25.9	115.3
(Daylight Savings Time)	12:00 PM	47.4	166.0
	3:00 PM	37.4	-132.9
	6:00 PM	7.3	-96.0

December 21	9:00 AM	14.2	141.9
(Eastern Standard Time)	12:00 PM	24.1	-175.6
	3:00 PM	10.0	-135.1

Times were adjusted for daylight savings time as appropriate. The Approved Development Plan and Proposed Program conditions were compared for the spring and fall equinoxes and the summer and winter solstices as required by the BRA. Shadows were estimated for each study date at 9 AM, 12 Noon, and 3 PM and at 6pm for the June 21 and September 21 dates. After review of the results of this (standard) study, an additional investigation of the morning hours on December 21 were completed to quantify the duration of a small shadow cast towards Commonwealth Avenue.

Existing and Approved Development Plan Conditions

The following section describes the estimated shadows under the Existing and Approved Development Plan conditions. Following this description is a summary of the estimated changes in the project area shadows caused by each element of the project.

March 21

March 21 is the vernal equinox, when the length of daytime and nighttime are equal. Eastern Standard Time is in effect. The sun rises at 5:46 AM in the south-southeast. At 9 AM, most north and west-facing sidewalks remain in shadow along with most of Boylston Street. The only consistent exceptions are several small gaps along the south facing sidewalks on Boylston Street. These conditions create a variable experience for pedestrians in the study area. Pedestrians walking along Boylston Street have the opportunity to seek out small sun-lit areas but the dominate condition is walking in shadows cast by low and high-rise buildings to the south and east of the Boylston Street corridor. Pedestrians on Newbury, Exeter, Fairfield and Gloucester Streets have the choice of seeking the sunny side of the street along these corridors. These conditions are typical of an urban environment in the early spring and are to some degree standard across the Back Bay due to the common street pattern.

At noon on March 21, the sun has shifted to the south and a more consistent pattern of shadows in the study area emerges. With the exception of shadows cast by existing high-rise buildings in the project area, all of the south and east sidewalks are in shadow and all of the north and west sidewalks are in full sunlight.

At 3 PM, the sun has shifted to the southwest more in line with the geometry of the Back Bay street network minimizing shadows cast on sidewalks and other public spaces within the study area. The existing high-rise buildings in the area continue to cast shadows on nearby sidewalks but overall this is the sunniest part of the day in the project area on March 21.

The sun sets on this date at approximately 5:58 PM, placing the entire study area in shadows shortly before the 6 PM study time.

June 21

June 21 is the vernal equinox, the first day of summer and has the longest day of the year. The sun rises at 5:08 AM and sets at 8:25 PM; Eastern Daylight Savings Time is in effect.

At 9 AM, the sun is in the eastern sky and has been up for almost four (4) hours. As expected, all south-facing sidewalks in the study area are in full sun and only rarely do even the high-rise buildings cast shadows that extend beyond their immediate vicinity.

At 12 Noon, the sun is at its annual zenith. North-facing sidewalks are still partially within existing shadows cast by adjacent buildings throughout the neighborhood. At this time of year, some pedestrians will be seeking shade from the sun while others will actively seek the full sun.

At 3 PM, the sun has moved to the southwest and shadows in the Back Bay are at their annual minimum due to the high sun angle and the orientation of the street network. Even the high-rise buildings in the vicinity of the project site cast relatively small shadows the generally remain on-site.

At 6 PM, the sun has moved lower in the western sky and south-facing sidewalks are uniformly shaded. Pedestrians continue to have the choice of walking in shade or on the sunny side of the street.

September 21

September 21 is the autumnal equinox; Eastern Daylight Savings Time is in effect. Under the Approved Development Plan condition, on this date, nearly all of the sidewalks and public spaces in the vicinity of the project are shaded during the 9 AM and 6 PM study times. These shadows along both sides of Boylston Street are cast in large measure by the existing mid and high rise buildings located southeast of Boylston Street (i.e. the Hynes Convention Center, the Prudential Center complex, the Lenox Hotel and Boston Public Library.) Shadows cast on the adjacent street network to the northeast (Newbury, Exeter, Fairfield and Gloucester Streets and the inbound side of Commonwealth Avenue) are cast by the adjacent low-rise buildings that make up the dominant architecture in this section of the back bay. With very few exceptions near street intersections, the pedestrian experience in this section of the Back Bay is one of walking in shadow at 9 AM and 6 PM.

At noon, the sun is predictably higher in the sky and has shifted further to the south generally reducing the extent of shadows in this area of the Back Bay to the southern side of the street. The northern sidewalks are, with the exception of parts of Boylston Street in full sun. The existing mid and high-rise buildings in the vicinity of the project site cast distinctive shadows limited to adjacent sidewalks.

At 3 PM, the sun has moved to the southwest but the dominant shadows remain on the north facing sidewalks placing them partially in the shade of the adjacent buildings. At this hour, the aforementioned distinctive shadows cast by the mid and high rise buildings south of Boylston Street no longer shade the northern sidewalks but continue to shade the adjacent southern sidewalks.

By 6 PM on September 21, nearly all of the sidewalks in the project area are in shadow as the sun sets at 6:44 PM.

December 21

On December 21st, the sun is relatively low in the southern sky throughout the day and even at noon, most public spaces and sidewalks within the study area are in full shadow including almost all of the Commonwealth Avenue green space. The only consistent exception throughout the day is the south-facing sidewalk on Commonwealth Avenue where approximately 50 percent of the sidewalk is in full sun at 12 Noon.

At noon, and 3 PM, most of the south-facing sidewalk of Commonwealth Avenue is in full sun but as stated above, the remainder of the study area sidewalk is in shadow. By 6 PM on December 21, the sun has set.

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Potential Effects – Exeter Residences

The following sections describe the anticipated net new shadows cast by the proposed Exeter Residences building.

March 21

On March 21, Exeter Residence Building is expected to shade a small section of the Boylston Street sidewalk. The majority of the area sidewalks are already shaded under the Existing and Approved Development conditions. This change is therefore minor and is not expected to affect pedestrian activity.

At 12 noon, Exeter Residences will cast new shadows towards the southeast corner of the Boylston / Exeter Street intersection filling in the existing shadows cast by the Lenox Hotel and the Boston Public Library. While the new shadows will cover most of the remaining sunlit Exeter Street sidewalk adjacent to the Boston Public Library, the duration of this shadow is expected to be brief. As the sun moves further to the west, any shadows cast by Exeter Residences will be subsumed by those cast by the existing mid and high rise buildings at the project site and the Library. At no time on this date do any shadows cast by Exeter Residences strike the Library courtyard in the historic portion of the building.

At 3 PM, the project casts no new shadows in the vicinity and by 6 PM the sun has set.

June 21

On June 21 at 9 AM, Exeter Residences casts a shadow that extends across the Prudential Center plaza to the west and is expected to create two small slivers of new shadow on the west side of Ring Road as it passes through the Prudential Center plaza. These two small slivers of shadow will be barely noticeable on this date.

At 12 Noon, the Exeter Residences shadows have moved to the northwest, parallel to the Back Bay cross streets. As such, most of the Exeter Residences' shadow is cast on the lower floors of the adjacent Lenox Hotel and the hotel's back alleys. These shadows will have no measurable effect on pedestrians if they are even noticed.

By 3 PM, the sun has moved to the southwest parallel to the Back Bay Street network and shadows in the project area are nearly non-existent. One notable exception is the new shadows cast by Exeter Residences eastward down Blagden Street. These shadows will extend approximately 100 feet along the sidewalks at the rear of the Boston Public Library's Johnson Building and the sidewalk behind One Trinity Place (25 Huntington Avenue). This new shadow will fall within a minor pedestrian thoroughfare on the longest day of the year. At the time these shadows are cast, there will be virtually no shade in the vicinity of the project. This small addition of shadow on Blagden Street may actually add to pedestrian enjoyment by providing a small respite from the sun on this longest day of the year.

At 6 PM on June 21, the sun is relatively low in the western sky and, as typical in this urban setting, most sidewalks are partially or fully shaded. Exeter Residences will cast new shadows to the east, filling in gaps in the south east corner of the Exeter/Blagden Street intersection and near the entrance to the Westin/Copley Hotel. This sidewalk adjacent to the hotel is dominated by the hotel entrance and exit and because of its location is difficult to access for most pedestrians and is used considerably less than nearby sidewalks. At 6 PM on June 21, these new shadows are not expected to have any measurable effect on pedestrian activity.

September 21

On September 21, the proposed Exeter Residences building creates a small amount of new shadow at the 9AM, 12 Noon and 3 PM study times. However, these new shadows add a small incremental amount of shade to areas already heavily shaded by the adjacent buildings.

At 9 AM, Exeter Residences will cast a small area of new shadow on the sidewalk along Boylston Street. This new shadow will close a small gap in the wall of shadows cast by the existing high and low-rise buildings south and east of Boylston Street. This minor change is not expected to have any appreciable effect on the pedestrian use of Boylston Street. The small areas of sunlit sidewalk along Boylston Street – in either the Approved Development Plan or Proposed Program condition - are too infrequent to have a strong influence on pedestrian activity.

At 12 Noon, Exeter Residences will result in a marginal increase in the amount of shadow on the Exeter Street sidewalks between Huntington Avenue and Boylston Street. However, as with the small changes at 9 AM, this new shadow will merely extend existing shadows cast under the Approved Development Plan condition. In this case, the shadows will occur within the narrow Exeter Street corridor between the Lenox Hotel and the Boston Public Library. No new shadows will be cast on the sidewalks adjacent to the Library.

At 3 PM on September 21, the sun has moved to the southwest and Exeter Residences casts a narrow shadow to the northeast. This shadow falls on a short (approximately 75 foot) section of the west-facing sidewalk adjacent to the Boston Public Library. At this time of day, all of the sidewalks around the Library and those adjacent to the Lenox are in shadows cast by existing buildings. While the Exeter Street corridor is a popular east-west pedestrian route, there are few activities on this sidewalk and its primary function is that of a point of access between Boylston Street and Huntington Avenue. This small change in the sun-shade conditions will not adversely affect pedestrians using these sidewalks.

By 6 PM, the sun is low in the western sky and all of the sidewalks in the study area are in full shade. The proposed Exeter Residences building does not cast any new shadows at this hour. The sun sets at 6:44 PM.

December 21

On December 21, the sun remains low in the sky and shadows are common throughout the Back Bay all day. At 9 AM, the Exeter Residences building and all of the existing nearby high-rise buildings cast shadows that reach westward beyond Commonwealth Avenue two blocks away. Most of this new shadow falls on roof-tops of the residential and commercial buildings between Boylston Street and Commonwealth Avenue. However, the wide expanse of the Commonwealth Avenue green space provides an opportunity for this new shadow to reach ground level. This new shadow is expected to shade a short section of sidewalk along Commonwealth Avenue. This new shadow will shade only a small section of this south-facing sidewalk for about an hour and is not expected to change the pedestrian experience because even under proposed conditions, greater than 80 percent of this block will remain in full sunlight. This small change is not expected to dissuade pedestrians from using this section of Commonwealth Avenue because it will remain the only consistently sunlit sidewalk in the area.

At 12 noon, the sun is nearly due south and all of the sidewalks between the project site and the inbound side of Commonwealth Avenue are in full shade. Exeter Residences will create a narrow band of new shadow adjacent to the western façade of the Boston Public Library extending the dominate shadows approximately 25 feet to the southeast.

At 3 PM, the sun has moved to the southwest and the entire study area is within shadows cast by existing buildings. As a result, Exeter Residences is not expected to create any new shadows. The sun sets on this date at 4:15.

Conclusions – Exeter Residences

The proposed construction of the Exeter Residences building will not create any new shadows that will adversely affect sidewalks or any other public spaces in the vicinity of the project. The relatively small new shadows expected to be cast by the Exeter Residences building will generally fill small gaps in existing area shadows or marginally expand existing shadows created in this dense urban area. Boston's Back Bay neighborhood, dominated by mid-rise buildings and adjacent to the "City's Spine" of high-rise building is an area of constantly changing sun and shadow shifting on an hourly, daily and seasonal basis. The minor changes predicted by this analysis are unlikely to be noticed by the typical pedestrian or casual observer. As a result, the proposed building will not have a measurable effect on pedestrian activities in the project area.

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Potential Effects – 888 Boylston

The following section describes the estimated shadows under the Approved Development Plan and the Proposed Program conditions for the 888 Boylston development and are shown on **Figures 6-5** thru **6-8**.

March 21

On March 21, the proposed expansion of 888 Boylston will create minor new shadows on the eastern and western sidewalks of Gloucester Street mid-block between Boylston and Newbury Streets at 9 AM. The project will fill in a small gap that remains in the existing shadows at the intersection of Gloucester Street and Public Alley No. 431. In addition, the building will create a sliver of new shadow at this hour on both the north and south-facing sidewalks of Boylston Street immediately in front of the project site. This sliver of new shadow also adds to an existing shadow cast by an adjacent high-rise building and is a very minor incremental increase in the dominant shadows present in the Boylston Street corridor at this hour.

At 12 noon, the project will similarly cast a small incremental shadow on the sidewalk on the opposite (south-facing) Boylston Street sidewalk, partially filling in an existing gap in the shadows present at that hour. It is important to note that in the Approved Development Plan condition; nearly the entire Boylston Street corridor from Hereford Street to Exeter Street is within the shadows of the existing low, mid and high-rise structures that dominate the vicinity.

At 3 PM on March 21, the sun has shifted to the southwest and most existing shadows coincide with Back Bay street network. Any shadows cast by the proposed 888 Boylston building will fall within the Prudential Center property and will not cast any new shadows on any publicly owned space or sidewalk.

The sun sets at 5:58 PM on March 21, placing the site in darkness by the 6 PM study hour.

June 21

On June 21, the sun traces it highest arc across the sky and results in the fewest shadows of the year in the project area. At 9 AM, 888 Boylston will cast a small shadow to the west across a sliver of Boylston Street near the Hynes Convention Center entrance and onto Boylston Street itself. However, these shadows do not impact the south-facing sidewalks across the street from the Hynes Convention Center.

At 12 noon, the sun is almost due south of the site and the building's new shadow extends to Boylston Street in a portion of the plaza in from of 888 Boylston.

At 3 PM, the proposed building will cast a small new shadow to the east, striking the existing Prudential Center entrance. However, this narrow shadow will be limited to the project site and will not shade any public space or sidewalk.

9am EST

12pm EST

3pm EST

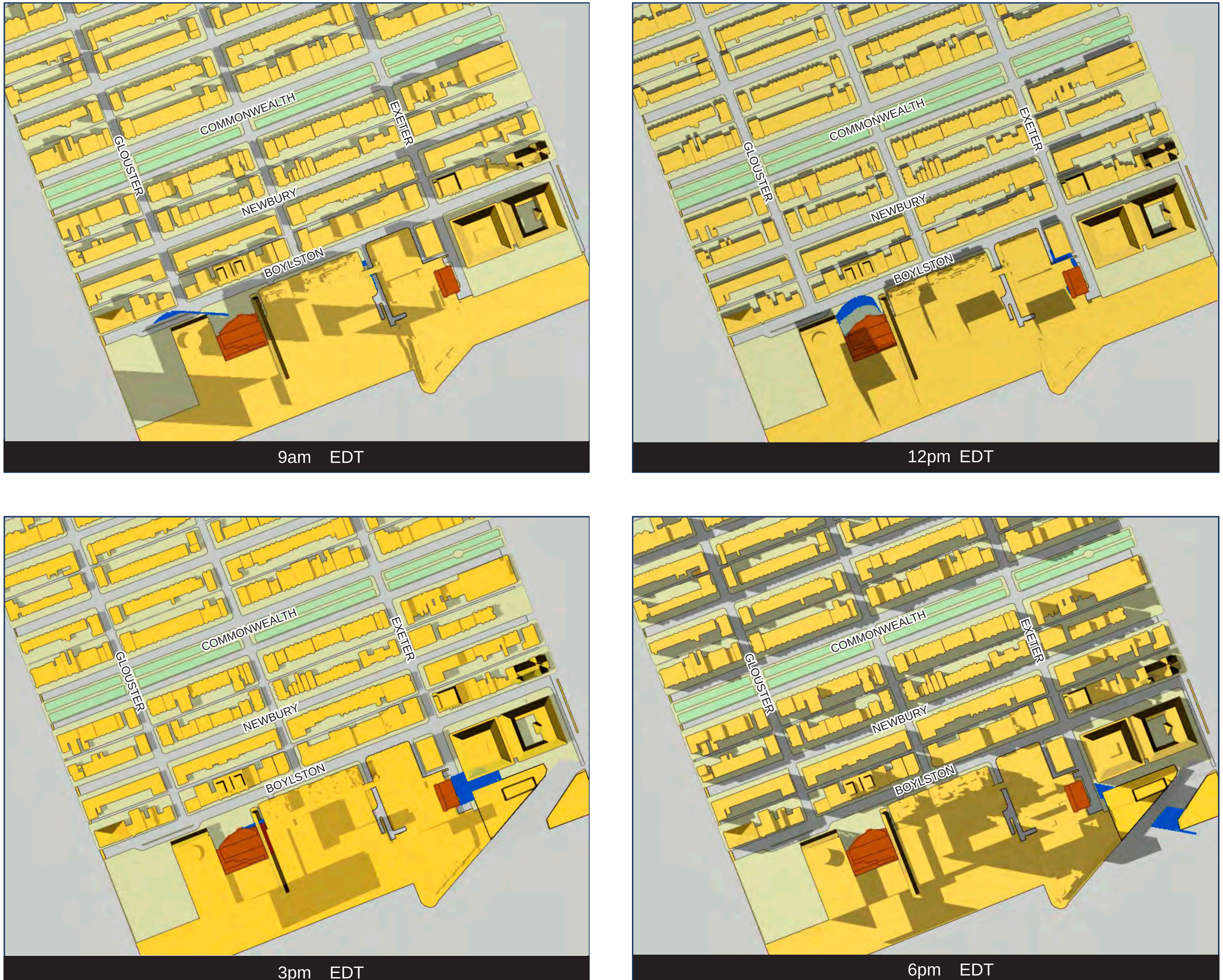
Sunset at 5:58pm EST

Legend

- Pavement
- Blocks
- Green Space
- Existing Buildings
- Existing Shadow
- Proposed Buildings
- Proposed Shadows

* 3d map provided by BRA

Figure 6-5
Shadow Study
March 21st



Legend

- Pavement
- Blocks
- Green Space
- Existing Buildings
- Existing Shadow
- Proposed Buildings
- Proposed Shadows

* 3d map provided by BRA

Figure 6-6

Shadow Study
June 21st

At 6 PM, the sun is low in the western sky and any shadows cast by the proposed building fall within the Prudential Center property and are subsumed by existing shadows. No new shadows are anticipated at this hour.

September 21

On September 21, 888 Boylston will cast new slivers of new shadows on sidewalks of other public areas during the 9 AM, 12 Noon and 3 PM study times. These shadows as shown on **Figure 6-7** will fill in minor gaps in existing shadow coverage or expand upon these shadows in extremely minor ways.

These new shadows on public sidewalks are so minor that can be identified only by the precision of the analysis and are unlikely to be noticed by even the most the observant of pedestrians and will not cause any change in public use of these spaces.

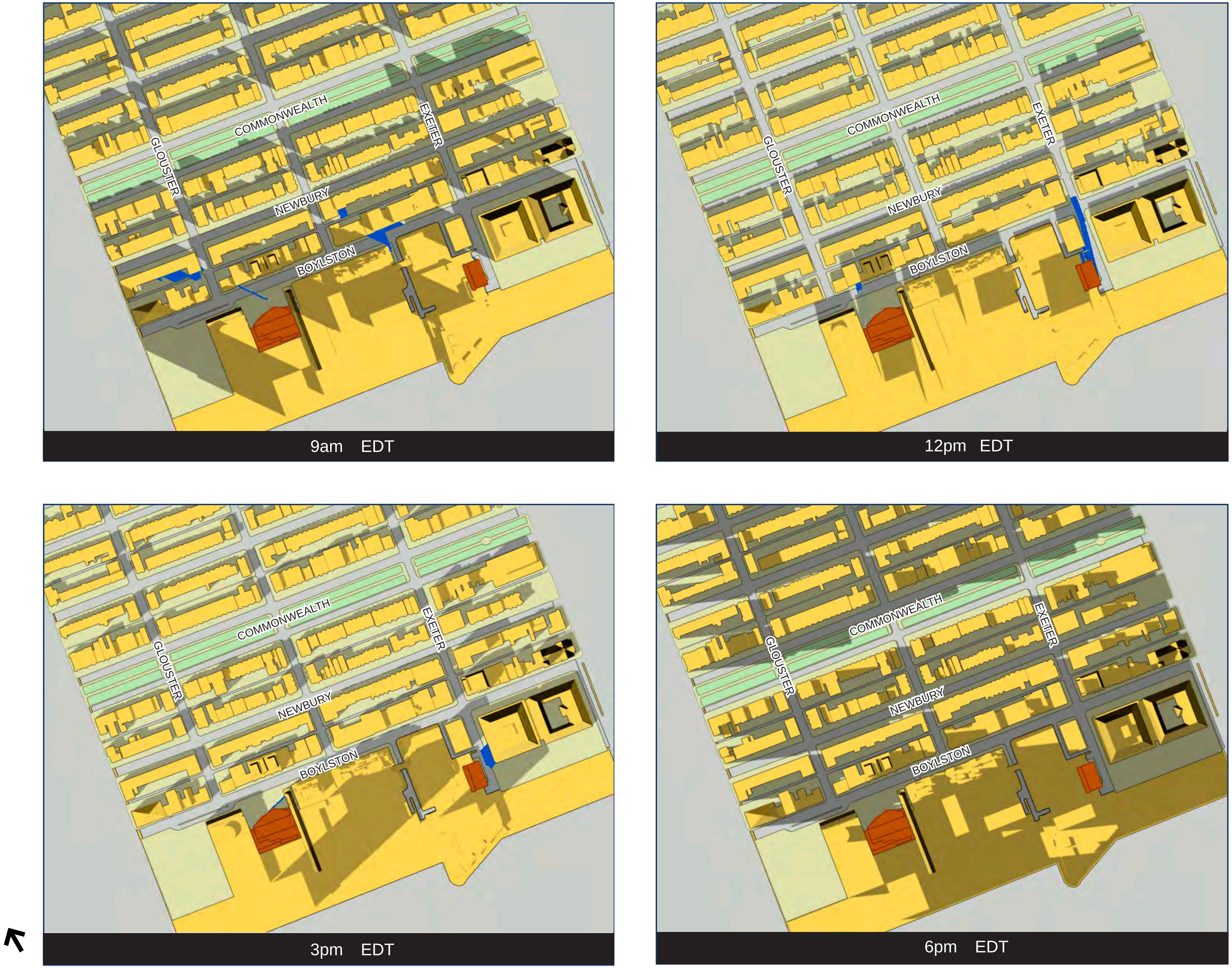
December 21

On December 21st, the proposed expansion of 888 Boylston will create one area of new shadow across the public space between the eastbound and westbound lanes of Commonwealth Avenue (**Figure 6-8**). The building will shade a small gap in existing shadows along this public space. However, a detailed analysis of the shadows created on this date indicates that the shadow will start at 8:28 AM, grow until 8:52 AM, and then recede by 9:35 AM for a total duration of 67 minutes. At the 9 AM study time in existing conditions, the remainder of this 7-block long public space lies with the shadows of the adjacent low-rise residential buildings and even this space at the eastern end of the Gloucester Street block is in the partial shade created by the large street trees which dominate the landscape. Accordingly, this brief new shadow is not expected to have any measurable effect on the public use of this space.

Conclusions – 888 Boylston

The proposed 888 Boylston building will create minor new shadows during each day modeled. In all cases, the shadows will fill in existing small gaps in the shadows created by the existing built environment or marginally expand on existing shadows.

As described above, at 9 AM on December 21, the proposed building will cast a new shadow across the width of Commonwealth Avenue, partially shading a section of the Commonwealth Avenue public space. Additional detailed modeling of this condition revealed that the shadow would be present for approximately 67 minutes at a time when greater than 95 percent of the Commonwealth Avenue public space is shaded under the Existing and Approved Development Plan conditions.

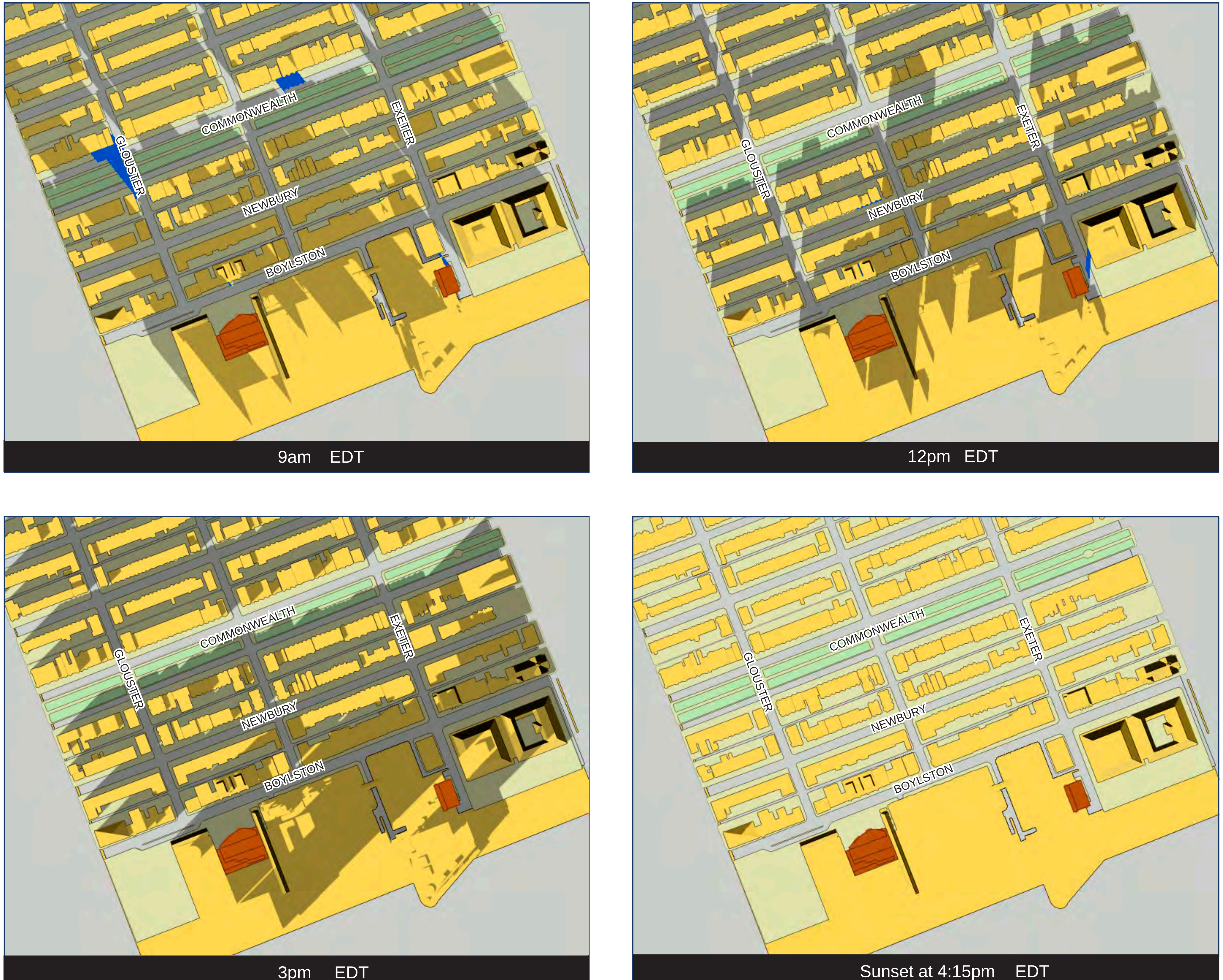


Legend

- Pavement
- Blocks
- Green Space
- Existing Buildings
- Existing Shadow
- Proposed Buildings
- Proposed Shadows

* 3d map provided by BRA

Figure 6-7
Shadow Study
September 21st



Legend

- Pavement
- Blocks
- Green Space
- Existing Buildings
- Existing Shadow
- Proposed Buildings
- Proposed Shadows

* 3d map provided by BRA

Figure 6-8
Shadow Study
December 21st

These minor and brief instances of new shadows created by the proposed building are not expected to have any measurable effect on the public use of these spaces. The Back Bay is a densely-developed urban neighborhood with a mixture of low, mid and high-rise buildings. The shadows created by this architectural mixture presently create a mosaic of sun and shade from Arlington Street to Massachusetts Avenue that change by the hour, day and season. The addition of the proposed building at 888 Boylston is consistent with the mixture of building sizes within the Boylston Street corridor and will only add to the existing shaded conditions at the margin. The minor changes are well below those that might be expected to result in a change in public use of open space or other pedestrian areas.

6.3 Daylight Analysis

The following section describes the project's anticipated effect on daylight obstruction at the site. The analysis was prepared using the BRA's Daylight Analysis Program and has been completed in accordance with the requirements of Article 80 of the City of Boston Zoning Code. The results of the analysis are presented in **Figure 6-9** and **6-10**.

Regulatory Context

Article 80, Section B(2)(c), Large Project Review – Environmental Component anticipates the potential need for a proponent to describe the percentage of sky plane obstructed in the Approved Development Plan conditions.

Methodology

The proposed project was analyzed using the Boston Redevelopment Authority's Daylight Analysis Program (BRADA) comparing the existing and proposed conditions. This section provides a description of the methodology used for the analysis.

BRADA Software

The BRADA[1] program was developed in 1985 by the Massachusetts Institute of Technology to estimate the pedestrian's view of the sky plane taking into account the massing and building materials used. The software approximates a pedestrian's view of a site based on input parameters such as: location of viewpoint, length and

▼

[1] Boston Redevelopment Authority Daylighting Analysis (BRADA) Software: Harvey Brian and Susan Stuebing, Massachusetts Institute of Technology, Cambridge, Massachusetts (1985).

height of buildings and the relative reflectivity of the building facades. The model typically uses the midpoint of an adjacent right-of-way or sidewalk as the analysis viewpoint. Based on these data, the model calculates the perceived sky plane obstruction and provides a simple graphic depicting the analysis conditions.

The model inputs used for the study presented in this PNF are based on site observations and an existing conditions survey prepared by Vanasse Hangen Brustlin, VHB and schematic design plans prepared by CBT and Elkus/Manfredi Architects, project architects. As described above, the BRADA software considers the relative reflectivity of building facades when calculating perceived daylight obstruction. Highly reflective materials are thought to reduce the perceived sky plane obstruction when compared to non-reflective materials. For the purposes of this study, the building facades are considered non-reflective, resulting in a conservative estimate of daylight obstruction.

Viewpoints

Two viewpoints were used for this daylight analysis:

- Exeter Street - located on the centerline of Exeter Street, centered on the façade of the proposed Exeter Residences.
- Boylston Street - located on the centerline of Boylston Street, centered on the façade of the proposed 888 Boylston.

Exeter Residences

Existing Condition / Approved Development Plan Conditions

Under the Existing and Approved Development Plan conditions, the sky plane from the Exeter Street study point is dominated by the existing massing of a portion of the Lord & Taylor building as well as the entrance to the existing Prudential Center parking garage. This view takes up approximately 21.9 percent of the sky plane when calculated by the BRADA program. **Figure 6-9** provides the percentage of sky plane obstructed under existing and Approved Development Plan scenarios.

Proposed Conditions

The proposed project, as viewed from the Exeter Street study point is currently dominated by the Lord & Taylor building and garage entrance which occupies approximately 21.9 percent of the sky plane. The establishment of a 30-story building at this location will increase the building’s massing and appearance from the centerline of Exeter Street by an additional 63.0 percent of the sky plane resulting in a total obstruction of 41.1 percent as calculated by the BRADA model. **Figure 6-9** summarizes the existing and proposed daylight conditions for the project.

888 Boylston

Existing Conditions / Approved Development Plan Conditions

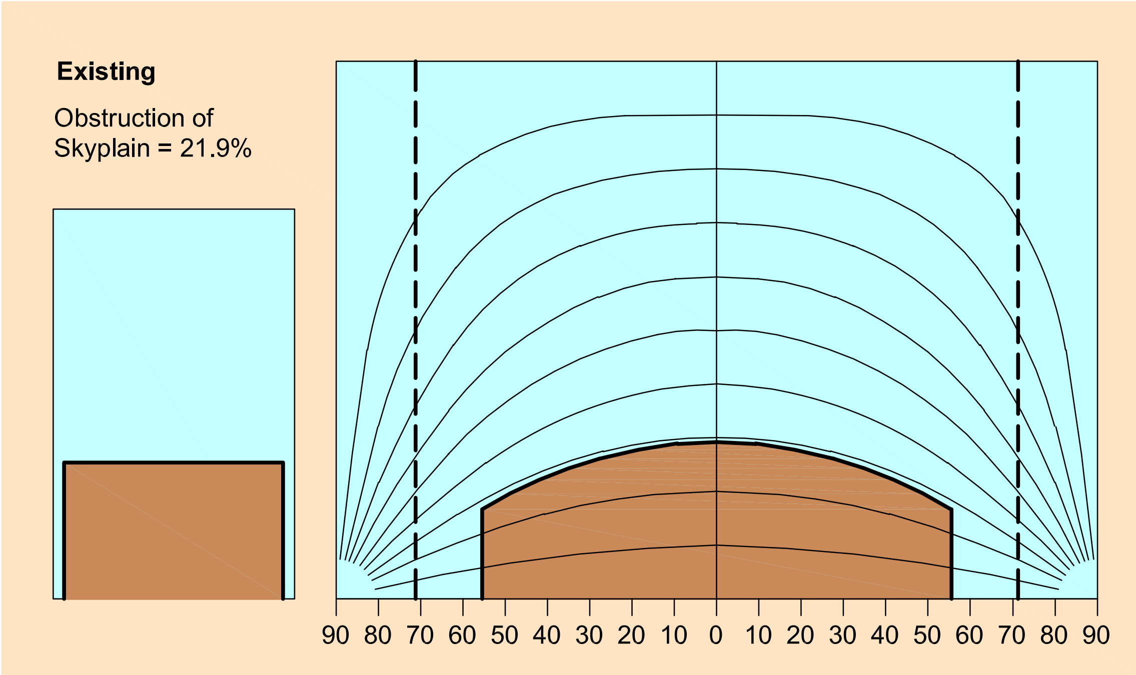
Under the previously approved development plan, 888 Boylston was approved for an 11-story building. Since this program is currently approved for construction, it is considered the existing and Approved Development Plan conditions. The sky plane from the Boylston Street study point is dominated by the existing massing of 11 stories of the 888 Boylston structure. This view takes up approximately 33.9 percent of the sky plane when calculated by the BRADA program. **Figure 6-10** provides the percentage of sky plane obstructed under existing and Approved Development Plan scenarios.

Proposed Conditions

The proposed project, as viewed from the Boylston Street study point is currently dominated by the currently approved 11-story building which occupies approximately 33.9 percent of the sky plane. The proposed addition of 8 stories to this structure will increase the building's massing and appearance by only a small amount when viewed from the centerline of Boylston Street. This change, when viewed from the centerline of Boylston Street will only obstruct an additional 5.6 percent of the sky plane resulting in a total obstruction of 39.5 percent as calculated by the BRADA model. **Figure 6-10** summarizes the existing and proposed daylight conditions for the project.

Conclusions

The proposed developments will alter the view of the sky plane from the adjacent streets and sidewalks. The effect from Exeter Residences project cannot be avoided because the project includes the addition of a 30 story building to an existing low-rise structure. The effect from the increased height of 888 Boylston from the previously approved plan is minimal. These changes will, of necessity, require a change in the view of the site and sky plane when viewed from the adjacent public streets and sidewalks.



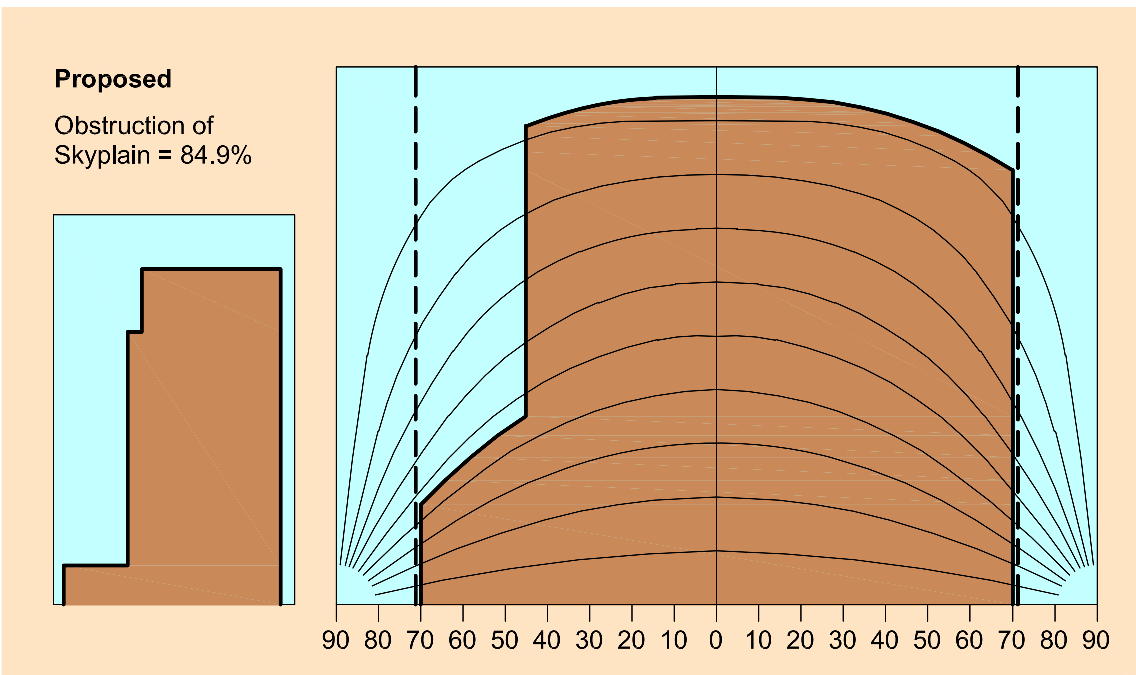
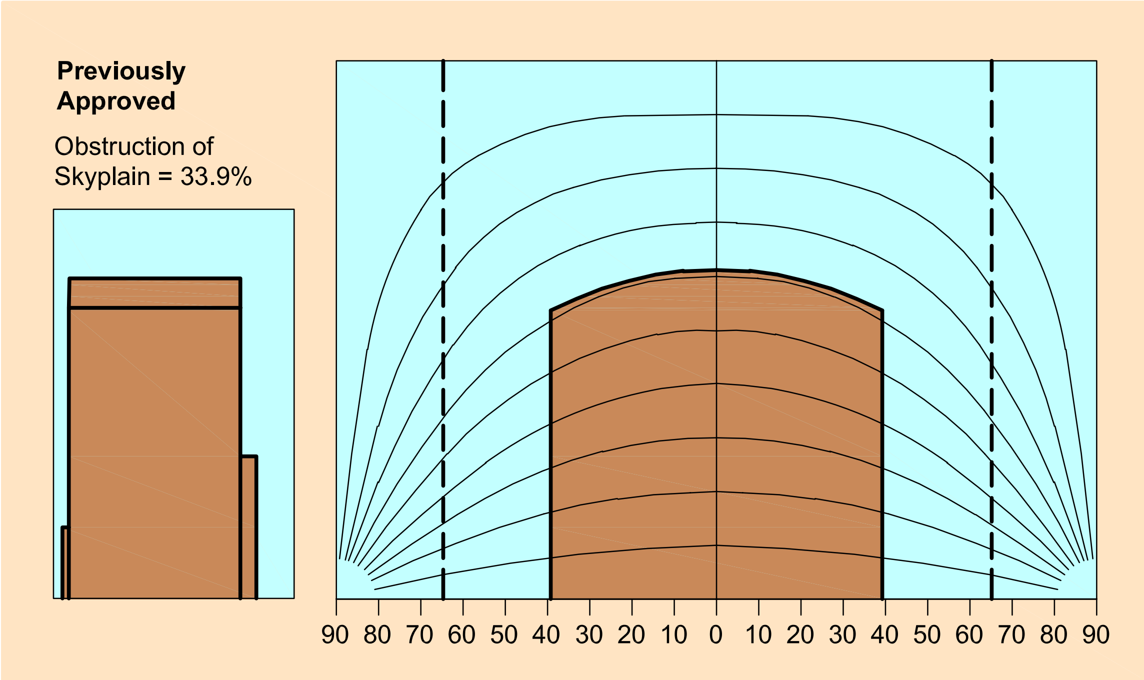


Figure 6-9

Boston Redevlopment Authority
Daylight Analysis
Center of Exeter Street



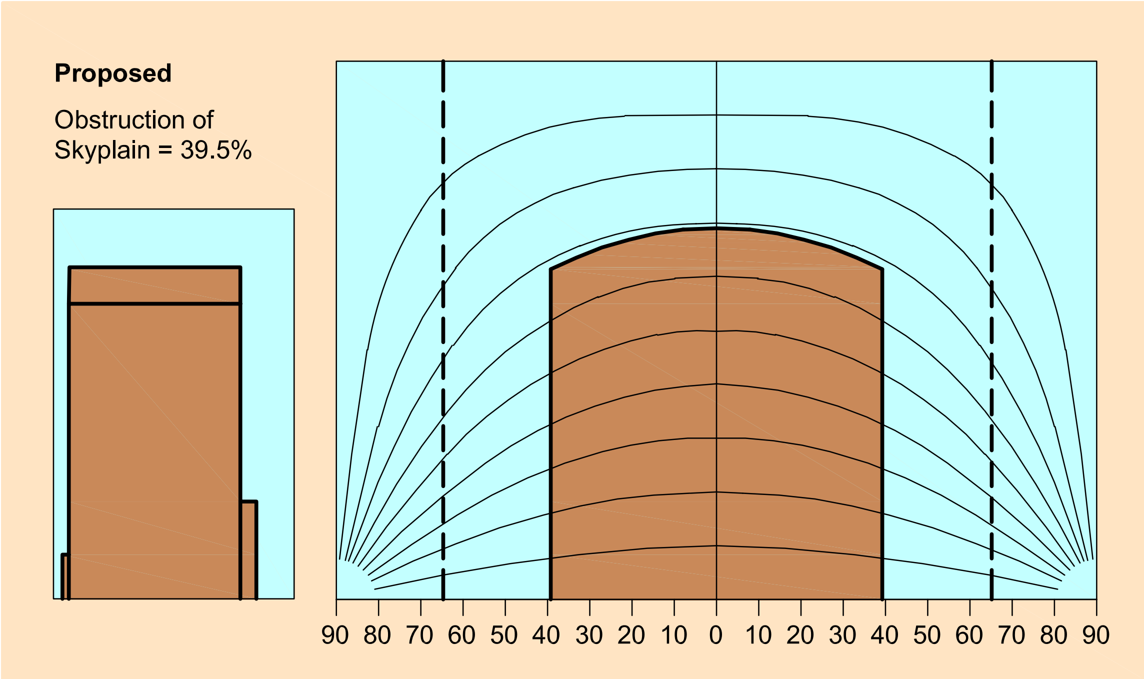


Figure 6-10

Boston Redevlopment Authority
Daylight Analysis
Center of Boylston Street

6.4 Solar Glare Analysis

Introduction

This section includes an assessment of the potential solar glare impacts from new program and mitigation strategies, if necessary, to offset potential heat gain and glare impacts. The Prudential Center Redevelopment FPIR/FEIR did not include a solar glare analysis. This analysis is being included to demonstrate conformance with the Article 80 review guidelines.

The proposed Exeter Residences building is primarily masonry building with residential scale fenestration that is expected to have a limited solar glare and heat gain effect on the surrounding buildings. Thus, the solar glare impacts typically associated with commercial glass curtainwall buildings are not anticipated.

888 Boylston is proposed to be a fully glazed building set back 77' from Boylston Street, and buffered from the street by street trees and plaza plantings. As a fully glazed building, there is a potential for glare and heat gain effects on neighboring streets and buildings.

Methodology

Utilizing a computer model of the Prudential Center and Back Bay downloaded from the BRA website, and a three dimensional computer model of the proposed building, the study team simulated sun angles for specific times of year and day then projected reflections off the proposed building. The proposed building was modeled as 100% reflective for the purposes of this study. The result of this study was then traced in Adobe Photoshop to insert colors and highlight the results for presentation purposes.

Study dates were as follows:

- Winter Solstice - December 21
- Spring Equinox - March 21
- Summer Solstice - June 21

Spring and Fall equinoxes were considered identical for the purposes of this study.

Study times for each date were as follows:

- 9am
- 12 noon
- 3pm

Note that Daylight Savings Time plays a part in this analysis. This study uses 2006 Daylight Savings Time hours and sun angles. Legislation signed into law in 2005 moves the start of Daylight Savings Time in 2007 from the beginning of April to the beginning of March. Thus the Spring Equinox will move from Standard Time to Daylight Savings Time and the sun will be somewhat lower at 9am and noon and somewhat higher at 3pm then what this study portrays.

Impact Analysis

March 21, 9am EST: While the sun is higher than on December 22, glare impacts are quite similar to December 22. **Figure 6-11** shows effects are restricted to the Prudential Center Arcade roof, the south face of the Mandarin Oriental Boston, and to north facing offices of the Prudential Tower. Issues and conclusions are identical to those described above under December 22, 9am EST.

March 21, 12 noon EST: Figure 6-12 identifies a small area of glare striking Boylston Street from the west elevation of 888 Boylston. The angle of incidence is almost at right angles to the direction of traffic, but this again points to the west elevation of 888 as potential glare problem.

March 21, 3pm EST: As indicated by **Figure 6-13**, shafts of reflected sunlight do strike Boylston Street at this date and hour. The one way traffic on Boylston Street will have their backs to the glare however. Notably, this study shows the north facing plaza in front of 888 Boylston benefiting from some rare reflected sunlight.

June 21, 9am EST: Sunlight reflecting off the facetted curve of the north elevation of 888 Boylston strikes Boylston Street and may be a factor to east-bound traffic. **Figure 6-14** shows the morning sun at a relatively low angle sending narrow bands of light onto the street. This figure highlights the importance of the plaza tree plantings to eliminating glare. Trees will be in full leaf well before June 21, and should address this issue. Other glare effects are to rooftops and to the Mandarin Oriental Boston, both addressed in earlier paragraphs.

June 21, 12 noon EST: The high angle of the sun at this date and time, as indicated in **Figure 6-15**, almost completely eliminate glare effects at this date and time.

June 21, 3pm EST: Significant shafts of reflected sunlight are shown in **Figure 6-16** striking Boylston Street. At this hour, these effects would not be expected to affect one-way traffic on Boylston Street, and plaza trees would in any case be expected to noticeably diminish the glare.

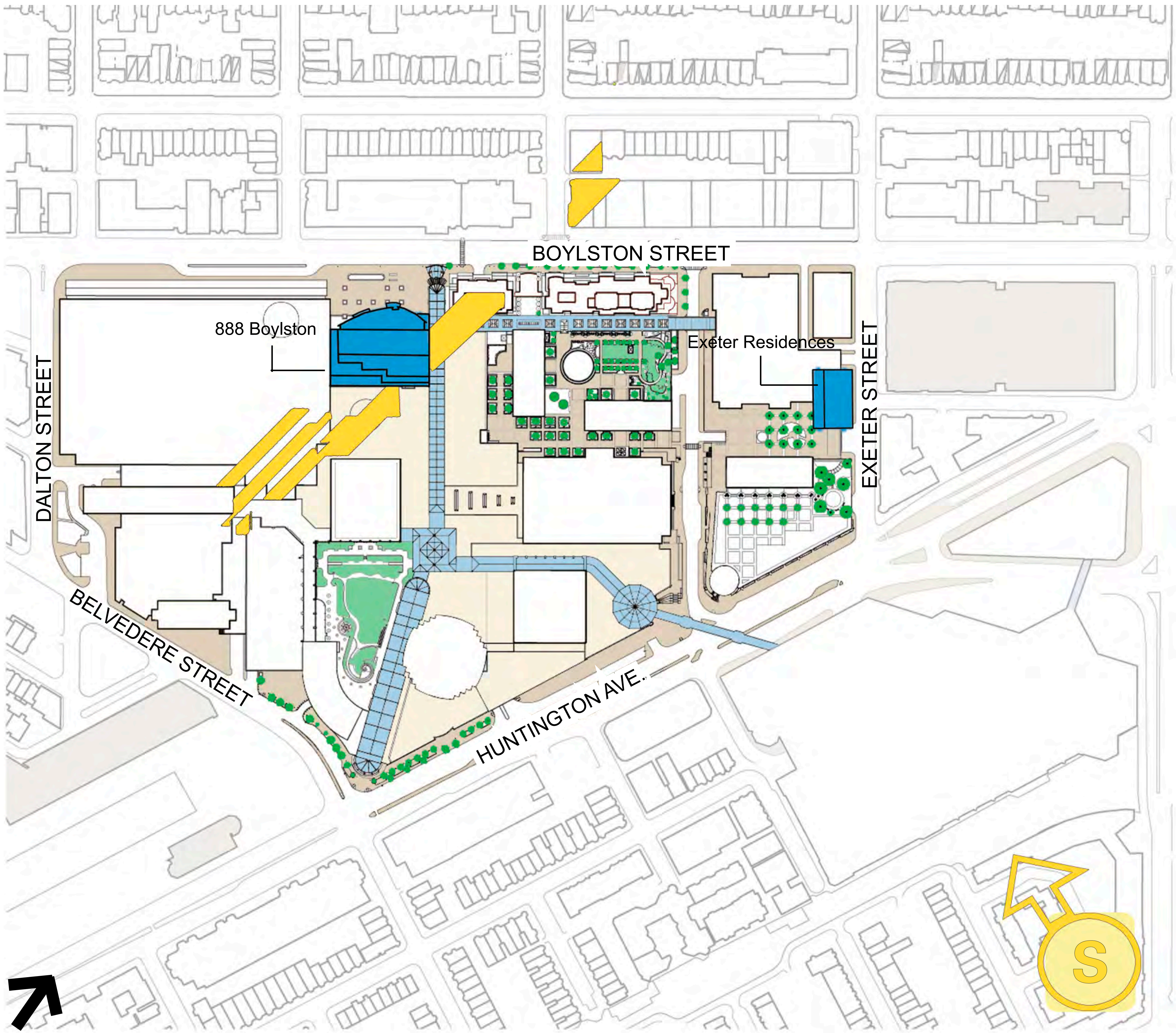
December 21, 9am EST: **Figure 6-17** shows low sun reflecting off the east face of 888 Boylston onto the skylights of the Prudential Center Arcade and the south wall of the

Mandarin Oriental Boston. There is no impact on Boylston Street at this date and time. Since temperatures at this time of year are low, any heat gain on neighboring buildings is likely to have a salutary effect and is not considered further in December. Glare effects through the glazed roof of the Arcade may result in some discomfort for shoppers walking south, though the low sun angle suggests that this would be quite minimal. The south elevation of the Mandarin Oriental Boston presents a solid wall with punched openings. Reflected sun will strike windows and doors otherwise fully shaded by the neighboring residential tower and may cause some residents to pull shades or blinds.

Sun also reflects off the south elevation of 888 Boylston, primarily striking the solid rooftops of neighboring buildings. A small number of Prudential Tower offices on the north side of the building will experience glare off 888 Boylston, and will likely require operable window treatments. The south elevation of 888 Boylston is stepped, putting some of it in shade and decreasing the effects slightly.

December 22, 12 noon EST: Figure 6-18 indicates a swath of reflected sunlight striking north face of the Prudential Tower, and again suggests that some tenants on the north side will all require adjustable window treatments. A small sliver of reflected light reflected off the west elevation of 888 Boylston also strikes the roof of the Hynes Convention Center and tiny segments of Newbury and Gloucester Streets. Since Newbury Street is one-way and traffic flows away from the glare, we do not anticipate safety concerns. On Gloucester Street, traffic will experience a flash of glare from 888 Boylston at this time of year and day. Although glare is evident on Gloucester Street on December 22 at 12 pm, the effects are minimized by two factors: First, Gloucester Street is already in full sun at that time of day. Second, the Hynes Convention Center blocks the glare directly at the intersection where maximum visibility is required by both pedestrians and motorists. None the less, for this reason the design team continues to explore architectural options that may prove beneficial in reducing or offsetting this glare.

December 22, 3pm EST: Figure 6-19 shows a number of narrow shafts of reflected sunlight effecting buildings on the north side of Boylston Street. The Hynes Convention Center effectively screens the street itself. To the east, the Ring Road is also effectively screened from glare effects by intervening buildings. The corner of Hereford and Boylston experiences a flash of sunlight, but Hereford is a one way street and traffic will have its back to the glare.

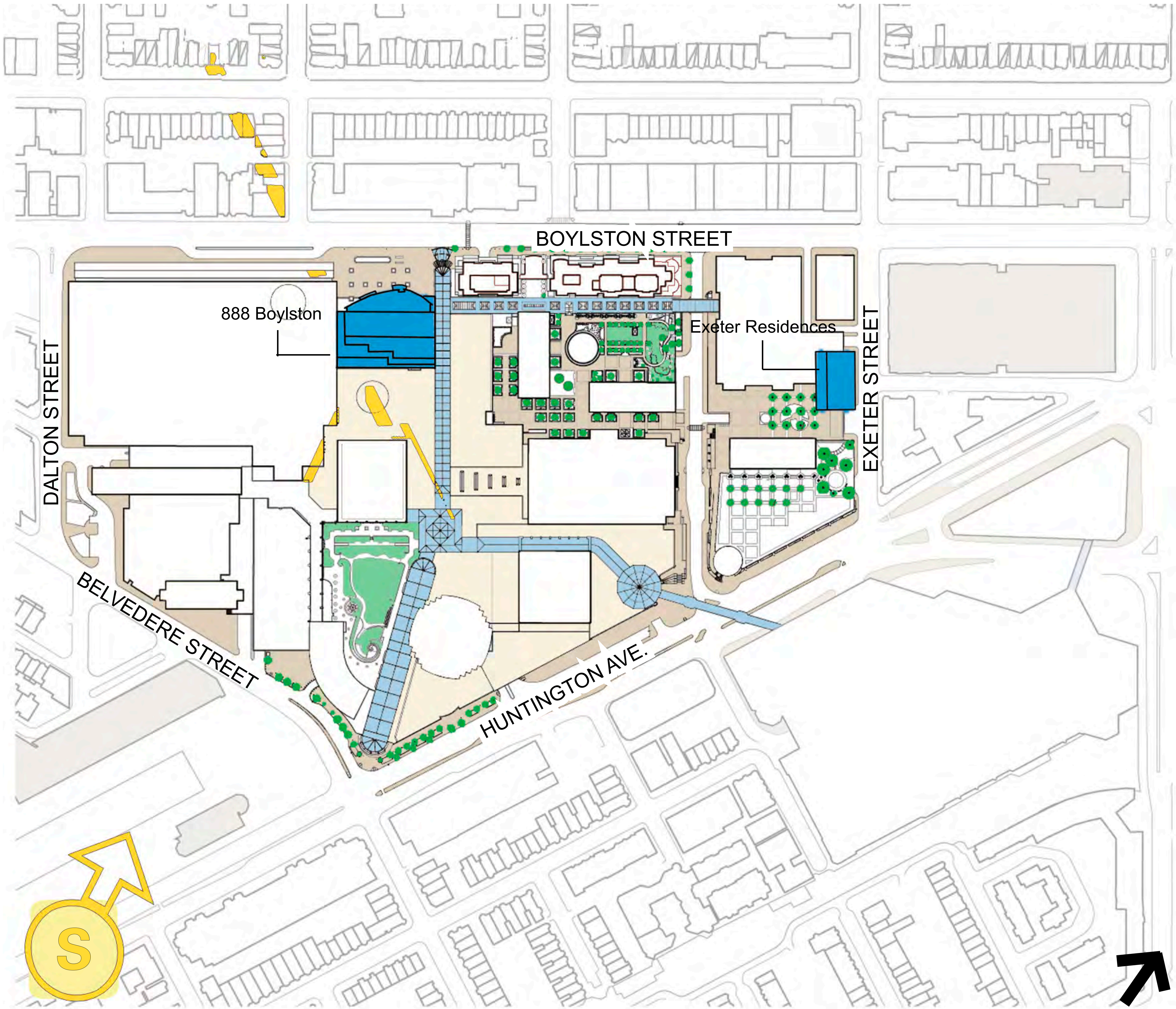


Legend

- Blocks
- Green Space
- Proposed Buildings
- Proposed Glare

Figure 6-11

Glare Study
March 21 9am

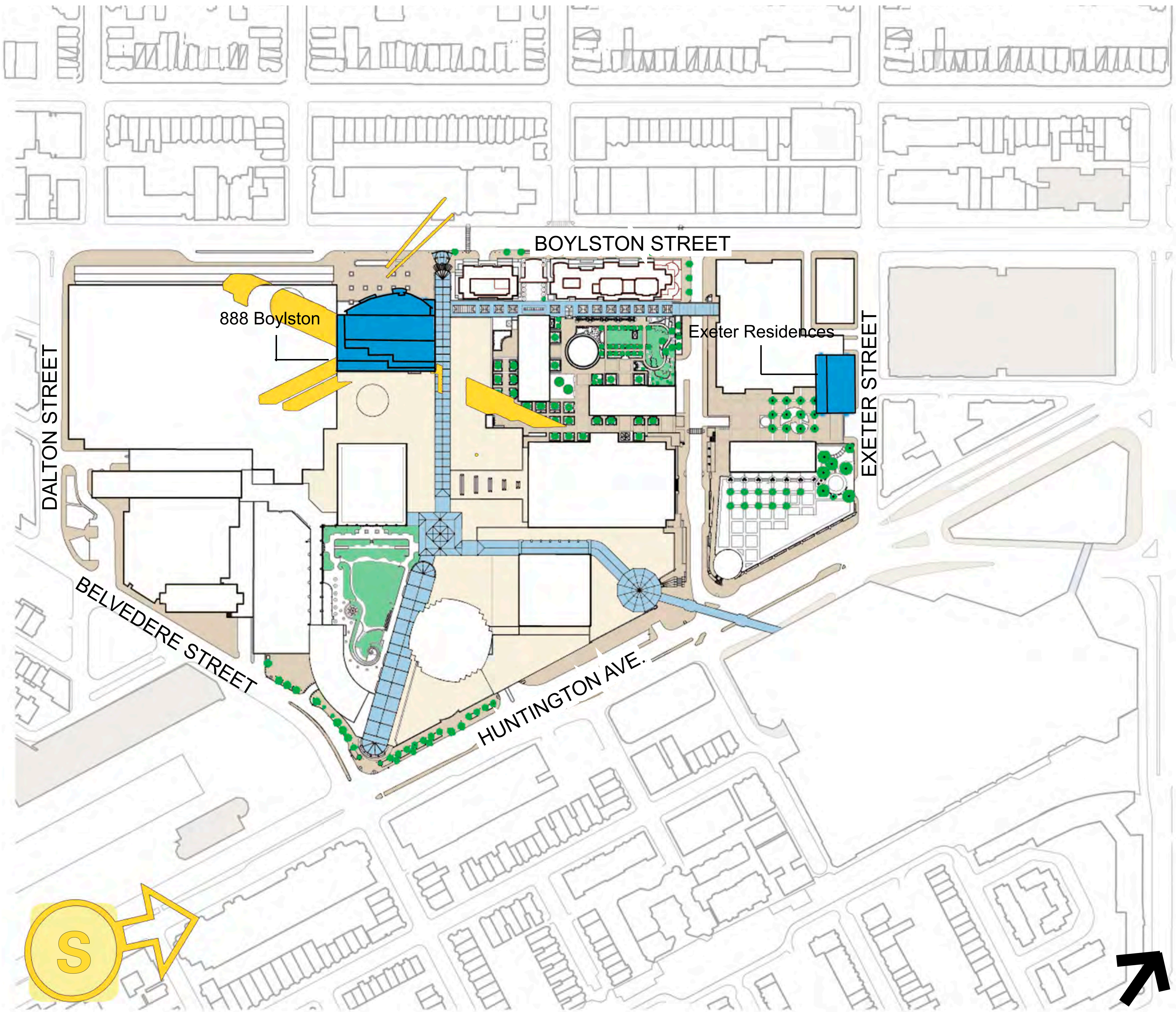


Legend

- Blocks
- Green Space
- Proposed Buildings
- Proposed Glare

Figure 6-12

Glare Study
March 21 12pm

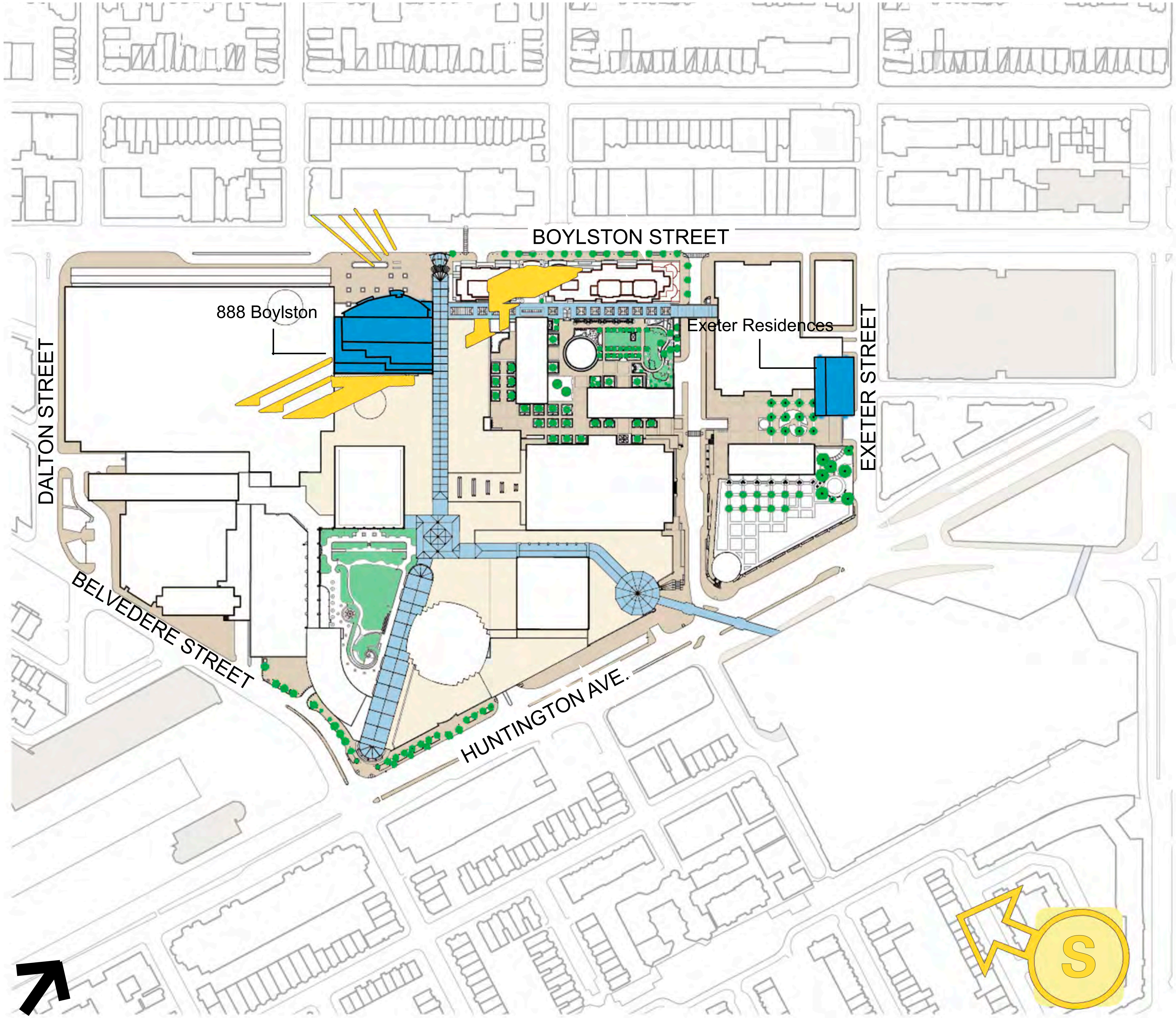


Legend

- Blocks
- Green Space
- Proposed Buildings
- Proposed Glare

Figure 6-13

Glare Study
March 21 3pm

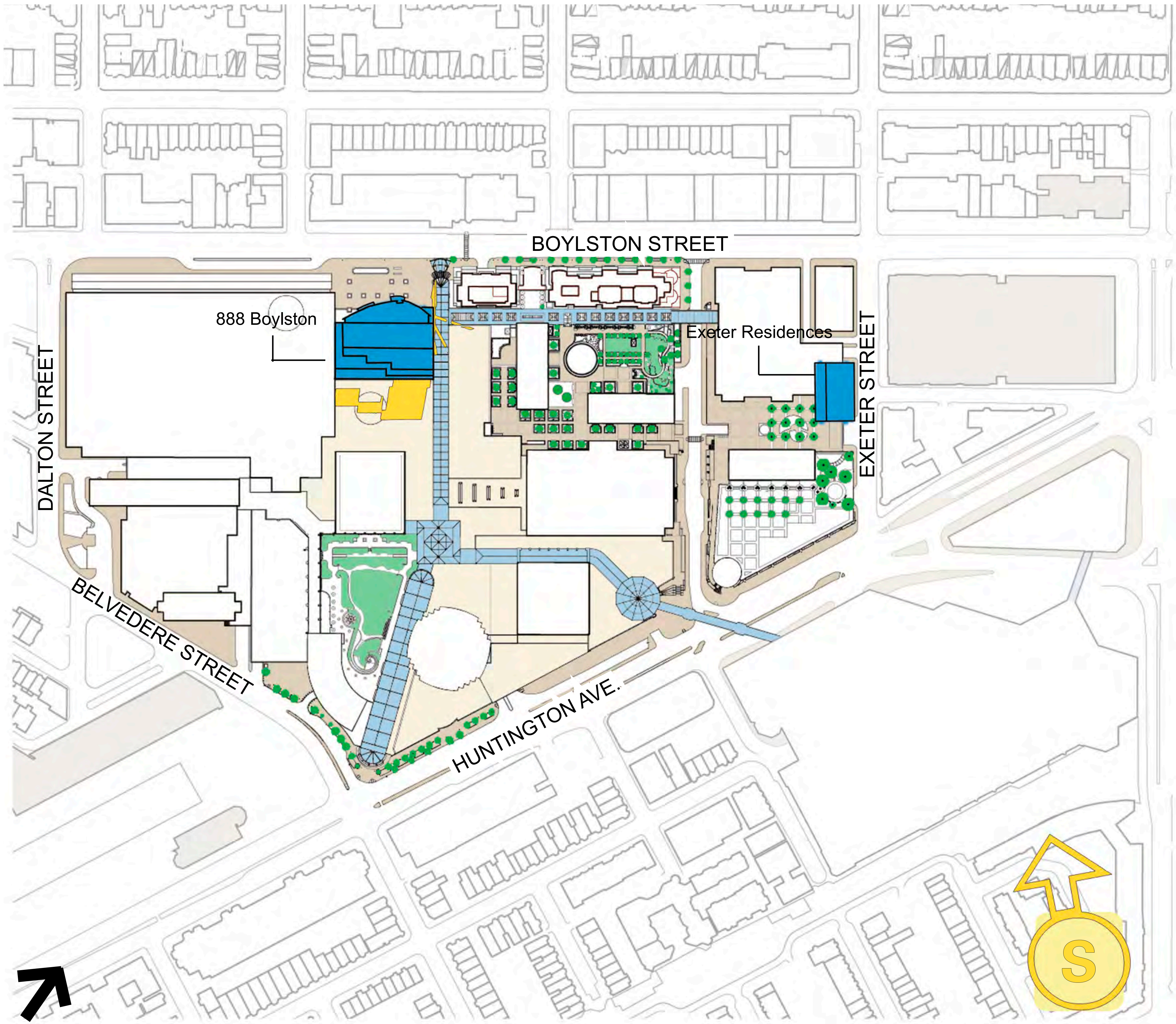


Legend

- Blocks
- Green Space
- Proposed Buildings
- Proposed Glare

Figure 6-14

Glare Study
June 21 9am

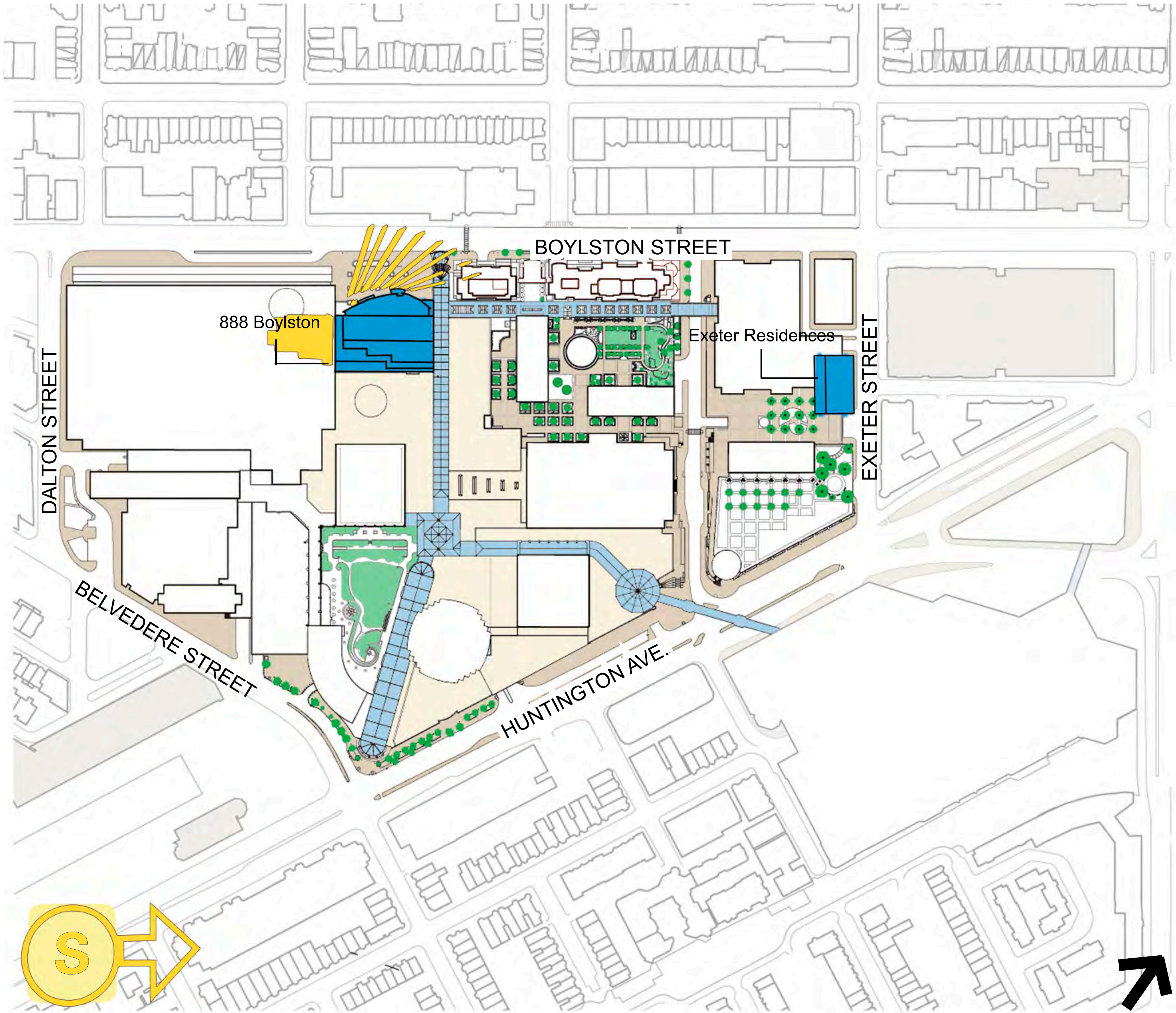


Legend

Blocks
Green Space
Proposed Buildings
Proposed Glare

Figure 6-15

Glare Study
June 21 12pm



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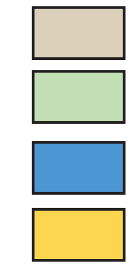
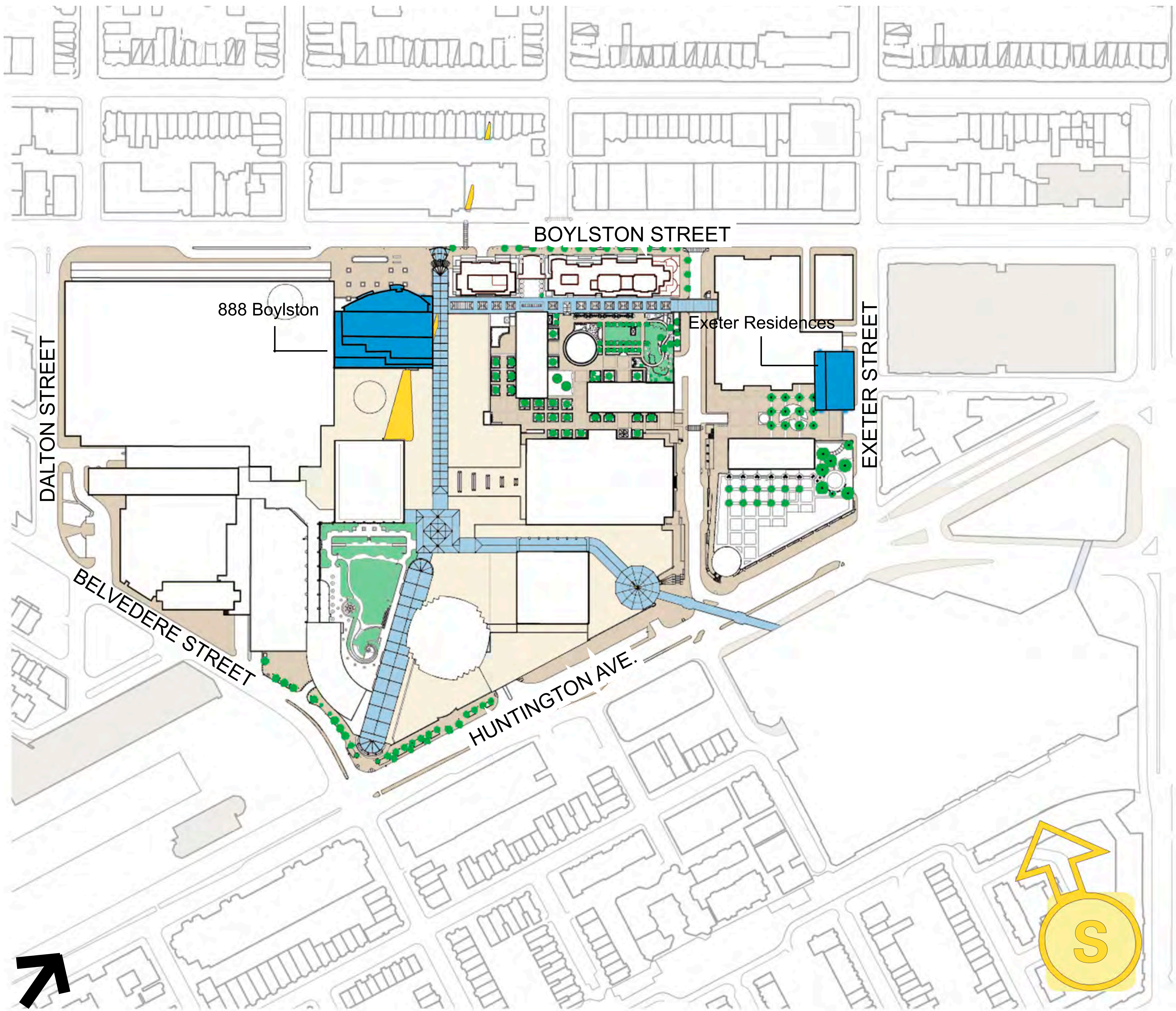


Figure 6-16

Glare Study
June 21 3pm

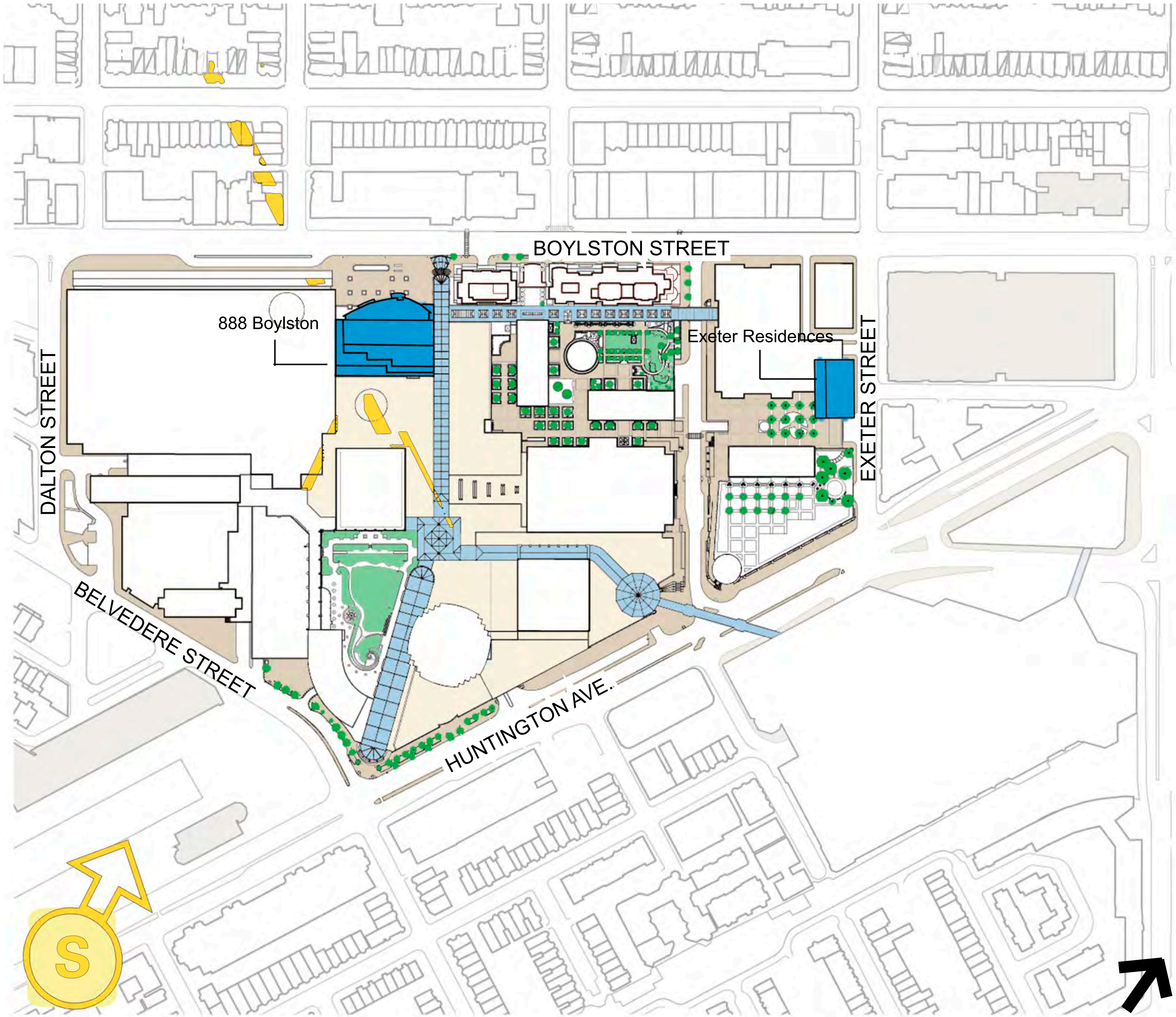


Legend

- Blocks
- Green Space
- Proposed Buildings
- Proposed Glare

Figure 6-17

Glare Study
December 21 9am

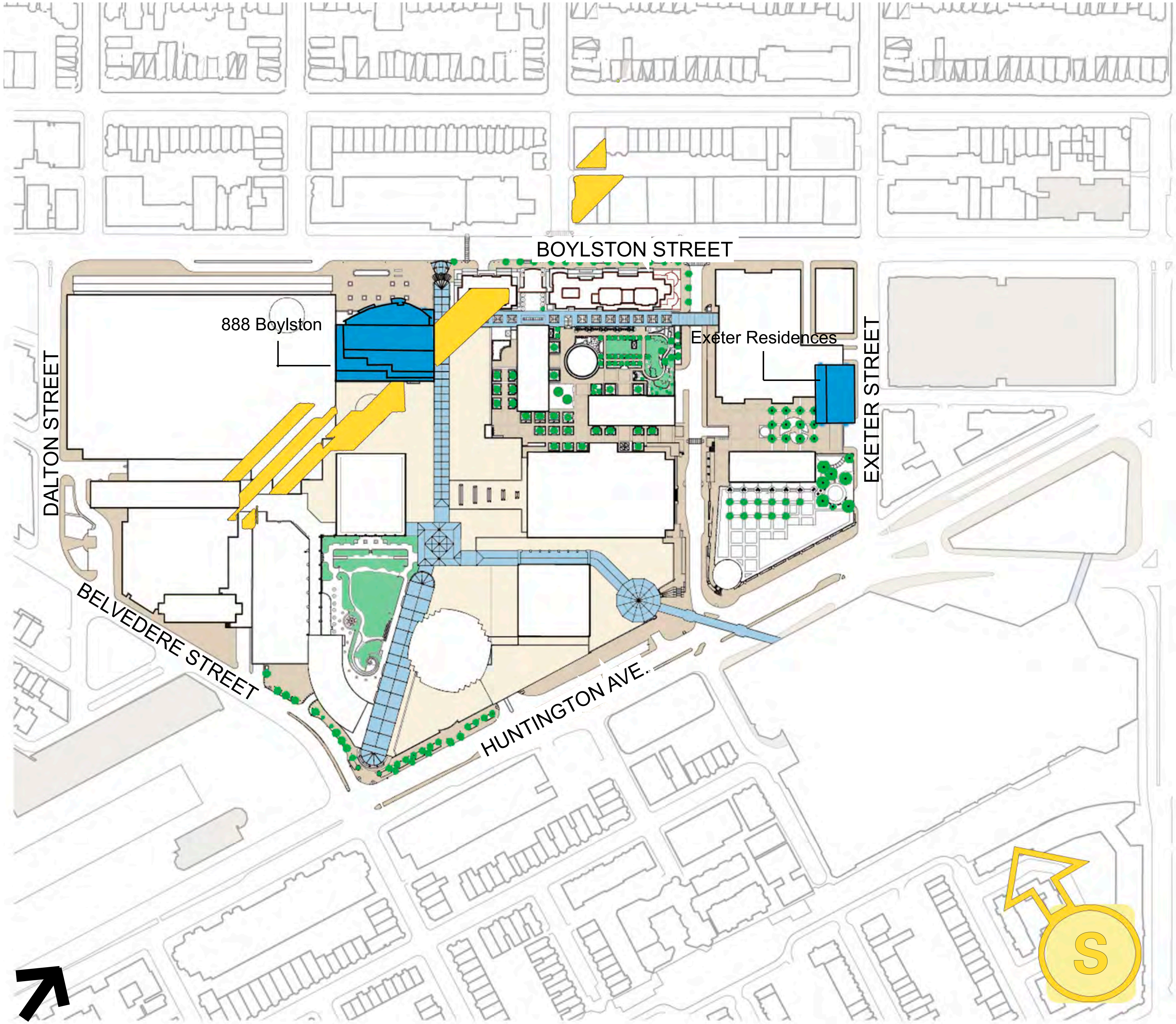


Legend

- Blocks
- Green Space
- Proposed Buildings
- Proposed Glare

Figure 6-18

Glare Study
December 22 12pm



Legend

- Blocks
- Green Space
- Proposed Buildings
- Proposed Glare

Figure 6-19

Glare Study
December 22 3pm

Conclusion

888 Boylston is a fully glazed building that will reflect sunlight onto neighboring buildings and streets. The potential for negative consequences are noticeably mitigated by a number of factors:

- The building is setback from Boylston Street by 77', and surrounded by buildings that shade the street from a significant portion of the reflected sunlight.
- Street trees on the plaza protect Boylston Street from early morning glare in the summer months.
- Boylston Street is one-way, so that traffic has its back to some of the afternoon glare effects.
- The stepped configuration of the south elevation puts some of it in shadow in the morning.

Likely effects from 888 Boylston on the surrounding public spaces, despite these mitigating features, include the following:

- Heat gain through the glazed roof of the Prudential Center atrium, especially in the summer.
- Glare effects in December on Gloucester Street from the west elevation of 888 Boylston.
- Potential glare on Boylston Street in June, addressed with plaza tree plantings.

The west and east façades of the building are recommended to undergo further analysis and design. In particular, glass treatments including special coatings, color and reflectivity of the glazing, and mullion depth and orientation should be carefully selected with an eye to decreasing reflected sunlight onto Boylston Street to the west.

6.5 Noise Analysis

This section presents the noise evaluation for the proposed Exeter Residences and 888 Boylston. The noise evaluation discusses sound levels under future conditions based upon mechanical equipment, motor vehicle traffic, building operations and emergency/back-up generators.

Methodology

This analysis evaluates the anticipated future sound levels from rooftop mechanical equipment, vehicle traffic, and building operations for Exeter Residences and 888 Boylston buildings. As discussed below, the net effect of the proposed project will be an insignificant increase in sound levels to adjacent receptor locations. Rooftop mechanical equipment sound levels from the buildings will be reduced by acoustical noise walls and partially blocked by the building geometry as this equipment will be located towards the middle of the roof. While the proposed project will generate noise as a result of site generated traffic and delivery trucks, vehicle traffic from Boylston Street is the dominant source of noise in the vicinity of the site with or without the proposed project. Building operations, such as loading dock activities and waste removal, will be designed to minimize sound impacts.

The noise analysis demonstrates that the project will comply with the City of Boston and the Department of Environmental Protection (DEP) and noise criteria because it will not generate sound levels that:

- Exceed the applicable receptor locations' land use criteria, or
- Significantly increase sound levels over existing levels, or
- Generate a pure tone condition because the characteristics of traffic noise are varied, or
- Exceed the City of Boston's construction noise criteria.

The following sections discuss the noise impact criteria, noise methodology, and results.

Noise Impact Criteria

The City of Boston and the DEP have developed noise impact criteria that establish noise thresholds deemed to result in adverse impacts. The noise analysis for Exeter Residences and 888 Boylston buildings used these criteria to evaluate whether the proposed development will generate sound levels that result in adverse impacts.

City of Boston Criteria

The City of Boston has established regulations for evaluating sound levels from proposed developments. These regulations establish maximum allowable sound levels based upon the land use of the proposed development. If the proposed development is located in a residential/industrial zoning district, the maximum noise level affecting residential uses shall not exceed the Residential-Industrial Noise Standard. The Residential-Industrial land use noise standard is 65 dBA for Daytime conditions (7:00 AM to 6:00 PM) and 55 dBA for Nighttime conditions (6:00 PM to 7:00 AM). The Business land use noise standard is 65 dBA for both Daytime and Nighttime conditions. These criteria are applicable to building facility noise sources, such as mechanical equipment, and do not apply to operation of any motor vehicle on any public way.

The City of Boston's regulations on construction sound levels state that operation of any construction devices, excluding impact devices, may not exceed 86 dBA during any time period.

Massachusetts DEP Criteria

DEP has established a policy (DEP Policy 90--001) for implementing its noise regulations (310 CMR 7.10). This policy states that a source of sound will be considered in violation of the Department's noise regulation under the following conditions:

- If the source increases the broad band sound level by more than 10 dBA above ambient (normally defined as L_{90} or the noise level exceeded 90 percent of the time during the hours of noise source operation); or
- If the source produces a "pure tone" condition.

The DEP noise regulations do not include any specific standards for construction period noise generation.

■

Noise Analysis Background

Noise is defined as unwanted or excessive sound. Sound becomes unwanted when it interferes with normal activities such as sleep, work, or recreation. The individual human response to noise is subject to considerable variability since there are many emotional and physical factors that contribute to the differences in reaction to noise.

Sound (noise) is described in terms of loudness, frequency, and duration. Loudness is the sound pressure level measured on a logarithmic scale in units of decibels (dB). For community noise impact assessment, sound level frequency characteristics are based upon human hearing, using an A-weighted (dBA) frequency filter. The A-weighted filter is used because it approximates the way humans hear sound. Table 6-3 presents a list of common outdoor and indoor sound levels. The duration characteristics of sound account for the time-varying nature of sound sources.

Sound level data can be presented in statistical terms to help describe the noise environment. A near infinite variation in sound levels (various intensities and temporal patterns) can be combined into the same value. The following is a list of other sound level descriptors:

- L_{max} is the maximum A-weighted sound level measured during the time period and,
- L_{90} is the A-weighted sound level that is exceeded for 90 percent of the time during the time period. The L_{90} is generally considered to be the background sound level since the L_{90} does not include transient noise events. During a 100-minute period, the L_{90} would be the sound level that was exceeded by other sound levels for 90 minutes of the 100-minute period.

The following general relationships exist between noise levels and human perception:

- A 1 or 2-dBA increase is not perceptible to the average person.
- A 3-dBA increase is a doubling of acoustic energy, but is just barely perceptible to the human ear.
- A 10-dBA increase is a tenfold increase in acoustic energy, but is perceived as a doubling in loudness to the average person.

Table 6-3
Common Outdoor and Indoor Sound Levels

Outdoor Sound Levels	Sound Pressure (μPa)*	Sound Level (dBA)**	Indoor Sound Levels
Jet Over-Flight at 300 m	3,324,555	110	Rock Band at 5 m
		105	
Gas Lawn Mower at 1 m	2,000,000	100	Inside New York Subway Train
		95	
Diesel Truck at 15 m	632,456	90	Food Blender at 1 m
		85	
Noisy Urban Area—Daytime	200,000	80	Garbage Disposal at 1 m
		75	Shouting at 1 m
Gas Lawn Mower at 30 m	63,246	70	Vacuum Cleaner at 3 m
		65	Normal Speech at 1 m
Suburban Commercial Area	20,000	60	
		55	Quiet Conversation at 1 m
Quiet Urban Area—Daytime	6,325	50	Dishwasher Next Room
		45	
Quiet Urban Area—Nighttime	2,000	40	Empty Theater or Library
		35	
Quiet Suburb—Nighttime	632	30	Quiet Bedroom at Night
		25	Empty Concert Hall

Quiet Rural Area—Nighttime	200	20	
		15	Broadcast and Recording Studios
Rustling Leaves	63	10	
		5	
Reference Pressure Level	20	0	Threshold of Hearing

Source: *Highway Noise Fundamentals*. Federal Highway Administration, September 1980.
*µPA – MicroPascals, which describe pressure. The pressure level is what sound level monitors measure.
**dBA – A-weighted decibels, which describe pressure logarithmically with respect to 20 µPa (the reference pressure level).

■

Existing Conditions

The Exeter Residences and 888 Boylston sites are both located in an urban area. Typical urban noise sources include vehicle traffic from local roadways, such as Boylston Street, rooftop mechanical equipment from existing buildings, and local urban activities. The study area consists of residential and commercial receptor locations that have outdoor activities and that might be sensitive to project-related noise. The residential receptor locations are made up of predominately multi-family residential buildings. These receptor locations represent the most sensitive locations in the proposed project study area that are likely to experience changes in sound levels due to the proposed project.

A baseline noise study has been performed to document the existing ambient noise condition at both the Exeter Residences and 888 Boylston sites. The baseline monitoring suggests a very active local area with an average daytime noise level of between 65 and 68 dBA and a night time average level ranging from 61 to 65 dBA.

A summary of the existing noise findings and the related noise monitoring locations are included as **Figure 6-20**.

■

Project Impacts

An extensive noise analysis was prepared in 1988 for the previously Approved Project as part of the Prudential Center Redevelopment Final Project and Environmental Impact Report (Prudential FPIR/FEIR) to determine conformance with the noise regulations and criteria outlined above. The previous noise study included measurements of ambient urban environmental noise at the project site, and evaluation of anticipated noise from project construction, project-generated traffic, and building mechanical systems. The noise sources for the proposed development will include motor vehicle traffic, rooftop mechanical equipment, loading activities, and construction activities.

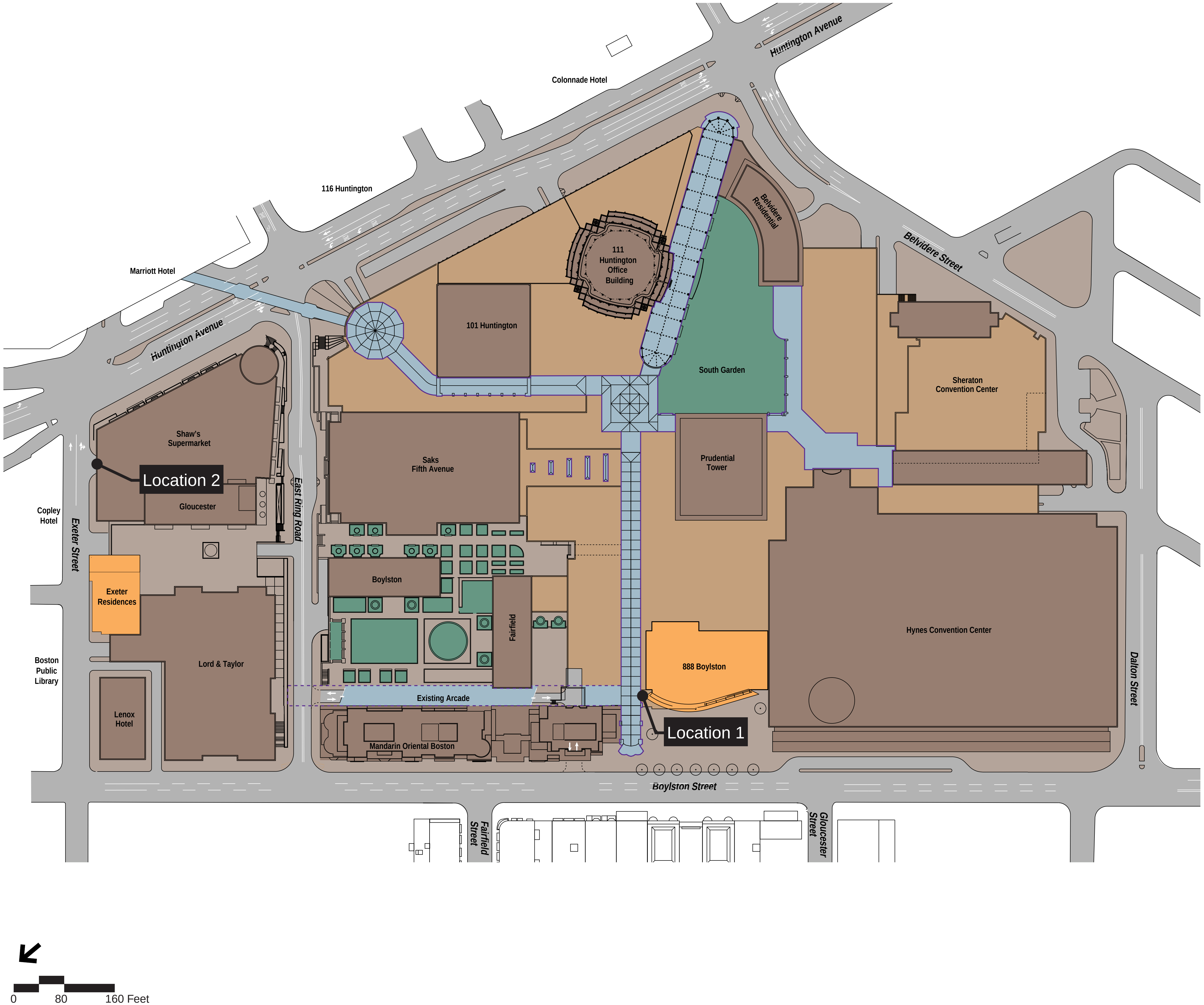


Figure 6-20
Sound Monitoring Locations

Exeter Residences\888 Boylston

AvalonBay COMMUNITIES, INC.
Boston Properties

Rooftop Mechanical Equipment

The Exeter Residences and 888 Boylston buildings will include rooftop mechanical equipment likely consisting of condensers supporting separate in-unit heating, ventilation, and air condition units (HVAC) systems. The rooftop mechanical equipment will be located together on the center of the roof to minimize sound transmission. The Proponent will require the mechanical engineer to provide sound generating information on the proposed HVAC components and certifications in the project specifications to ensure compliance with city noise standards. The Proponent will provide sound screening around the rooftop mechanical equipment, as necessary, to meet city noise standards in the final design.

Loading Activities

The buildings on the existing site have a number of loading dock areas consistent with the current commercial/residential uses of the site. The loading activity areas for the proposed buildings, which will be primarily residential moves, loading activities related to the retail component and trash removal for the Exeter Residences building and office-related moves, loading activities related to the retail, and trash removal for 888 Boylston will be designed and operated to ensure that there will be no adverse noise impacts to the receptor locations.

Construction Noise

Construction period activities may temporarily increase nearby sound levels due to the intermittent use of heavy machinery during the construction of the two buildings. However, it is expected that both building will not be constructed simultaneously. Therefore, the impacts will be limited to a smaller area one building at a time.

The City of Boston noise control regulations consider construction sound levels to be an impact to residential land uses if the L10 is in excess of 75 dBA or the Lmax is in excess of 86 dBA. Construction activities will occur primarily during normal weekday daytime hours (7:00 AM to 6:00 PM) and will comply with applicable City of Boston noise regulations.

The proposed buildings will generate typical sound levels from construction activities, including foundation construction, truck movements, heavy equipment operations, and general construction activities. Regulation 3 of the City of Boston Code, Ordinances, Title 7, Section 50, includes specific construction noise limits by land use. The relevant criterion for the project is based on residential or institutional land use. The construction noise at the property line for residential or institutional land use is limited to a maximum level of 86 dBA, with a limit of 75 dBA for the construction noise level exceeded 10 percent of the time (L10). In addition, the City of Boston Code, Ordinances, Title 14, Chapter 11, Section 354 (titled "Unreasonable Noise") also applies to construction activities. This ordinance establishes a noise limit of 50 dBA for construction noise measured at residential lot lines between 6:00 PM and 7:00 AM. This ordinance effectively prohibits nighttime construction near residential areas.

Construction activity associated with the project may temporarily increase nearby sound levels due to the use of heavy machinery. Heavy machinery will be used intermittently throughout the proposed project's construction phases.

Exeter Residences and 888 Boylston will implement mitigation measures to reduce or minimize noise from construction activities and to maintain compliance with the City's noise ordinances. A Construction Management Program (CMP) will be developed with input from City of Boston agencies. The CMP will address noise impacts and mitigation.

Specific mitigation measures may include:

- Construction equipment will be required to have installed and properly operating appropriate noise muffler systems.
- The construction vehicles and equipment will be required to maintain their original engine noise control equipment.
- All exterior construction activities, such as site excavation/grading and new building construction will typically be limited to normal working hours and off hour work would be minimized, to the extent practicable.
- Appropriate traffic management techniques implemented during the construction period will mitigate roadway traffic noise impacts.
- Proper operation and maintenance, and prohibition of excessive idling of construction equipment engines, will be implemented as required by DEP regulation 310 CMR 7.11.
- The site will be surrounded by safety fencing to provide site security, as well as to mitigate construction noise and fugitive dust.
- Work hours and relevant noise generating activities will be reviewed further with the City of Boston to outline those construction activities which may occur prior to 7:00 AM and after 6:00 PM, Monday through Friday, as well as those activities which may occur during weekend hours.
- Quieter-type (manually adjustable or ambient-sensitive) backup alarms on construction vehicles will be required.
- Additional noise control options will be evaluated during the design process for effectiveness and feasibility.
- Appropriate operational specifications and performance standards will be incorporated into the construction contract documents.

Conclusion

Through building design and management of construction activities the proposed Exeter Residences and 888 Boylston are expected to comply with the City of Boston and State noise criteria because the proposed developments are not expected to generate sound levels that:

- Exceed the applicable receptor locations' land use noise criteria, or
- Significantly increase sound levels over existing levels, or
- Generate a pure tone, or
- Exceed the City of Boston's construction noise criteria.

6.6 Air Quality Analysis

The proposed project complies with the Massachusetts and /or National Ambient Air Quality Standards (NAAQS) established by the Federal Clean Air Act Amendments (CAAA).

The Prudential FPIR/FEIR found that "the maximum predicted at the Massachusetts Avenue/Boylston Street intersection during the eight-hour average period is 8.3 parts per million (ppm) under the Approved Development Plan, and decreases to 8.2 ppm under the Proposed Program with Mitigation case."[2] Mitigation for the Approved Development Plan included traffic related measures including roadway geometry changes to increase roadway capacities, and signal timing optimization to enhance traffic flow. Other air quality mitigation components included improvements in Travel Demand Management (TDM), for public transportation, parking, loading, and pedestrian. These are detailed in the Prudential FPIR/FEIR.

An air quality analysis, conducted for the Prudential FPIR/FEIR at the intersection of Massachusetts Avenue/Boylston Street, found that the maximum carbon monoxide (CO) concentrations at this intersection would not exceed the on-or eight-hour NAAQS for either the 1994 or 1999 cases. This air quality analysis concluded that, due to the improvement of automobiles with a higher standard for emission testing, the air quality in the area would be expected to improve in the future.

The conclusion in the Prudential FPIR/FEIR that the proposed project will meet the NAAQS for CO is still valid. The additional building associated with the proposed Exeter Residences and 888 Boylston is not expected to result in a substantial change to the air quality results. This conclusion is based upon the following factors:

▼

[2] The State Implementation Plan (SIP) defines "a concentration above 8.5 ppm is considered an exceedance of the National Ambient Air Quality Standards of 9.0 ppm"

- The air quality standards are being met. The Prudential FPIR/FEIR demonstrated that the Approved Project met the City of Boston, the Department of Environmental Protection (DEP), and the Environmental Protection Agency (EPA) air quality standards for carbon monoxide (CO).
- There will be an insignificant change in traffic volumes. The traffic analysis described in the Transportation Component (Chapter 5) if this document shows that traffic volumes will increase only 4.5 to 4.9 percent (morning and evening weekday peak) over previously the analyses project will have an insignificant impact on air quality emissions as a whole within PD No.37. This change is less significant compared to the activity on the roadway network serving the Prudential Center and can be accommodated through signal timing adjustments at key intersections. The proponent, as described in Chapter 5, has also evaluated to the operations of the Huntington Avenue and Boylston Street corridors and will take action to ensure that in the area of the Prudential Center that the operations are restored to their design condition and operate efficiently minimizing air quality impacts.
- There will be no impact on the parking garage ventilation system. The parking spaces required will be increased by 4.6% or 182 spaces. This change is not anticipated to require any changes to the configuration of the garage ventilation system intake and exhaust locations and control system that was fully upgraded during the previous phases of the redevelopment.
- Carbon monoxide emission factors for individual vehicles will be lower in the future. The 1999 CO emissions factors from the Prudential FPIR/FEIR will be reduced by 20 percent in the year of 2001 and by additional 20 percent in the year 2006. These reductions are due to the Federal Motor Vehicle Emission Control Program and further demonstrate that the proposed changes to the Development Plan are not expected to have a negative impact on air quality as compared to the results presented in the Prudential FPIR/FEIR.

Based upon these factors, when compared to the Approved Project, the proposed Exeter Residences and 888 Boylston are expected to continue to comply with City of Boston, the DEP, and the EPA air quality standards for CO.

6.7 Solid and Hazardous Materials

Environmental studies including chemical testing of soil and groundwater for the presence of Oil and Hazardous Materials (O&HM) has been conducted for previous developments at Prudential Center. Chemical test results have not revealed elevated levels, of O&HM to be present in soil or groundwater. Furthermore during previous construction activities conditions related to contaminated soil or groundwater have not been encountered. These construction activities include excavation and soil management and chemical testing of construction dewatering effluent. Therefore no releases of O&HM are known to exist in soil or groundwater.

Foundation construction for each of the new buildings will generate soil requiring off site transport. The soil will consist of spoil materials generated during drilled shaft foundation drilling. The drill spoils will primarily consist of clay intermixed with small amounts of sand, granular fill, and bentonite slurry drilling fluid. Chemical testing of the material will be required by receiving facilities to identify chemical constituents and any contaminants present. Additional testing of the specific soil material to be generated is planned. Chemical testing of the material will be conducted prior to construction in accordance with facility requirements.

Any material leaving the site will be required to be legally transported in accordance with local, state and federal requirements. Due to physical properties of the clayey material it will likely be transported to facilities such as unlined landfill for use as daily cover. In addition any unanticipated conditions related to O&HM will be managed in accordance with appropriate Massachusetts Department of Environmental Protection (MA DEP) regulatory requirements.

6.8 Geotechnical and Groundwater Analysis

Subsurface soil and groundwater conditions at the Prudential Center have been well studied since the original Prudential Center development in the 1960s. Data from numerous previous test borings is available and has been assembled defining existing subsurface soil and bedrock conditions. An extensive groundwater monitoring program has been undertaken by the Boston Properties for many years, resulting in well documented and carefully monitored groundwater conditions.

Geotechnical

The Prudential Center is underlain by a deep deposit of Marine Clay which extends to depths of greater than 100 ft below the current Prudential Center garage level. Bedrock underlies the site at depths of 110 to 140 ft. New building structures require deep foundation support due to the soft compressible nature of the underlying clay soils. Selection of the deep foundation system needs to consider potential impacts to abutting facilities such as ground movement, vibration and groundwater. Drilled shaft foundations will be designed to support new building column loads. Drilled shafts have been selected since they are low displacement elements which minimize soil disturbance, installation does not generate vibrations and dewatering is not required for foundation drilling.

New buildings will be supported on drilled shafts extending though the marine clay and socketed into bedrock. Drilled shafts will be cored through the existing concrete floor slab of the garage. No construction is planned below the garage slab level however; isolated excavations below the slab will be required for pile cap construction and structural connections. Drilled shaft diameters will range from about 3 to 5 ft, and lengths ranging from 120 to 160 ft are anticipated.

Drilled shafts will be drilled/excavated through temporary steel casing used to support the sides of the excavation and prevent soil collapse at the top of the excavation. The temporary starter casings will extend to a depth of 20 to 25 ft below the garage floor slab. Slurry drilling fluid will be used to support the excavation during drilling. Use of slurry also maintains stability during excavation below groundwater levels. Localized dewatering will be required in areas such as around drilled shafts and elevator pits.

Groundwater

Groundwater levels at the Prudential Center have been well documented and are measured periodically within a network of 29 interior monitoring wells located within the lowest level Prudential Center garage. Measured groundwater levels range from approximately El. 1 ft to 2 ft Boston City Base (BCB). The existing lowest level garage is at about El. 3 ft.

A large network of monitoring wells also exists in city streets located outside of the Project. The wells surrounding the project indicate groundwater levels ranging for about El. 3 ft to 7 ft depending on location (see **Figure 6-21**).

No basement levels below the current garage are planned therefore there is no potential for impacts or change to the current groundwater conditions from the planned permanent construction.

Groundwater Conservation Overlay District

The Prudential Center is located within the new Groundwater Conservation Overlay District (GCOD) and will need to comply with the associated requirements such as infiltration of rainwater. The most significant issue will be to design a suitable system for the appropriate volume of stormwater infiltration. Existing constraints at the Prudential Center will impact the design including the shallow depth to groundwater; groundwater levels are encountered at the bottom of the existing Prudential Garage slab. In addition, the Prudential Center is surrounded by a sheet pile cut off wall and numerous below grade structures such as the MBTA Green Line tunnels below Boylston, Exeter and Huntington Ave and the depressed Massachusetts Turnpike roadway which bisects the 888 Boylston site. The

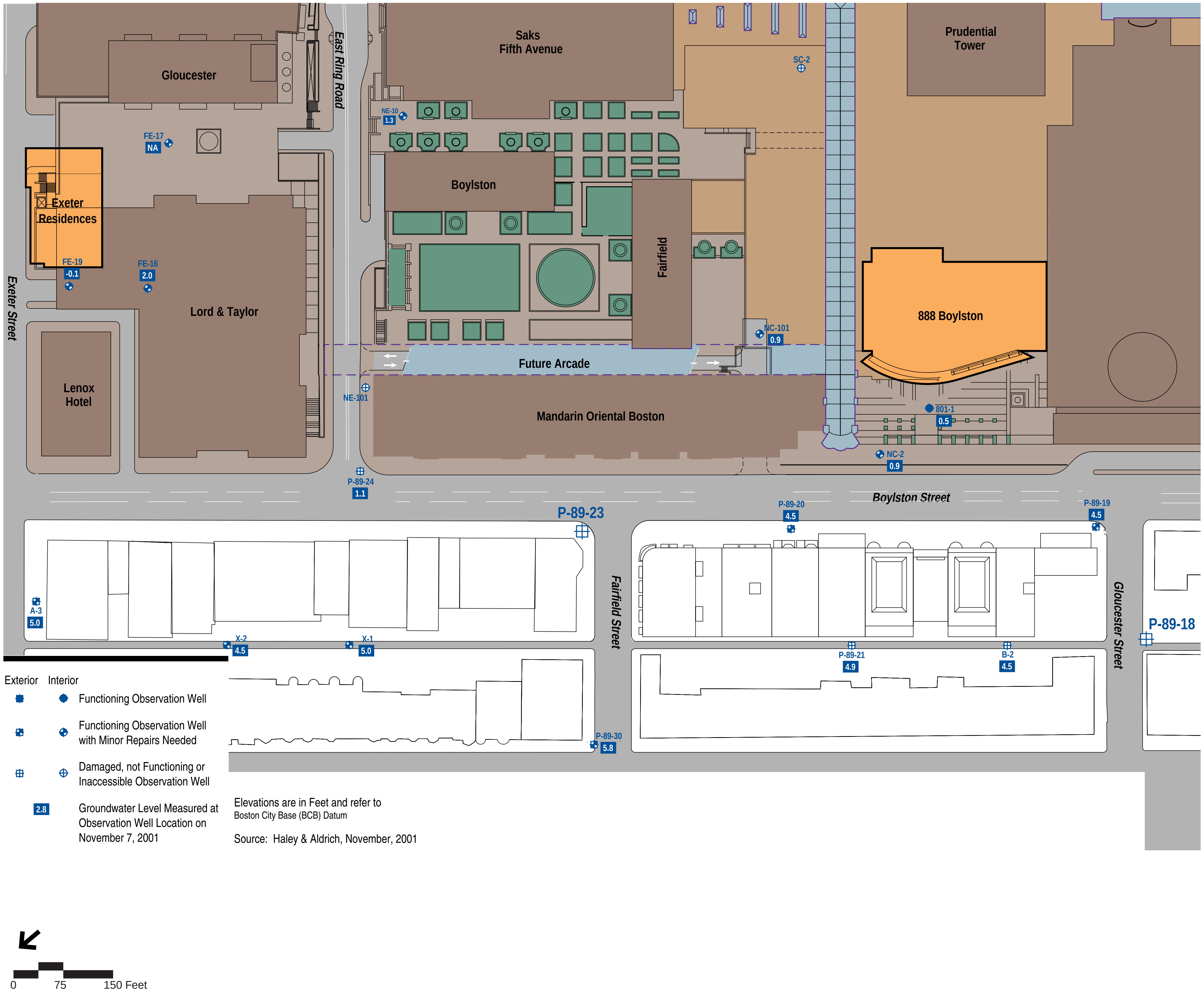


Figure 6-21

Groundwater Observation
Well Location Plan

Exeter Residences\888 Boylston

AvalonBay COMMUNITIES, INC. Boston Properties

stormwater infiltration design will need to consider site constraints in order to meet the intent of the GCOD.

6.9 Water Quality

The primary concern regarding water quality is the potential impacts of Exeter Residences and 888 Boylston on the water quality of the Charles River and Boston Harbor. No water quality evaluation was required for the Prudential FPIR/FEIR. The site does not lie alongside any water body; it is located nine blocks from the Charles River. All sanitary and stormwater service is provided by the Boston Water and Sewer Commission and is described in detail in Chapter 7, Infrastructure Systems.

As it exists, the areas where Exeter Residences and 888 Boylston would occupy are nearly 100 percent impervious to rainfall percolation. The proposed Exeter Residences footprint will displace parts of the existing Prudential Center parking garage and a portion of the existing Lord & Taylor department store. The majority of the 888 Boylston site is a structural slab that straddles the below grade Prudential Center Parking Garage. The balance is generally impervious sidewalks and a pedestrian plaza. Existing runoff from both areas is collected via internal drains or offsite in catch basins.

Both Exeter Residences and 888 Boylston improve the water quality by removing stormwater runoff currently generated from impervious plaza and sidewalk areas from both sites. Instead, the stormwater runoff collected via the roof drains of the proposed buildings will be significantly cleaner than the existing runoff from adjacent sidewalks and plaza areas. The Department of Environmental Protection (DEP) Management Standards identify rooftop runoff (except certain metal roofs) as uncontaminated for the purposes of Stormwater Management Standards.

For Exeter Residences and 888 Boylston, the majority of onsite drainage will be collected internally then directed to the municipal collection system in Exeter and Boylston Streets, respectively. The offsite catch basins which receive flows from the sidewalk areas are owned and maintained by the BWSC. Drainage facilities and related water quality performance will be reviewed by Boston Water and Sewer Commission as part of the Site Plan review process.

6.10 Flood Hazards/Wetlands

No flood hazard districts are located in the area of PDA No. 37. The site does not lie alongside any water body or on wetlands; and it is located nine blocks from the Charles River.

6.11 Construction Impacts

Transportation

Construction impacts for the proposed buildings are similar to the uses under the Approved Project. Properly managed, construction workers and construction trucks are not expected to have significant impacts on traffic conditions on surrounding streets during construction. The Proponent will work with the BTD to develop a site specific Construction Management Plan.

- Typical work hours for construction personnel are from 7:00 AM to 6:00 PM and most workers would not travel during peak traffic periods. In addition, because no free parking would be provided on-site and the site is well served by transit, a large percentage of workers is expected to carpool or use transit.
- The impact of construction trucks on the evening peak hour is expected to be insignificant because most deliveries would be completed before the end of the workday. Morning impacts would be slightly greater, but deliveries are spread uniformly during the workday. Maximum daily truck volumes for construction deliveries are not expected to exceed 50 trucks and would average 23 trucks daily throughout the construction period.
- Routes would be designated for trucks, which would keep them on main thoroughfares, and out of residential areas. Further requirements will be presented in the Prudential Transportation Access Plan Agreement (TAPA).

Construction Management Plan

In conformance with the components of the Construction Traffic Management Plan included in the Prudential FPIR/FEIR and the requirements outlined in the Prudential TAPA, and following the pattern of the Construction Management Plan developed for the phases of the Prudential Center redevelopment. The following elements will be addressed in the final Construction Management Plan:

- Designation of truck routes for deliveries
- Protection of pedestrian walkways
- Location and sizing of staging areas for on-site storage of construction materials
- Definition of worker parking parameters and measures to maximize related use of public transportation
- Identification of truck waiting areas
- Police officer traffic management
- Construction graphics program
- Interim traffic operation improvements
- Definition of street and sidewalk occupancies

- Location of tower cranes
- Definition of work hours

6.12 Rodent Control

The Pest Control Program in effect will be updated and expanded to accommodate the added impacts from additional construction. Rodent extermination certificates are filed with the building permit application to the City. During the construction process, regular service visits will be made in order to maintain effective rodent control levels.

6.13 Sustainable Design and Practices

The Proponent is committed to sustainability and environmental responsibility. As such, the Exeter Residences and 888 Boylston will follow the guidelines of the City of Boston Article 37 requirements. Where applicable and feasible, the following categories' guidelines were examined:

- Construction — noise and working hours, air quality, stormwater quality, geotechnical impact, groundwater impact, , recycling and reuse, construction worker transportation.
- Operations — air quality, noise, water quality, water conservation, energy conservation, pollution prevention, solid and hazardous waste, and recycling.
- Transportation — Transportation Demand Management (TDM), flextime.

The Proponent and architects of Exeter Residences and 888 Boylston are dedicated to the improvement of Boston's urban environment. Responsible and sustainable development will be addressed in further development of the design and incorporated where possible. A construction plan will be developed with the City of Boston, PruPAC and appropriate jurisdictional agencies and constituencies to address the specifics of each of these issues; this plan will include programs and protections that will fulfill the requirements of construction methodology in relation to evolving site circumstances. Each contractor will be apprised fully of these provisions and guidelines prior to construction.

Construction

A project-specific Construction Management Plan (CMP) will be developed for Exeter Residences and 888 Boylston taking the unique site context and circumstances into account for each development. During construction, the Proponent will work with the contractor to:

- Maximize re-use and recycling of materials salvaged during site demolition. This includes creating a process for segregation and transfer of construction waste and recyclables, and participate with the Building Materials Resource Center, donating suitable excess materials or non-recyclable materials where possible.
- Adhere to city construction standards and noise ordinance requirements of 7:00 AM to 6:00 PM for construction work hours.
- Establish with the city and adjacent neighborhoods efficient truck routes that minimize use of residential streets, and provide maps indicating truck routes to all suppliers, contractors and sub-contractors.
- Consider scheduling deliveries for off-peak hours.
- Post no-idling signs and enforce the no-idling law during the construction period.
- Work toward minimizing fugitive dust impacts by: requiring materials- and debris-removal trucks to undergo wheel wash; spraying all aggregate piling and excavated material at day's and week's end; and, scheduling regular mechanical street sweeping (working with the City to provide appropriate definitions of required thoroughfare proximity and standards).
- If feasible, connect stationary noise-producing equipment (pumps, generators) to the NSTAR grid.
- Consider offering incentives for workers who carpool or use public transit to work through the Artery Business Committee's Transportation Management Association (ABC TMA)
- Evaluate employing measures such as: securing decking on roadways; adjusting backup alarms on vehicles and equipment; keeping engine housing panels closed; and, shutting off equipment that is not in use.
- Providing for the proper storage and disposal of hazardous materials during operations.
- Consider building screening through the construction process to provide light shielding and to improve the aesthetic environment for surrounding area users and residents.

Operations

During the operation of Exeter Residences and 888 Boylston, the Proponent will examine the possibility of the following measures to protect air quality and water quality, promote water and energy conservation, reduce solid and hazardous waste and encourage recycling through the following measures:

- Installing sensor-operated sinks and toilets in public restrooms.
- Including trash disposal and recycling within the entire system.
- In design and subsequent operation, the Proponent is pursuing the concept of sustainability and is exploring opportunities to utilize energy and resource

conservation in the process of further design development, and incorporating them where possible.

- One aspect of particular interest to the Proponent is making sure that unoccupied spaces are not consuming energy needlessly or being unnecessarily illuminated, but only to the degree of maintaining operational safety and building security.
- Where applicable, exterior lighting will be directed downward and shielded to reduce glare, in keeping with City agency policies, and appropriately applying similar standards to privately owned spaces.

Transportation

The Exeter Residences and 888 Boylston transportation study is discussed in detail in Chapter 5. Relevant to matters of responsible and sustainable development, the following areas have been discussed and identified as desirable for inclusion in ultimate building operations.

- Joining the Prudential Center's Transportation Management Organization (TMO). The TMO has a transportation coordinator and sponsors:
  - Transportation Day events which educate tenants on transportation opportunities to the Center and provides information on MBTA, carpool and vanpool programs, walk and bike to work programs, etc.;
  - A segment in the quarterly CenterScene newsletter that provides detailed information on the TMO's programs;
  - Program recruitment for the Artery Business Committee's Transportation Management Association (ABC TMA), whose programs focus on decreasing single-drivers and getting people to commute via other methods of transportation.
  - The TMO has several bike rack areas located throughout the Center, both outside (Boylston and Bridge Court entrances) and inside (Orange level of the south garage).

- It is possible that the Exeter Residences and 888 Boylston owners will join the ABC TMA directly, or will work through the auspices of the Boston Properties on-site transportation coordinator. Consideration will be given to the following:
  - Encouraging flextime scheduling (flextime is inherent in hotel, apartment and condominium operations; thus this measure of traffic congestion reduction will naturally occur);
  - Continued support and potential expansion of the on-site ZipCar® or similar vehicles;
  - Providing shower and locker facilities for staff to facilitate walking and bicycle commuting.
  - Guaranteed Ride Home program for non-drivers and HOV users.

- Providing secure bicycle storage in an area protected from the elements (for commuters), and providing additional bicycle storage for short-term users.
- Examining the possibility of MBTA fare subsidization for employees., through pre-tax payroll deduction for MBTA pass or other methods
- On-site sale of MBTA Visitor Passes.

In addition to incorporating City of Boston Article 37 requirements, Exeter Residences and 888 Boylston will incorporate many "life-cycle" sustainable measures, as established by the Leadership in Energy and Environmental Design (LEED®) Council. The Proponent and architects will make the buildings LEED® certifiable green buildings in accordance with Article 37 of the City of Boston Zoning Code. Both project teams will research additional sustainable and energy-efficient measures as the building designs develop. Preliminary LEED® Checklists used in attaining certification are provided in the appendix for both Exeter Residences and 888 Boylston.

6.14 Cultural Resources

Identification of cultural resources in the project vicinity and the effect of the project upon them is the focus of this section. Information about cultural resources was obtained as a result of site file research at the Massachusetts Historical Commission.

Existing Inventoried and Designated Cultural Resources

The most prominent designated cultural resources in or near the project area is the Bay Bay Historic District, listed in the National Register of Historic Places in 1973. The Back Bay Architectural District was designated a local historic district in 1966. .Buildings with addresses between 8-36, 38-56, 15-25, 27-41, 43-53, 55-65 St. Germain, west of Dalton Street, were documented on Boston Landmarks Commission Building Information Forms (and thus are part of the *Inventory of the Historic and Archaeological Assets of the Commonwealth*) and recommended eligible for both the National Register of Historic Places and as an Architectural Conservation District. A small number of buildings have been inventoried near the project area, including St. Cecilia parish complex (Area VI) at St. Cecilia and Scotia Streets; 51-69 Exeter Street (Hotel Lenox), 760 Boylston Street (Lord & Taylor Department Store), and 780 Boylston Street(Boylston Apartment). The buildings at 760 and 780 Boylston Street and 51-69 Exeter Street are all within the Back Bay Historic District. The locations of these designated and inventoried properties are shown in **Figure 6-22**.

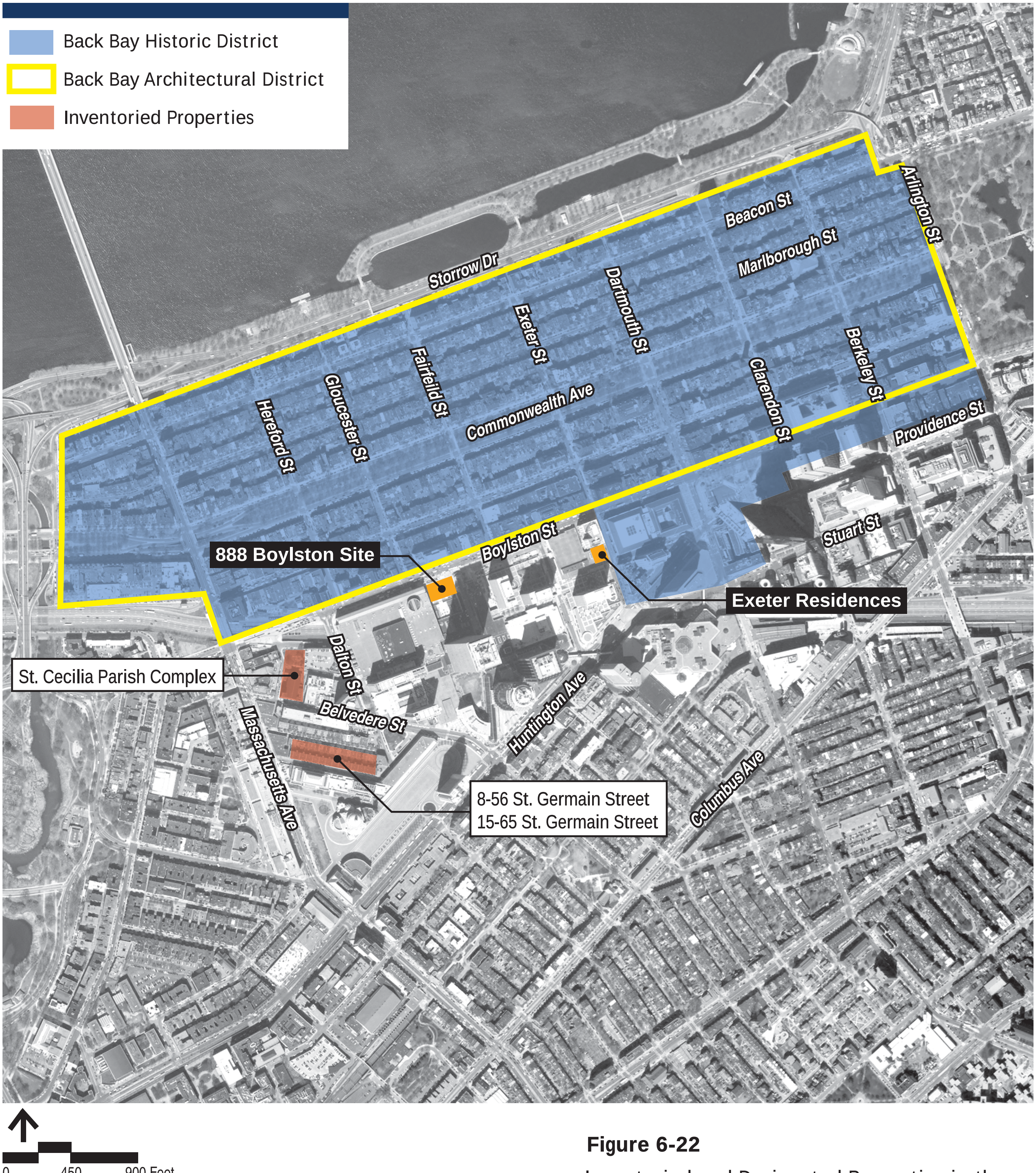


Figure 6-22

Inventoried and Designated Properties in the Vicinity of ExeterResidences\888 Boylston Project

Existing Archaeological Resources

Site file research at the Massachusetts Historical Commission concluded that there are no archaeological resources in close proximity to the Prudential Center site. Interstate 90, the Massachusetts Turnpike, runs underneath the site, further negating the possibility of archaeological resources in the area.

Analysis of Project Effect to Historic Resources

No historic resources will be affected by Exeter Residences and 888 Boylston as the projected shadows cast by the higher building height appear to mainly affect the rear first story of commercial buildings on Newbury Street in the morning. Increased shadows for such a short period of time will not affect the physical fabric of any historic building within the Back Bay Historic District, and thus will not harm the physical characteristics for which these buildings are significant.

7

Infrastructure Systems

The Exeter Residences and 888 Boylston commercial and retail development will connect to existing city and utility company systems in the adjacent public streets. In general, these project elements will be referred to collectively, but separate references may be made where appropriate. The preliminary design of the 888 Boylston building had been previously approved as part of the Prudential Center Development Plan update by the Mandarin Oriental Boston submission dated January of 2002. Since then, the building design has increased by an additional eight stories. This PNF will consider the design of the building as a whole and will note incremental demand increases to the originally permitted development plan. This chapter evaluates the infrastructure systems that will support Exeter Residences and the 888 Boylston relating to the following existing and proposed infrastructure systems as specified by Article 80:

- Wastewater
- Domestic Water and Fire Protection
- Stormwater Management
- Energy Systems
- Telecommunications
- Sustainable Design

Based on initial investigations and consultations with the appropriate agencies and utility companies, all existing infrastructure systems are adequately sized to accept the incremental increase in demand associated with the development and operation of the new program associated with Exeter Residences and 888 Boylston.

The final design process for these project components will include all required engineering analyses and will adhere to all applicable protocols and design standards, ensuring that the proposed buildings are properly supported by, and in turn properly use the City's infrastructure. Detailed design of the utility systems will proceed in conjunction with the design of the buildings and interior mechanical systems.

The systems discussed below include those owned or managed by the Boston Water and Sewer Commission (BWSC), private utility companies, and on-site infrastructure systems. There will be close coordination among these entities and with the project Engineers and Architects during subsequent reviews and design process. **Figures 7-1** and **7-2** depict proposed and existing utilities infrastructure for Exeter Residences and 888 Boylston, respectively.

All improvements and connections to BWSC infrastructure will be reviewed by the Commission as part of the designated site plan review process. This process includes a comprehensive design review of the proposed service connections, assessment of system demands and capacity as well as the establishment of service accounts.

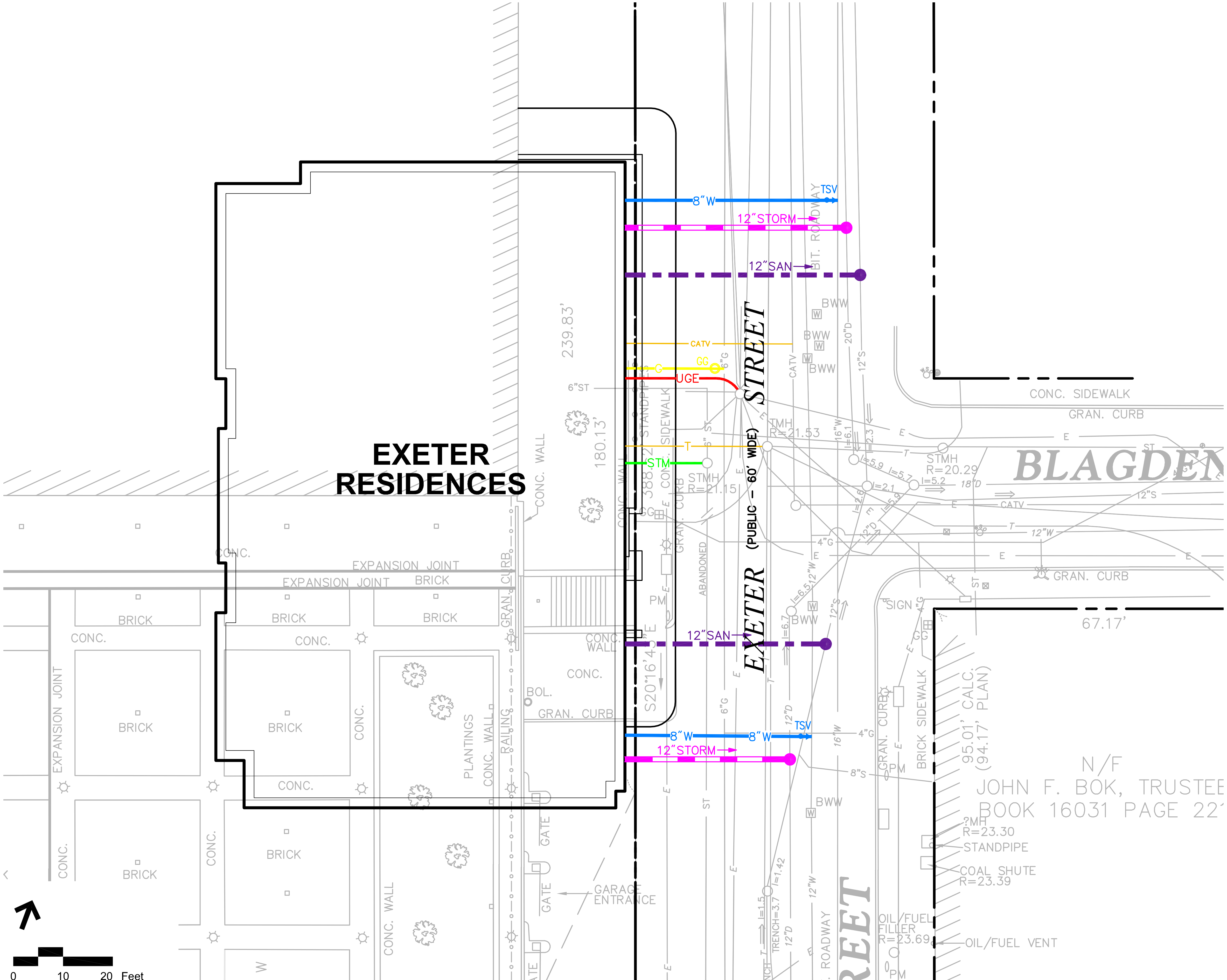
7.1 Regulatory Framework

All utility connections proposed in conjunction with this project will be designed and constructed in accordance with city, state and federal standards.

- A sewer connection permit from the Massachusetts Department of Environmental Protection (DEP) will be required.
- The Boston Fire Department will review the proposed design with respect to fire protection measures such as siamese connections and standpipes.
- Design of the site access, utility service connections, fire hydrant locations, and energy systems (gas, steam and electric) will also be coordinated with the respective system owners.
- New utility connections will be authorized by the Boston Public Works Department through the street opening permit process, as required.

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

A more complete list of the state and local permits anticipated in connection with the project infrastructure is included in Chapter 3.



Legend

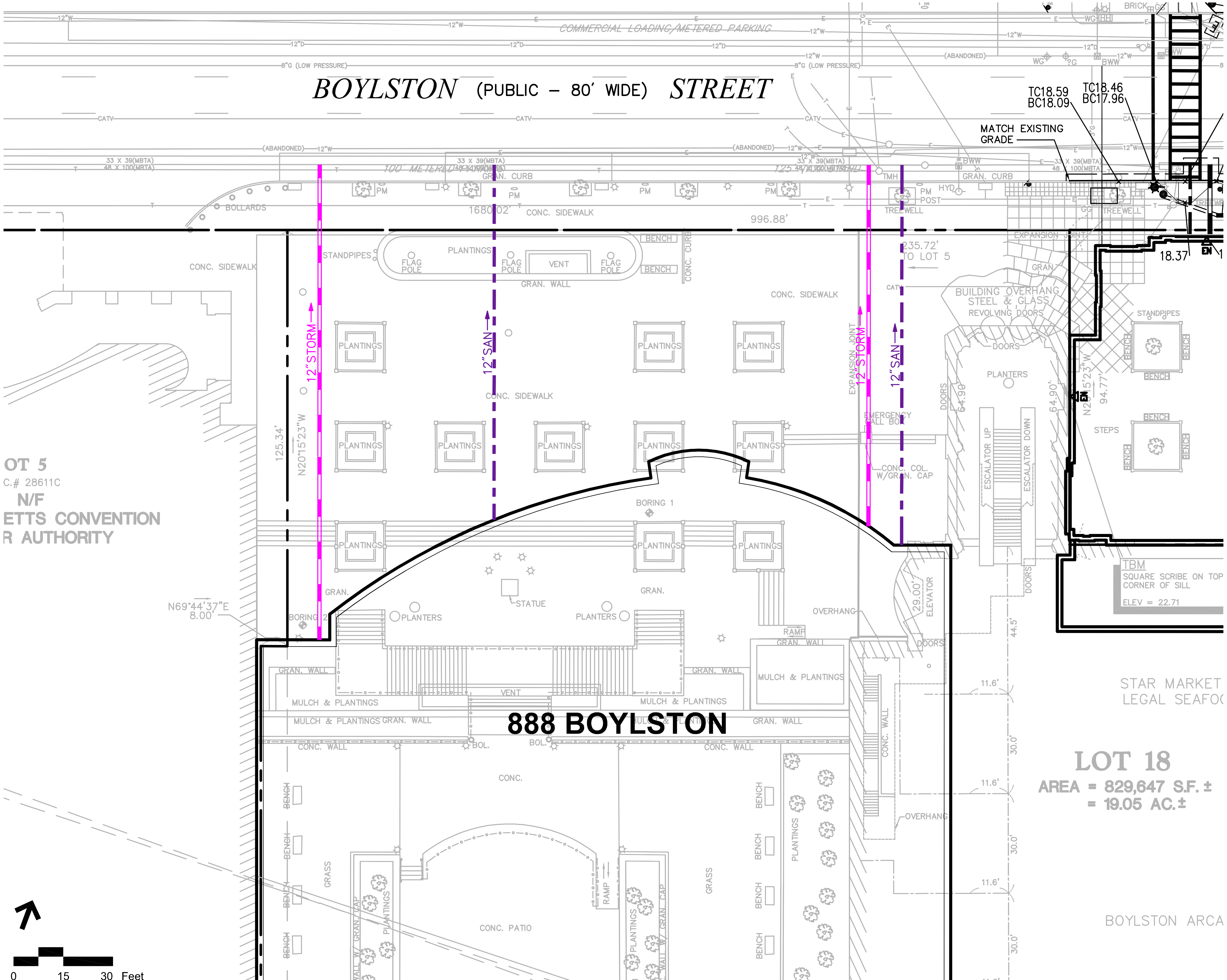
- Electric Lines and Structures
- Telecom Lines and Structures
- Storm Sewer Lines and Structures
- Sanitary Sewer Lines and Structures
- Water Lines and Structures
- Steam Lines and Structures
- Gas Lines and Structures

Figure 7-1

Conceptual Utility Plan
Exeter Residences

Exeter Residences\888 Boylston

AvalonBay Communities, Inc. | Boston Properties



Note: Gas, Electric, Telecom, Water and Steam Services will be fed internally via the existing Prudential Center utility systems.

Legend

- Electric Lines and Structures
- Telecom Lines and Structures
- Storm Sewer Lines and Structures
- Sanitary Sewer Lines and Structures
- Water Lines and Structures
- Steam Lines and Structures

Figure 7-2

Conceptual Utility Plan
888 Boylston

Exeter Residences\888 Boylston

AvalonBay COMMUNITIES, INC. Boston Properties

7.2 Wastewater

The sanitary sewer system in the City of Boston is owned and maintained by BWSC. This site is also serviced by the Massachusetts Water Resources Authority (MWRA). All collected sanitary waste outlets to the Deer Island Treatment Facility which is maintained by the MWRA.

Existing Wastewater

Exeter Street is serviced by sanitary mains that flow north and south toward the Blagden Street and Exeter Street intersection where they are directed easterly down Blagden Street to a 36-inch sewer main in Dartmouth Street. Boylston Street is serviced by a 33x39-inch sanitary main which flows southwesterly. This main combines with a 10-inch sanitary main and several stormwater and combined sewer mains at a siphon chamber at the intersection of Hereford and Boylston Streets. The outlet from the siphon structure is a 60-inch combined sewer main which flows southerly in Dalton Street, and is commonly known as the West Side Interceptor (WSI).

Demand / Use

Exeter Residences consists of 200 residential units. Based on Massachusetts State Environmental Code (Title V, Sewer Connection and Extension Regulations, 310 CMR 15.203) Sewage Generation Rates, the building will generate an expected 33,000 GPD of sanitary waste. In addition, 2,500 square feet of retail and common space will produce 105 GPD and an allowance of 800 GPD for the HVAC system requirements. The total wastewater flows engendered by Exeter Residences is expected to be approximately 34,000 GPD.

The 888 Boylston includes 51,000 square feet of retail space and approximately 369,000 square feet of new office space. Based on this program 888 Boylston is expected to generate 32,000 gallons per day (GPD). Sewer demand under the current building program is 13,000 GPD greater than the previously permitted allowance under the Development Plan for Parcel 4a (888 Boylston).

Proposed Connection

A service connection to the 12-inch main in Exeter Street is proposed for Exeter Residences. To support 888 Boylston, two connections are proposed to the 39x39-inch sanitary main in Boylston Street.

7.3 Domestic Water and Fire Protection

Domestic water and fire protection services are provided by the MWRA and BWSC in the City of Boston. Based on various ground elevations throughout the City, BWSC has designated water systems and/or service districts. The five systems are southern low (commonly known as low service), southern high (commonly known as high service), southern extra high, northern low, and northern high. The low service typically has a residual pressure of 60 pounds per square inch (psi) and is used to provide domestic water service. The high service system typically has a residual pressure of 90 psi and is used to provide fire protection service.

■

Existing Water Supply System

Two water mains are located in Exeter Street. One, which was installed in 1880, is a 16-inch cast iron southern low service and the other is a 12-inch cast iron southern high service, which was installed in 1900.

Water service for domestic use and fire protection to the Prudential Center is provided via a number of water mains located on all sides of the Prudential complex. Multiple service lines enter into the Prudential Center Garage and are tied into an internal network that supplies the entire Prudential Center. Additional mains located around the Prudential Center include two 12-inch water mains in Boylston Street. The northern main is a southern low cast iron service that was installed in 1901 and the southern main is a southern high service main. This configuration results in exceptional diversity for service supplies reinforcing the local public water system.

For Exeter Residences, hydrant test data was obtained from the BWSC for a hydrant located on Exeter Street in between Boylston Street and Huntington Avenue. Included in Table 7-1 are the results of the test which indicates that there is enough flow and pressure to support the proposed buildings.

Table 7-1 Hydrant Flow Results

Date	Location	Static Pressure (psi)	Residual Pressure (psi)	Total Flow (gpm)	Flow (gpm) @ 20 psi[1]

11/18/06	Exeter Street (hydrant 2)	74	64	3340	8303

1. psi= pounds per square inch

The results of the hydrant flow test indicate the actual amount of water (flow) available and the actual pressure (residual) flow provided. These numbers are analyzed to establish the quantity of water that will be delivered at 20 psi.

Hydrant test data for 888 Boylston was obtained from the BWSC for several hydrants located along Boylston Street between Exeter and Hereford Streets. The test results, provided in Table 7-2, indicate there is adequate flow and pressure in the area of the 888 Boylston site to service the proposed building.

Table 7-2 Hydrant Flow Results

Date	Location	Static Pressure (psi)	Residual Pressure (psi)	Total Flow (gpm)	Flow (gpm) @ 20 psi[1]
7/7/97	867 Boylston Street (hydrant 130)	50	44	3164	7545
1/28/98	750 Boylston Street (hydrant 148)	98	78	3103	6470
3/6/06	889 Boylston Street (hydrant 122)	72	68	2004	8006

1. psi= pounds per square inch

Proposed Connection

Domestic water demand is based on estimated sewage generation with an added factor of ten percent for consumption, system losses, and other use. Based upon sewage generation rates, Exeter Residences is expected to generate approximately 37,500 GPD of water demand. The 888 Boylston will require approximately 35,000 gallons of water per day. This is an increase of approximately 14,000 GPD from the previously permitted water demand allowance under the Development Plan through 2001. Exeter Residences will be supplied by water service connections from the 12-inch service in Exeter Street.

As previously reviewed, construction of the 888 Boylston requires the addition of new connections for domestic water service and fire protection service. These connections will be made to existing mains at the Prudential Center North Garage.

Alternatively, the proposed service connections for 888 Boylston will be made to the southern high 12-inch water main in Boylston Street.

7.4 Stormwater Management

Stormwater management controls will be established in compliance with BWSC standards. The proponent is committed to controlling peak flows, pollutants and sediments entering into the receiving waters of the local BWSC stormwater drainage system to the extent practical. The drainage design will be reviewed and approved by the Commission as part of the Site Plan Approval process.

As stated in Section 6.8, the project site is located within the limits of the Groundwater Conservation Overlay District (GCOD), pursuant to Article 32 of the Boston Zoning Code. Exeter Residences and 888 Boylston sites are located above below grade parking garages. Based on this existing constraint, the sites offer few opportunities for recharge of stormwater. However, the proponents will work with the BWSC and the Boston Redevelopment Authority (BRA) to identify potential recharge areas within the Prudential Center in order to comply with the requirements of the GCOD.

Existing Conditions

In Exeter Street, the stormwater drainage system closely mirrors that of the sanitary system. A 12-inch northwestern flowing stormwater main combines with a 20-inch southeastern flowing stormwater main at the intersection of Blagden Street at Exeter Street. The resulting 18-inch drain pipe is routed to a collector drain in Dartmouth Street and is eventually directed to an outfall at the Charles River.

A 12-inch stormwater drain is located in Boylston Street and flows northeasterly. This drain line increases to a 33x39-inch stormwater main before the intersection of Boylston and Fairfield Streets where it discharges to a 60x72-inch combined sewer. From here the flow gets carried northward until it discharges dry weather and lower intensity flows to the WSI. During high wet weather flow events, this line overflows to a 36x48-inch combined sewer line that continues to carry flow northward to the Boston Marginal Conduit (BMC) located beneath Storrow Drive.

A 48x100 stormwater drain, which flows southwesterly in Boylston Street, combines with the 33x39-inch sanitary line at the siphon chamber at the intersection of Boylston and Hereford Streets where it discharges dry weather and lower intensity flows to the WSI. During high wet weather flow events, this line overflows to an 84-inch combined sewer line that continues to carry flow northward to the BMC located beneath Storrow Drive.

Proposed Conditions

As it exists, both development sites are nearly 100% impervious to rainfall percolation. The majority of the site is a structural slab that straddles the Prudential Center Parking Garage. The balance is generally impervious sidewalks and driveways. All the runoff from the site is collected via internal drains or off site in street drains and catch basins.

Stormwater drainage connections for Exeter Residences will be serviced via the 20-inch stormwater main in Exeter Street. 888 Boylston will be served by the 12-inch main in Boylston Street.

Compliance with DEP Stormwater Management Policy

The site drainage design for both Exeter Residences and 888 Boylston will be based on the applicable Massachusetts Department of Environmental Protection (DEP) Stormwater Performance Standards as stated in the DEP/Coastal Zone Management (CZM) Stormwater Management Policy. Compliance with the standards for the final site design will be reviewed as part of the BWSC Site Plan Review process of the building design.

Exeter Residences and 888 Boylston involve the redevelopment of a previously developed site. Standard 7 of the Stormwater Management Standards states: "Redevelopment of previously developed sites must meet the Stormwater Management Policy to the maximum extent practicable. However, if it is not practicable to meet all the Standards, new (retrofitted or expanded) stormwater management systems must be designed to improve existing conditions." To demonstrate the ways in which the site will be consistent with the Stormwater Management Policy, a discussion of each Stormwater Management Standard follows:

Standard #1: Untreated Stormwater

Storm runoff contributed by plazas and driveway areas will be treated through appropriate stormwater measures. DEP Management Standards identify rooftop runoff (except certain metal roofs) as uncontaminated for the purposes of the Stormwater Management Standards.

Standard #2: Post-Development Peak Discharge Rates

The impervious/pervious characteristics of the site are essentially the same for both the Existing and Future Conditions. Accordingly, the post-development discharge rate is expected not to exceed the pre-development discharge rate to the receiving body of water (Charles River).

Standard #3: Recharge to Groundwater

The existing site constraints make it difficult for recharge of groundwater directly within the development sites. The encouragement of groundwater recharge will be evaluated within the entire Prudential Center site and implemented where practical.

Standard #4: 80 Percent Total Suspended Solids Removal

The proposed on-site drainage collection system will use control structures that will reduce total suspended solids (TSS) to the extent practical.

Standard #5: Higher Potential Pollutant Loads

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

Standard #6: Protection of Critical Areas

The site does not contain any critical areas.

Standard #7: Redevelopment Projects

The developments will meet the Stormwater Management Standards to the maximum extent practicable, which is required to meet Standard #7.

Standard #8: Erosion/Sediment Controls

The construction documents will include measures and specifications regarding erosion and sediment controls. Construction dewatering discharges will be appropriately controlled and discharged in accordance with National Pollutant Discharge Elimination System (NPDES) and state dewatering standards.

Standard #9: Operation/Maintenance Plan

An Operation and Maintenance plan will be developed for both construction and post-development, which will include, at a minimum, system ownership information, parties responsible for operation and maintenance, and inspection and maintenance schedules. Routine maintenance is expected to include catch basin cleaning, stormwater control cleaning, and removal of debris from outlets. It is also expected that pedestrian and vehicular access ways will be swept appropriately to control sand applied during winter months.

Measures aimed at minimizing the disposition of site soils to off-site areas, primarily the surrounding streets and existing drainage collection systems, will be a part of the City's required Construction Management Plan. In addition, the proponent will apply for all appropriate permits for construction activity and dewatering. All efforts will be made to contain sediment, pollutants, and any other construction related materials within the site. Stabilized construction exits will be installed at each access point of the work areas to minimize off-site transport of soil by construction vehicles. These exits will remain in place until site areas have been stabilized. In addition, the proponent will use Best Management Practices (BMP's) during construction such as installing silt sacks on catch basins, a truck-trailer wheel wash station, anti-tracking pads, and covering material piles.

7.5 Anticipated Energy Needs

This section describes the anticipated energy needs per type of services needed.

Gas Service

KeySpan Energy provides gas transmission service to the facility. Gas may be purchased from several providers including KeySpan, Total Gas & electric, Metromedia Energy, and Amoco Energy Trading Corp.

At this time, a decision to utilize gas or TriGEN Steam to meet Exeter Residences's demand has not yet been made. The Proponent does not intend to use gas to meet the 888 Boylston's heating or hot water requirements, however future restaurants (if any) at the retail level would probably use gas for cooking.

Steam Service

The Exeter Residences and the 888 Boylston Proponents are currently exploring the use of steam supplied by TriGEN to meet the heating and hot water requirement of the proposed buildings. TriGEN currently provides steam service to the Prudential Center. The required steam for the new buildings will be an extension of that service. Economic review that is still ongoing will determine if gas of TriGEN steam will be included to serve Exeter Residences's heating and hot water requirements.

Based on a heating and hot water demand of 50 British Thermal Units (BTUs)/hr/sf, Exeter Residences will have a demand of 13.5 million BTUs/hr.

Based on a heating and hot water demand of 30 British Thermal Units (BTUs)/hr/sf, the 888 Boylston will have a demand of 13.7 million BTUs/hr.

Electrical Service

Electricity is provided to the Exeter Residences site by NSTAR Electric Company. Based upon a typical demand of 4-5 watts per square foot, Exeter Residences will require 2 megawatts (MW) of power. It is anticipated that NSTAR will be able to meet this demand.

NSTAR will supply electricity to the sites via existing infrastructure in Exeter Street. The Exeter Residences will require the installation of 13.8 kilovolts (kV) electrical lines from Exeter Street into a transformer room within the project site. The Proponent will coordinate the installation of electrical service with NSTAR and obtain all required permits.

Electricity is provided to the 888 Boylston site by NSTAR Electric Company. Based upon a typical demand of 7-8 watts per square foot, 888 Boylston will require 3.6 megawatts (MW) of power. It is anticipated that NSTAR will be able to meet this demand.

NSTAR will supply electricity to the 888 Boylston site via existing infrastructure in Boylston Street. This will require the installation of 13.8 kilovolts (kV) electrical lines from Boylston Street into a transformer room within the 888 Boylston site. The Proponent will coordinate the installation of electrical service with NSTAR and obtain all required permits.

Telecommunication Service

The Proponent will select a private telecommunications company to provide telephone, cable, and data to Exeter Residences and 888 Boylston. Possible candidates to provide that service include AT&T Broadband, RCN, and Verizon. All these services are available from existing facilities at the Prudential Center.

Access to the building sites will be from Exeter Street or through the Prudential Garage for Exeter Residences and from Boylston Street for 888 Boylston. The Proponent will obtain all required permits.

7.6 Protection of Utilities

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

7.7 Construction Coordination

The proponent will continue to work and coordinate with the utility companies to assure the compliance and integrity of the project.

7.8 Sustainable Design/Energy Conservation

The energy conservation features to be included in Exeter Residences and 888 Boylston are described in this section and also referenced in the sustainability section in the Environmental Projection Component. Consideration will be given to the following energy conservation measures for Exeter Residences and 888 Boylston

- Heavily insulated walls and roofs
- Insulating glass with special coatings and low heat transfer values
- Water side economizer to reduce cooling compressor operation during the winter for 888 Boylston
- Heat pump system for Exeter Residences
- Reclaimed heat from lights with perimeter fan boxes for 888 Boylston
- Monitoring and control all building functions with DDC controls for 888 Boylston
- Utilization of high efficiency motors
- Variable frequency drives on fan and pump motors
- Utilization of high efficiency fluorescent lamps and electronic ballasts.

7.9 Conclusions

Exeter Residences and 888 Boylston will use the existing water, sewer, drain, and electrical systems available from the Prudential Center or public streets adjacent the both sites. Research and coordination to date indicates that these services are adequately sized to support the increased demands associated with the additional program associated with Exeter Residences and 888 Boylston. The proponent will continue to work with the utility authorities on the design and servicing of the two new buildings. The proposed design approach is consistent with DEP's Stormwater Management Policy and it incorporates a number of sustainable design and energy conservation measures.

8
Development Impact Project Component

8.1 Introduction

This component of the Project Notification Form (PNF) for Exeter Residences and 888 Boylston outlines the Development Impact Project requirements for housing linkage and jobs linkage in the sections that follow as required by Article 80.

8.2 Prudential Center as Development Impact Project

The Prudential Center redevelopment as a whole is a Development Impact Project within the meaning of Article 26A and 26B, predecessors to Section 80B-7, and within the meaning of Section 80B-7. As a Development Impact Project, housing linkage funds are paid which are designed to mitigate the impacts of large scale real estate development on the supply of low and moderate income housing. A jobs contribution exaction is also paid which is designed to mitigate the effects of new large-scale real estate development by providing for related job training for low and moderate income people.

A Development Impact Project Agreement was executed between the BRA and Prudential, dated April 17, 1990, as amended on January 21, 2005, which established the obligations of the developer of Prudential Center for housing linkage, either through a housing creation option or a housing payment option, and for jobs linkage. The obligations of the developer were due on various "Housing Payment Dates" or

"Jobs Payment Dates" which coincided with the issuance of building permits for various phases of the Prudential Center Redevelopment. In accordance with the rates applicable at the time of execution of the 1990 DIP Agreement, housing linkage is payable at the rate of $5.00/SF occupied by a Development Impact Use and jobs linkage is payable at the rate of $1.00/SF occupied by a Development Impact Use. In accordance with the rates applicable at the time of execution of Amendment No. 3 to Development Plan related to the Mandarin Oriental Boston, the DIP Agreement was amended to reflect the rates applicable at the time of filing of the application for Amendment No. 3 to Development Plan, in accordance with which housing linkage for Mandarin Oriental Boston is payable at the rate of $5.49/SF occupied by a Development Impact Use and jobs linkage is payable at the rate of $1.09/SF occupied by a Development Impact Use. Effective April 5, 2006, linkage rates were increased to $7.87/SF occupied by a Development Impact Use for housing linkage and to $1.57/SF occupied by a Development Impact Use for jobs linkage. In connection with Exeter Residences and 888 Boylston, the DIP Agreement will be further amended to reflect those for Exeter Residences and the increases for the square footage for 888 Boylston approved under the Fourth Amendment to Development which is additional to that previously approved under the Development Plan.

8.3 Housing Linkage

Development Impact Uses as defined in Article 80B-7 excludes residential uses but includes commercial uses, such as office and retail, and public space uses. Exeter Residences is estimated to have 2,500 square feet of retail and common space dedicated to Development Impact Uses. 888 Boylston and the remainder of Phase 4a is estimated to have 151,500 square feet of retail and common space dedicated to Development Impact Uses, additional to the 287,493 square feet dedicated under the previously approved program at the schematic level for the Development Plan. At the rate of $5.00/SF for the areas included in the Approved Project in 1990 and at the rate of $7.87/SF for the additional area proposed by this Notice of Project Change/Project Notification Form, the Projects will contribute $2,649,445 in housing linkage payments. This is an increase of $1,211,980 over the housing linkage payment of $1,437,465 which would have been due for the Approved Project.

8.4 Jobs Linkage

Exeter Residences is estimated to have 2,500 square feet of retail and common space dedicated to Development Impact Uses. 888 Boylston and the remainder of Phase 4a is estimated to have 151,500 square feet of retail and common space dedicated to Development Impact Uses, additional to the 287,493 square feet dedicated under the previously approved program at the schematic level for the Development Plan. At the rate of $1.00/SF for the areas included in the Approved Project in 1990 and at the rate of $1.57/SF for the additional area proposed by this Notice of Project Change/Project Notification Form, the Projects will contribute $529,273 in jobs linkage payments. This is an increase of $241,152 over the jobs linkage payment of $241,780 which would have been due for the Approved Project.

9

Review List

9.1 Introduction

This *Notice of Project Change /Project Notification Form* (NPC/PNF) for Exeter Residences and 888 Boylston is being distributed to public agencies, city and community groups concerned with the development of the Prudential Center area, and to the interested parties listed below. This list includes those entities that Article 80 requires as part of the review of the document. Additional copies of this report are available from Mark Junghans, Vanasse Hangen Brustlin, Inc. (VHB), 99 High Street, Boston, MA 02110 telephone (617) 728-7777.

Public Agencies

Office of the Mayor

Chief of Staff,
City of Boston Mayor's Office
One City Hall Square
Boston, MA 02201

Boston Assessing Department

Mr. Ronald Rakow, Commissioner
Boston Assessing Department
One City Hall Square, Room 301
Boston, MA 02201

Boston Transportation Department

Mr. Thomas Tinlin, Commissioner
Boston Transportation Department
One City Hall Square, Room 721
Boston, MA 02201

Vineet Gupta
Boston Transportation Department
One City Hall Square, Room 721
Boston, MA 02201

Boston Civic Design Commission

Mr. David A. Carlson, Executive Director
Boston Civic Design Commission
Boston Redevelopment Authority
Room 939, City Hall
Boston, MA 02201

Boston Environment Department

Mr. Bryan Glascock
Boston Environment Department
One City Hall Square, Room 805
Boston, MA 02201

Boston Fire Department

Commissioner Roderick J. Fraser Jr.
Boston Fire Department
115 Southhampton Street
Boston, MA 02118

Fire Marshal Joseph M. Fleming
Boston Fire Department
115 Southampton Street
Boston, MA 02118

Boston Law Department

Mr. William Sinnott
Chief General Counsel
Law Department
One City Hall Square, Room 615
Boston, MA 02201

Boston Police Department

Commissioner Edward Davis
Boston Police Department
1 Schroeder Plaza
Boston, MA 02120

Boston Public Works

Mr. Dennis Royer
Public Works Department
Room 710, City Hall
Boston, MA 02201

Para M. Jayasinghe, PE
Public Works Department
Room 710, City Hall
Boston, MA 02201

Boston Parks and Recreation Department

Antonia Pollack, Commissioner
Boston Parks and Recreation
Department
1010 Massachusetts Avenue
Boston, MA 02118

Boston Water and Sewer Commission

Vincent G. Mannering
Executive Director
Boston Water and Sewer
Commission
PO Box 199177
Roxbury, MA 02119-9177

Department of Neighborhood Development

Joanne Massaro, Director
Department of Neighborhood Development
26 Court Street
Boston, MA 02108

Inspectional Services Department

Commissioner William Good
Inspectional Services Department
1010 Massachusetts Avenue
Boston, MA 02118

Mayor's Office of Neighborhood Services

Jay Walsh, Director
One City Hall Square, Room 708
Boston, MA 02201

Department of Environmental Protection

Division of Wetlands and Waterways
One Winter Street
Boston, MA 02108

Prudential Planning Adivsory Committee (PruPAC)

Ms. Betsy Johnson
President/Chair PruPAC
Claremont Neighborhood Association
11½ Greenwich Park
Boston, MA 02118

Ms. Marianne Abrams
Vice Chair PruPAC
League of Women Voters
101 Monmouth Street, Suite 915
Brookline, MA 02446

Mr. Elliott Laffer
Vice Chair/Treasurer PruPAC
Neighborhood Association of the Back Bay
90 Commonwealth Avenue
Boston, MA 02116

Mr. John Achatz
Beacon Hill Civic Association
74 Jay Street
Boston, MA 02114

Mr. Robert Banks
Ironworkers Local 7
195 Old Colony Avenue
Boston, MA 02127

Ms. Pam Beale
Kenmore Association
P.O. Box 15735
Boston, MA 02215

Mr. Robert Bradley
St. Botolph Neighborhood Association
167 Warren Street
Boston, MA 02118

Mr. James Coyle
Building & Construction Trade
12A Everdean Street #2
Boston, MA 02122

Mr. Malcolm Davis
Boston Society of Architects
790 Boylston Street, Apt. 19-I
Boston, MA 02199-7919

Mr. Ronald Druker

Ms. Kathleen Emrich

Mr. Douglas Fiebelkorn

:Chamber of Commerce
c/o 50 Federal Street
Boston, MA 02110

Ellis Neighborhood Association
48 Montgomery Street
Boston, MA 02116

Bay Village Neighborhood Association
29 Appleton Street
Boston, MA 02116

Ms. Barbara Foster
Symphony United Neighbors
43 Symphony Road, #1-0
Boston, MA 02115

Mr. Anthony Gordon
Boylston Street Association
P.O. Box 304
Boston, MA 02117

Mr. David Grissino
c/o Good Clancy
40 Boylston Street
Boston, MA 02116

Ms. Clare Hayes
Boston League of Women Voters
156 West Canton Street
Boston, MA 02118

Mr. Barry Hoffman
Boylston Street Association
558 Clapboard Tree Street
Westwood, MA 02090

Mr. Richard Kiley
Fenway Civic Association
One Nassau Street, Suite 1606
Boston, MA 02111-1584

Mr. James Klocke
Boston Chamber of Commerce
One Beacon Street
Boston, MA 02108-3114

Mr. Marc Laderman
Fenway Community
Development Corporation
87 Gainsborough Street
Boston, MA 02115

Mr. Marc Lucas
NSTAR/Boston Edison Company
800 Boylston Street
Boston, MA 02199

Ms. Cynthia Chace MacNiel
Pilot Block Neighborhood
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127 Pembroke Street
Boston, MA 02118

Ms. Meg Mainzer-Cohen
Back Bay Association
234 Clarendon Street
Boston, MA 02116

Mr. Kevin Maloney
Fenway Civic Association
51 Park Drive, Apt. 28
Boston, MA 02215

Mr. Warren Markarian
Prudential Center Residents
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790 Boylston Street, Apt. 7H
Boston, MA 02199-7919

Ms. Terri North, President
Kenmore Residents Group
464-466 Commonwealth Avenue
Boston, MA 02215

Mr. Ted Pietras
Pilot Block Neighborhood Association
167 Warren Street
Boston, MA 02118

Ms. Margaret Pokorny
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Back Bay (NABB)
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Boston, MA 02115

Ms. Nancy Restuccia
St. Botolph Neighborhood
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9 Harcourt Street, Apt 504
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Mr. James Rooney
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Authority
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Boston, MA 02210

Councilor Michael Ross
Boston City Councilor,
District 8
One City Hall Square
Boston, MA 02201

Ms. Laura Sargent
The Office of State
Representative
District 8
State House, Room 443
Boston, MA 02133

Mr. Walter Salvi
NSTAR Electric & Gas Corp.
One NSTAR Way, MA-14
Westwood, MA 02090-9230

Mr. Patrick Sarkis

Mr. Anthony Selvaggi

Mr. Kenneth Sinkiewicz

Back Bay Association
c/o Back Bay Restaurant Group
284 Newbury Street
Boston, MA 02115

Mr. Raymond Skiba
Ellis Neighborhood Association
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Boston, MA
02218

Rep. Marty Walz
eRepresentative
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State House, Room 443
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Prudential Center Residents
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Boston City Councilor,
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Boston City Hall
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Massachusetts Convention Center
Authority
415 Summer Street
Boston, MA 02210

Mr. Peter Thomson
Beacon Hill Civic Association
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Boston, MA 02114

South End Historical Society

Mr. Michael Leabman
South End Historical Society
532 Massachusetts Avenue
Boston, MA 02118

Proponent

Mr. Michael A. Cantalupa
Boston Properties
800 Boylston Street, Suite 1900
Boston, MA 02199

AvalonBay Communities

Mr. Michael Roberts
AvalonBay Communities
51 Sleeper Street, Suite 750
Boston, MA 02210

10

Signatures

This expanded Project Notification Form has been circulated to agencies and persons in accordance with the provisions of the Boston Zoning Code, Section 80A-3.

Proponent		**Preparer**	
Boston Properties		Vanasse Hangen Brustlin, Inc.	
	8-27-07		8/27/07
Michael A. Cantalupa Senior Vice President of Development	Date	Mark Junghans, P.E. Senior Project Manager	Date

Technical Appendices

Prudential Center Redevelopment

Exeter Residences & 888 Boylston

Phases 6 & 4a
Boston, MA

Submitted Pursuant to Article 80 of the Boston Zoning Code

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

Submitted by:
Boston Properties, Inc.
800 Boylston Street
Boston, MA 02199

Prepared by:
Vanasse Hangen Brustlin, Inc.
99 High Street, 10th Floor
Boston, MA 02110

In association with:
Goulston & Storrs
Boston, MA

CBT
Boston, MA

Elkus/Manfredi Architects
Boston, MA

AvalonBay Communities, Inc.
Boston, MA

Volume II

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APPENDIX

A - PROPOSED SCOPE FOR ARTICLE 80B LARGE PROJECT REVIEW – Exeter Residences (Phase 6) & 888 Boylston (Phase 4a)

PROPOSED SCOPE FOR ARTICLE 80B LARGE PROJECT REVIEW

PRUDENTIAL CENTER PLANNED DEVELOPMENT AREA NO. 37

NOTICE OF PROJECT CHANGE/PROJECT NOTIFICATION FORM

SUBMISSION REQUIREMENTS

PROPOSED PROJECT PHASES: **THE EXETER RESIDENCES (PHASE 6)**
888 BOYLSTON STREET (PHASE 4a)

PROPONENT: **BP PRUCENTER ACQUISITION LLC**

The following shall be contained in a Notice of Project Change/Project Notification Form for Planned Development Area No. 37.

I. PROPOSED PROJECT PHASES

The Proposed Project Phases consist of two components: The Exeter Residences, a residential component to be constructed in the portion of the Planned Development Area referred to as Phase 6, and a modification to the 888 Boylston Street Office Building to be constructed in the portion of the Planned Development Area referred to as Phase 4a.

The Exeter Residences, which is located in the portion of the Planned Development Area referred to as Phase 6, was contemplated in the Master Plan approved in 2003 but has not been reviewed to date under Article 80B Large Project Review. The 888 Boylston Street building, which is located within the portion of the Planned Development Area, referred to as Phase 4a, was reviewed in 1990 under Article 31 Large Project Review (the predecessor to Article 80) but is being reviewed with respect to changes to the height and massing proposed since the original Development Plan.

As currently envisioned, the Project Phases are proposed to include the following program for Phases 6 and 4a:

	Development Plan Approved Program	*New Program*	*Change from the Approved Development Plan*
Phase 6			
<u>The Exeter Residences</u>			
Residential (approximately 200 units)	0	252,500 sf	252,500 sf
Ground Floor Retail	0	2,500 sf	2,500 sf
Parking	0	0	0

	Development Plan Approved Program	*New Program*	*Change from the Approved Development Plan*
Phase 4a			
<u>888 Boylston Street</u> (includes the remainder of Phase 4a)			
Office Space	219, 996 sf	369,000 sf	149,004 sf
First and Second Floor Retail	48,990 sf	51,000 sf	2,010 sf
Common Area	18, 507 sf	19,500 sf	993 sf
Parking	58 spaces	240 spaces	182 spaces

Notes:
1. Total square foot (s.f.) numbers are approximate.
2. Program square footages are calculated based on the definition of Gross Floor Area in the City of Boston Zoning Code. Proposed square footages to be further refined as the design is developed
3. Development Plan Phase 4a includes 49,515 sf of pre-existing space.
4. Parking for The Exeter Residences will be provided by reallocation of approximately 140 spaces from the existing residential spaces at the Prudential Garage to The Exeter Residences.

<u>The Exeter Residences</u>

The Exeter Residences is proposed to be sited on the eastern edge of the Prudential Center Planned Development Area (PDA) and will be bounded by Exeter Street to the east; an existing Shaws grocery store to the south; an existing Lord & Taylor department store to the north; and a public plaza to the west. The building is proposed to rise in a footprint that spans parts of the existing Prudential Center parking garage entrance and takes the place of a portion of the Lord & Taylor department store footprint.

As proposed, The Exeter Residences will provide approximately 200 units of rental housing in a building with 30 above grade levels. This building is proposed to infill a significant city block connecting Boylston Street to Huntington Avenue and is proposed to minimize the effects of an existing loading dock and parking garage entrance by establishing an active edge of retail and residential uses, thereby enlivening the block and engaging pedestrians.

The Exeter Residences is envisioned as a vertically articulated tower clad with contemporary materials. The roof of the building is proposed to rise 330 feet above Exeter Street. As proposed, the façade will step away from the street wall near the top to create a distinctive geometry providing building identity and enhancing the city's skyline. The building will rest on a four-story tall base clad in natural stone or similar material in pedestrian-friendly proportions.

888 Boylston Street

888 Boylston Street is proposed to be a 19 story mixed use building, incorporating street and arcade level retail space with 17 stories of office space above, supported by 2 levels of underground parking representing an 8 story addition to the previously approved Phase 4a project. Situated between the Prudential Center Arcade entrance and the Hynes Convention Center, the building is proposed to be set back from Boylston Street to create a new pedestrian scaled street level plaza, replacing the existing, two-level plaza. As proposed, the building will be moved slightly forward from previous proposals to avoid an existing fan-room owned and operated by the Massachusetts Turnpike Authority for the Turnpike tunnel.

Although taller than previously approved, 888 Boylston is similar to the building included as the development component of Phase 4a in the 1990 Development Plan in being conceived as a foreground element to the Prudential Tower, with a smooth curved glass curtainwall contrasting with the adjacent masonry structures on Boylston Street. As proposed, the curved façade will reduce the apparent width of the building and create a dynamic relationship between it, the Mandarin Oriental Boston and the Hynes Convention Center.

II. DEVELOPMENT REVIEW REQUIREMENTS

The proposed filing should update and revise the previous Large Project Review studies submitted for the Prudential Center under the Article 31 and the Article 80B Large Project Review processes through the approval of the Boylston Street Mixed Use Project in 2002.

A. TRANSPORTATION COMPONENT

The transportation component should update the previous studies performed for the Prudential Center, most recently the detailed analysis prepared for the Boylston Street Mixed Use Project which is currently under construction. The study should address technical issues, questions and studies related to transportation, traffic and pedestrian operations. Transportation management issues, particularly specific site access issues, on-site parking, and development of a loading and service management plan should be addressed.

1. Study Area

The transportation study should consist of a thorough analysis of the project's transportation impacts throughout the study area. The study area should be comprised of the following seven (7) intersections:

1. Boylston Street at Gloucester Street
2. Boylston Street at Fairfield Street/Prudential Arcade
3. Boylston Street at East Ring Road
4. Boylston Street at Exeter Street
5. Boylston Street at Dalton Street/Hereford Street

6. Huntington Avenue at Exeter Street
7. Huntington Avenue at East Ring Road

This section should review all relevant project proposals and planning studies that would affect the study area intersections, and incorporate these into the transportation analysis.

The transportation study should address the technical issues, questions, and studies related to transportation that are required by the Boston Transportation Department (as discussed with the BTD). Development of technical analysis scenarios in support of the new program for the weekday morning and evening commuter peak hours should include:

- 2006 Existing Conditions
- 2011 No-Build Conditions
- 2011 Build Conditions
- 2011 Build Conditions Mitigated (if necessary)

2. Traffic Volumes

The weekday morning, weekday evening and Saturday peaks for Boylston Street and Huntington Avenue should be determined. Data should be collected on weekday volumes for the intersections listed above, to indicate traffic volumes for peak hours and off-peak hours. Turning movement counts should be collected from 7:00 to 9:00 AM and 4:00 to 6:00 PM for weekday morning and weekday evening peak periods respectively. The Saturday counts should be performed during 2:00 to 6:00 PM. Automatic Traffic Recorders should be placed along Boylston Street and Huntington Avenue for 48 hours. Traffic and pedestrian volume counts at all study area intersections for peak periods should be conducted under existing conditions.

3. Trip Generation Analysis

The trip generation methodology and the basis for the underlying assumptions should be detailed. The source and basis for the trip generation rates, vehicle occupancy rates, and mode split should be explained in detail. This section should provide information on the number of person-trips expected, and the resulting vehicle-trips, transit-trips, and pedestrian-trips generated by the new program. The calculations should be based on trip generation rates, presented in the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 7th Edition*. ITE rates should be used to generate total person-trips by correcting for vehicle occupancy rate (VOR) consistent with the City of Boston guidelines. The mode split assumptions based on BTD's mode share data for Zone 4 should be used for the new program and should be compared for consistency with the Boylston Street Mixed Use Project (2002).

4. Vehicle Trip Distribution Analysis

This section should discuss the trip distribution methodology based on existing travel patterns in the Boylston Street and Huntington Avenue Corridors and the surrounding neighborhood. The trip distribution should identify the directional split (i.e. north, south, east and west) of person-trips and vehicle-trips for the specific location and trip types of the proposed project. The distribution patterns used in the previous Large Project Review studies submitted for the Prudential Center through the approval of the Boylston Street Mixed Use Project in 2002 should be the basis for this analysis. The distributed trips should be assigned to the appropriate means of accessing the project highway routes, surface streets and intersections, sidewalks, crosswalks, site access/egress points and public transit lines.

5. Traffic Operations Analysis

The traffic operations analysis should be based on a horizon year which is five (5) years in the future. The analysis of transportation impacts should be based on 2006 existing condition and projected to the year 2011 with an annual growth rate of one (1) percent. Approved development projects in the vicinity of the study area including the Mandarin Oriental Boston, the Columbus Center, The Clarendon and 154 Berkeley Street should be reviewed and included as background growth within the 2011 No-Build Condition analysis. This section should summarize and discuss 2006 Existing Condition, future 2011 No Build and 2011 Build Conditions with respect to traffic operations for the study area intersections and site access driveways.

Existing issues related to roadway capacity, loading impacts, pedestrian crosswalk and sidewalk safety and queuing to approaches along the Exeter Street corridor should be identified and addressed. In addition, existing traffic operations should be examined in detail for the driveways and intersections along Exeter Street, specifically, curb uses adjacent to The Exeter Residences site.

Traffic signal layout and operations during peak hours at the intersection of Huntington Avenue and Exeter Street/Stuart Street should be observed. Safety enhancements should be evaluated to improve vehicular and pedestrian operations at this intersection.

Existing operations at the intersection of Massachusetts Avenue at Boylston Street also should be observed and any operational deficiencies should be reported.

Traffic capacity analyses should be included at study area intersections for Existing Condition, Future No-Build Condition, and Future Build Condition. These capacity analyses should be performed using the latest version of SYNCHRO for the peak periods mentioned above. Level-of Service, volume-to-capacity ratio and delay results should be summarized.

6. Parking Supply/Demand and Impacts

This section should analyze the projected parking demand for the new program and proposed parking supply. The existing usage and operations of the existing Prudential Center parking facilities may provide a baseline for projecting future use patterns and needs. The existing garage operations and utilization/management of the parking spaces for the existing Prudential Center garages should be observed and summarized. Entry and exit locations should be examined and the circulation patterns within the existing parking garages should be analyzed. This section should evaluate the additional parking requirement and present a justification for the need of the additional spaces. This section should build on this information and update the parking studies done to-date.

7. Loading and Servicing

The anticipated loading and servicing needs for the new program, the expected volume and vehicle types should be described. Updated allocation of spaces for loading and trash management within existing loading areas should be reviewed and documented. The capacity of the existing (Shaw's) and proposed Boylston Street Mixed Use Project loading areas for truck service to service the new program and the adequacy of existing driveways should be analyzed.

The existing loading operations at the Shaw's Supermarket loading bays should be observed and used as a basis for calculating the loading requirements for The Exeter Residences residential units. Trash management for the residential buildings within the Prudential Center site should be discussed. The existing loading facility at the North loading dock should be evaluated to accommodate the demand for the 888 Boylston Street building.

The following service and loading requirements should be described:

- Number of loading bays
- Services to be provided and level of loading and service activity
- Loading and service schedule, schedule restrictions
- Design vehicle(s) and required truck turning movements
- Major loading and service vehicle routes for site access and egress and access for emergency vehicles.

8. Public Transportation Analysis

It is anticipated that the majority of site trips will be via public transportation and pedestrian trips. The MBTA train and bus service will play an important role in serving users of both building sites. This section should provide an analysis of the number of transit trips the new program will be expected to generate and determine the availability of transit services to serve these demands. Any adjustments to off-site transportation and transit conditions to help support the new program should be discussed. Special attention should be given to Prudential, Copley and Hynes Stations. The capacities of MBTA bus routes serving the Prudential Center along Boylston Street and Huntington Avenue should be evaluated. Existing curb use related to taxi stands and bus stops should be observed near the 888 Boylston Street building and the need for the relocation of any bus stops and taxi stands should be reviewed. Any relocation of bus stops should be designed to provide easy access from the entrances of the buildings along Boylston Street.

9. Pedestrian and Bicycle Environment

This section should discuss the pedestrian and bicycle accommodations that are provided within and in the vicinity of the site. This section should review the integration of the proposed buildings into the developed pedestrian fabric of the Prudential Center and surrounding streets. Pedestrian impacts within the study area should be evaluated to include:

- Pedestrian access to and from the project, pedestrian circulation routes
- Pedestrian accommodation in the project's public spaces (e.g. sidewalk, adjacent intersections, plaza spaces, benches, etc.)

10. Travel Demand Management (TDM)

The proponent should confirm its commitment to developing a comprehensive travel demand management program as part of the updated project. Specific TDM commitments should be discussed. The measures committed to in the existing TAPA for the Prudential Center Redevelopment should be used as basis for this discussion, and a proposed amendment to the existing TAPA reflecting any modifications or additional mitigation should be provided.

11. Construction Management

This section should present an overview of construction period transportation impacts and proposed short-term mitigation. The Construction Management Plans used for the 111 Huntington Avenue and the Boylston Street Mixed Use Project on Boylston Street should be utilized as models for a preliminary Construction Management Plan.

12. Mitigation

Any roadway and traffic improvements proposed should be discussed and should be specified in an amendment to the existing TAPA for the Prudential Center Redevelopment. The mitigation measures committed to in the existing Prudential Center Redevelopment TAPA should be reviewed and the status of the improvements implemented for the projects constructed to date should be reported.

B. ENVIRONMENTAL PROTECTION COMPONENT

1. Wind

The Exeter Residences building represents a new element that was not previously studied in the Development Plan. The proposed building at 888 Boylston Street is a modification of a previously approved building that was analyzed as part of the Prudential Center Development Plan.

In order to provide a comprehensive review of the wind environment, the proponent should include a complete quantitative wind tunnel review of pedestrian level winds and the proposed buildings to assess changes to the wind environment resulting from the massing and discuss the design features that will be included to mitigate impacts on the pedestrian environment in order to maintain wind conditions and velocities within acceptable levels. The Wind Study should be prepared in accordance with the protocol of the Boston Redevelopment Authority Development Review Guidelines (2006).

2. Shadow

This section should provide a shadow analysis in accordance with the requirements of the Boston Redevelopment Authority Development Review Guidelines (2006), including analysis of the incremental effects of the proposed development on existing and proposed public open spaces and pedestrian areas and showing existing and new shadows. These public open spaces include sidewalks, pedestrian walkways and transit stops in the vicinity of the project and parks, plazas and other open space areas.

3. Daylight

Daylighting analysis should be performed for both sites by measuring the percentage of skydome that is obstructed by each building and comparing current and proposed daylighting conditions at the public way. The Daylight Study should be prepared in accordance with the protocol of the Boston Redevelopment Authority Development Review Guidelines (2006).

4. Solar Glare

A qualitative analysis of any potential solar glare issues should be provided in accordance with the protocol of the Boston Redevelopment Authority Development Review Guidelines (2006). This should include a review of existing traffic patterns and potential impacts affecting streets, public open spaces and pedestrian areas and a proposed design approach to limit those impacts.

5. Air Quality

The previous site review included development of a comprehensive Air Quality analysis that evaluated the proposed transportation related impacts, location of garage ventilation components and key analysis points throughout the Prudential Center. The proponent should indicate whether the proposed construction modifies the garage ventilation intake and exhaust points and configurations as previously analyzed and whether it will have a significant impact on the operations of the local transportation network. If significant modifications are not proposed, the proponent should include a qualitative assessment of the changes to the air quality environment and the proponent should coordinate with the Boston Environment Department in the preparation of this section.

6. Water Quality

The Prudential Center is not located near any waterbody or wetland. Therefore, impacts on water quality, if any, are expected to be negligible. Accordingly, further study is not required.

7. Flood Hazard Zone

The Prudential Center is not located near within a flood hazard district. Accordingly, further study is not required.

8. Stormwater Management

Stormwater management controls should be established in compliance with BWSC standards. The proponent should discuss the methods of controlling peak flows, pollutants and sediments entering into the receiving waters of the local BWSC stormwater drainage system and groundwater to the extent practical. The drainage design should be reviewed and approved by BWSC as part of the Site Plan Review process.

9. Noise

The proposed buildings should be designed to comply with state and local noise ordinances and the residential building should be designed to comply with the federal Interior Design Noise Level. The primary noise sources will likely be the mechanical and HVAC equipment necessary to maintain environmental controls for building operations. To establish the base conditions the proponent should undertake a noise monitoring program in and around the proposed building sites to determine baseline day and night noise levels.

The noise assessment should qualitatively evaluate proposed equipment and identify appropriate mitigation and design elements to reduce excessive noise levels to acceptable limits. This section should also outline anticipated construction noise impacts and identify measures that will be undertaken to limit noise impacts during construction.

10. Solid and Hazardous Wastes

All of the proposed construction is located either over the existing Prudential Center garage or existing Prudential Center structures. Construction of the foundation systems and utility services will penetrate these structures and extend into the underlying soil. Given the developed nature of the site and the experience of previous activity on the site, the proponent should retain a firm to provide Licensed Site Professional (LSP) consulting services for the assessment of site conditions as they relate to site contamination and environmental regulatory compliance that may be encountered. Subsurface exploration programs should be completed to characterize site conditions regarding concentrations of any hazardous wastes or contaminants in soil, groundwater, and soil vapor. If contamination is identified, appropriate soil and groundwater management actions should be undertaken prior to and during construction.

As typical of construction on previously developed properties, excavated material may be composed of below-grade remains of former structures, miscellaneous fill placed during earlier development activities, and underlying naturally-deposited soils. The proponent should characterize the fill and commit to dispose of it appropriately.

11. Groundwater

The site's location within the Back Bay makes it critical that the building design addresses measures that protect the groundwater levels during construction and in the final condition. The proponent should identify the design considerations being evaluated to address the city's Groundwater Conservation Overlay District standards focused on providing groundwater recharge. The proponent should coordinate this effort with the Boston Groundwater Trust.

12. Geotechnical Impact

The proponent should describe existing subsoil and geotechnical conditions in and around the site including ground movement and settlement during excavation. The effect these conditions have on foundation construction, excavation and building design should be described.

13. Construction Impacts

This section should outline the anticipated construction plan for each building and the means and methods that will be used to comply with the city's construction management guidelines. The proposed construction process, including demolition, excavation and building erection, should be described.

14. Wildlife Habitat/Natural Features.

The site is a fully developed urban site. No significant flora, fauna or natural features are present. Accordingly, further study is not required.

15. Sustainable Design

The proposed project phases should comply with the recently-adopted Article 37 of the Boston Zoning Code. The proponent is encouraged to develop a plan to limit the use of environmental resources while providing modern and livable spaces. Accordingly, the proponent should demonstrate that the proposed buildings are designed to satisfy the BRA's Development Review Guidelines (2006) regarding sustainable development. This section should describe the sustainable design features and components with the overall intent of creating a durable, safe, sustainable environment for the community.

C. URBAN DESIGN COMPONENT

This section should document the design basis for each of the proposed buildings. Both The Exeter Residences and 888 Boylston Street buildings should integrate into the fabric of the Prudential Center and the surrounding neighborhood by providing pedestrian connections that relate to surrounding buildings. Each should establish its own identity and design character. This section should include a separate design discussion for each of the proposed buildings.

The document should evaluate the urban design elements of the proposed buildings addressing the following design aspects:

- Design Development
- Height and Massing
- Character and Materials
- Open Space and Pedestrian Environment
- Parking
- Vehicle Access and circulation
- Conformance with the Boylston Street Master Plan (888 Boylston Street only)

The document should include the submissions in connection with Project Schematics based on the 2006 Development Review Guidelines.

D. INFRASTRUCTURE SYSTEMS COMPONENT

1. Utility Systems and Water Quality

The proponent should estimate the approximate water consumption and generation of sewage based on the types of uses and corresponding square footage on the site as outlined in the Commonwealth's Department of Environmental Protection (DEP) Sewer Connection and Extension Regulations. The proponent should work closely with BWSC on the design and capacity of the proposed connection to the sewer system.

2. Energy Systems

The proponent should determine the energy needs for the new program and work with the appropriate utility companies to confirm adequate capacity will be available to serve the site. The proponent should also coordinate connection locations with existing systems serving the area.

3. Domestic Water and Fire Protection

Water will be provided by the BWSC from systems in the public way and interconnections to systems within the Prudential Center. The proponent should obtain actual flow and pressure data from the BWSC and compare it to the needs of the proposed program. The proponent should work closely with the BWSC to ensure that adequate water supply and pressure will be available to serve the proposed buildings and the surrounding area.

4. Rodent Control

In order to control any potential rodent concerns, the City enforces the requirements established under the Massachusetts State Sanitary Code and the State Building Code. The proponent should prepare a comprehensive rodent control program for each building site.

E. HISTORIC RESOURCES COMPONENT

Based on the existing historic resource analysis prepared as part of the original Prudential Center Redevelopment, the proponent should locate any proposed historic resources within one-quarter mile of the site and identify any anticipated impacts on historic resources that may result. The proponent should coordinate this effort, as necessary, with the Boston Landmarks Commission as the design and technical analyses are developed.

F. ADDITIONAL INFORMATION AND SUBMISSION REQUIREMENTS

1. Applicant Information

2. Development Team Information

3. Community Groups Consulted

This section should list meetings held and proposed to be held with the Prudential Center Project Advisory Committee (“PruPAC”), as the representative of its member organizations.

4. Public Benefits

This section should specify the amount of linkage contributions anticipated to be paid, the increase in tax revenue anticipated, and other community public benefits.

5. Affordable Housing

In connection with The Exeter Residences, the proponent should confirm its commitment to comply with the Mayor’s Executive Order on Affordable Housing of 2000, as amended.

6. Employment

This section should estimate anticipated employment levels including construction jobs and permanent jobs. The proponent should also confirm its commitment to continue compliance with the Boston Residents Construction Plan regarding construction jobs and the First Source Agreement and MOU regarding good-faith efforts in connection with permanent jobs in effect at the Prudential Center Redevelopment.

7. Regulatory Controls and Permits

This section should present a list of all anticipated permits or approvals required from other municipal, state or federal agencies.

B – TRAFFIC VOLUMES

- Automatic Traffic Recorder (ATRs)
- Turning Movement Counts (TMCs)

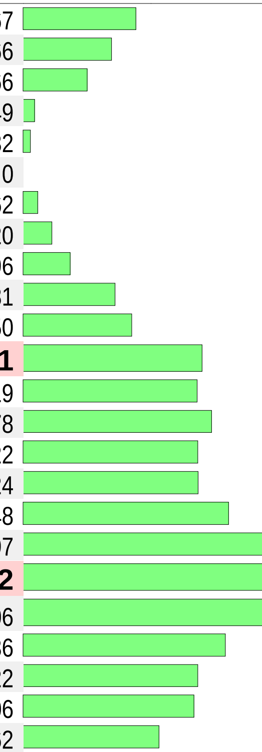
Automatic Traffic Recorder (ATRs)

Accurate Counts
978-664-2565

Location : Boylston Street EB West of
Location : Fairfiled Street
City/State: Boston, MA
Counter : 16431

12550001
Site Code: 12550001

Start Time	Mon 11-Sep-06	Tue 12-Sep-06	Wed 13-Sep-06	Thu 14-Sep-06	Fri 15-Sep-06	Average Day	Sat 16-Sep-06	Sun 17-Sep-06	Week Average
12:00 AM	*	*	386	548	*	467	*	*	467
01:00	*	*	257	475	*	366	*	*	366
02:00	*	*	165	366	*	266	*	*	266
03:00	*	*	98	0	*	49	*	*	49
04:00	*	*	65	0	*	32	*	*	32
05:00	*	*	0	0	*	0	*	*	0
06:00	*	*	0	125	*	62	*	*	62
07:00	*	*	0	241	*	120	*	*	120
08:00	*	*	0	391	*	196	*	*	196
09:00	*	*	0	762	*	381	*	*	381
10:00	*	*	231	668	*	450	*	*	450
11:00	*	*	**694**	**788**	*	**741**	*	*	**741**
12:00 PM	*	*	760	678	*	719	*	*	719
01:00	*	*	768	788	*	778	*	*	778
02:00	*	*	696	747	*	722	*	*	722
03:00	*	*	692	756	*	724	*	*	724
04:00	*	*	789	906	*	848	*	*	848
05:00	*	*	927	1067	*	997	*	*	997
06:00	*	*	887	**1218**	*	**1052**	*	*	**1052**
07:00	*	*	**942**	1069	*	1006	*	*	1006
08:00	*	*	749	924	*	836	*	*	836
09:00	*	*	651	793	*	722	*	*	722
10:00	*	*	626	786	*	706	*	*	706
11:00	*	*	536	587	*	562	*	*	562
Day Total	0	0	10919	14683	0	12802	0	0	12802
% Avg. WkDay	0.0%	0.0%	85.3%	114.7%	0.0%				
% Avg. Week	0.0%	0.0%	85.3%	114.7%	0.0%	100.0%	0.0%	0.0%	
AM Peak			11:00	11:00		11:00			11:00
Vol.			694	788		741			741
PM Peak			19:00	18:00		18:00			18:00
Vol.			942	1218		1052			1052
Grand Total	0	0	10919	14683	0	12802	0	0	12802



ADT Not Calculated

Accurate Counts
978-664-2565

Location : Huntington Avenue East of
Location : East Ring Road
City/State: Boston, MA
Counter : 9575

12550002
Site Code: 12550002

Start Time	11-Sep-06 WB	11-Sep-06 EB	Tue WB	Tue EB	Wed WB	Wed EB	Thu WB	Thu EB	Fri WB	Fri EB	Sat WB	Sat EB	Sun WB	Sun EB	Week Average WB	Week Average EB
12:00 AM	*	*	*	*	124	274	139	260	*	*	*	*	*	*	132	267
01:00	*	*	*	*	69	160	62	119	*	*	*	*	*	*	66	140
02:00	*	*	*	*	47	142	52	150	*	*	*	*	*	*	50	146
03:00	*	*	*	*	69	100	48	69	*	*	*	*	*	*	58	84
04:00	*	*	*	*	120	131	95	100	*	*	*	*	*	*	108	116
05:00	*	*	*	*	177	261	177	194	*	*	*	*	*	*	177	228
06:00	*	*	*	*	290	607	306	461	*	*	*	*	*	*	298	534
07:00	*	*	*	*	490	928	473	731	*	*	*	*	*	*	482	830
08:00	*	*	*	*	594	1104	576	**925**	*	*	*	*	*	*	585	**1014**
09:00	*	*	*	*	561	**1182**	507	845	*	*	*	*	*	*	534	1014
10:00	*	*	*	*	561	951	494	841	*	*	*	*	*	*	528	896
11:00	*	*	*	*	**640**	882	**595**	833	*	*	*	*	*	*	**618**	858
12:00 PM	*	*	*	*	595	959	567	898	*	*	*	*	*	*	581	928
01:00	*	*	*	*	586	903	568	916	*	*	*	*	*	*	577	910
02:00	*	*	*	*	633	878	592	950	*	*	*	*	*	*	612	914
03:00	*	*	*	*	630	952	669	1066	*	*	*	*	*	*	650	1009
04:00	*	*	*	*	663	1034	696	1137	*	*	*	*	*	*	680	1086
05:00	*	*	*	*	**672**	**1263**	705	1273	*	*	*	*	*	*	**688**	1268
06:00	*	*	*	*	621	1198	**729**	**1341**	*	*	*	*	*	*	675	**1270**
07:00	*	*	*	*	541	949	592	1275	*	*	*	*	*	*	566	1112
08:00	*	*	*	*	454	730	491	798	*	*	*	*	*	*	472	764
09:00	*	*	*	*	386	669	438	897	*	*	*	*	*	*	412	783
10:00	*	*	*	*	328	579	410	860	*	*	*	*	*	*	369	720
11:00	*	*	*	*	230	395	271	549	*	*	*	*	*	*	250	472
Lane	0	0	0	0	10081	17231	10252	17488	0	0	0	0	0	0	10168	17363
Day	0		0		27312		27740		0		0		0		27531	
AM Peak					11:00	09:00	11:00	08:00							11:00	08:00
Vol.					640	1182	595	925							618	1014
PM Peak					17:00	17:00	18:00	18:00							17:00	18:00
Vol.					672	1263	729	1341							688	1270
Comb. Total	0		0		27312		27740		0		0		0		27531	

ADT Not Calculated

Turning Movement Counts (TMCs)

Accurate Counts
978-664-2565

N/S Street : Hereford St / Dalton St
E/W Street: Boylston Street
City/State : Boston, MA
Weather : Overcast

File Name : 125500A1
Site Code : 12550001
Start Date : 9/16/2006
Page No : 1

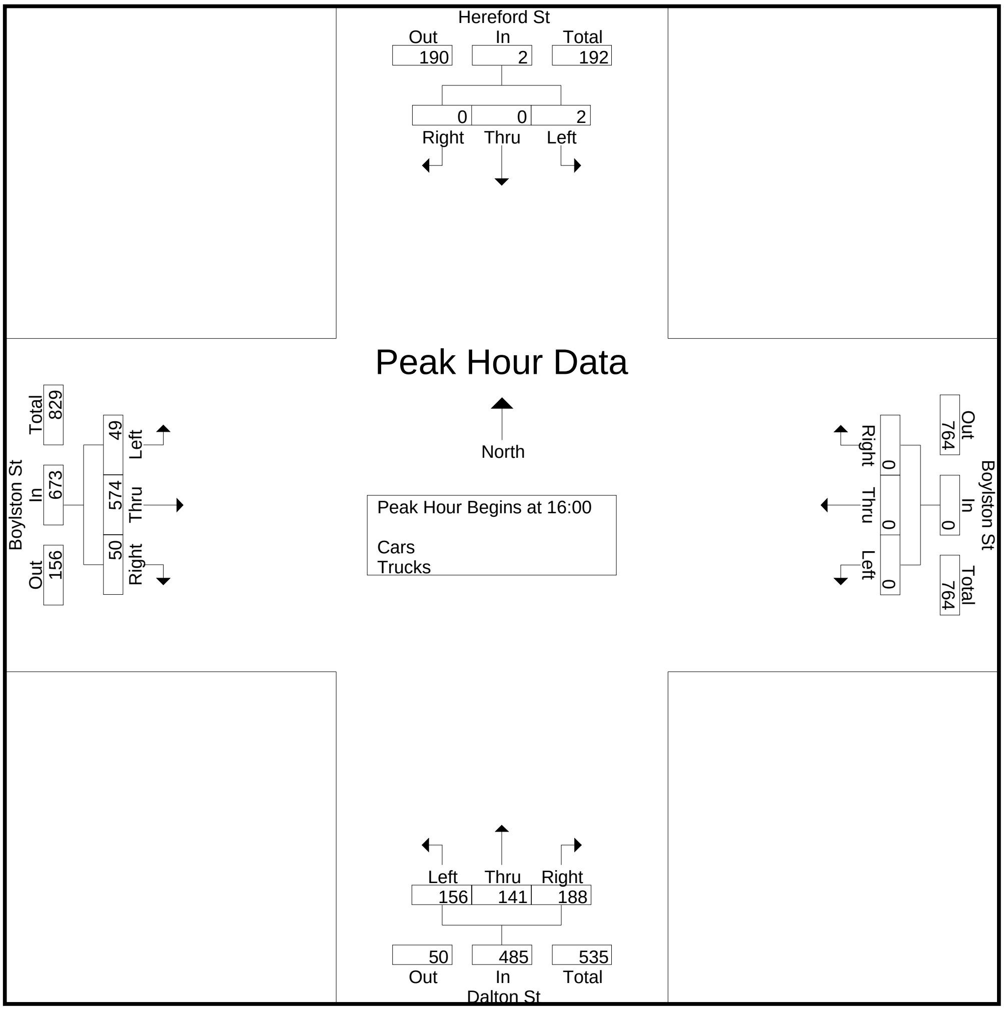
Groups Printed- Cars - Trucks

	Hereford St From North				Boylston St From East				Dalton St From South				Boylston 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
14:00	0	0	0	196	0	0	0	99	31	16	59	111	7	156	21	27	433	290	723
14:15	0	0	0	183	0	0	0	91	23	30	59	114	9	135	12	19	407	268	675
14:30	0	0	0	180	0	0	0	138	35	34	60	122	16	140	11	25	465	296	761
14:45	0	0	0	241	0	0	0	113	17	31	67	120	12	147	16	44	518	290	808
Total	0	0	0	800	0	0	0	441	106	111	245	467	44	578	60	115	1823	1144	2967
15:00	0	0	0	166	0	0	0	93	24	31	46	86	6	142	8	45	390	257	647
15:15	0	0	0	149	0	0	0	120	21	35	47	133	3	118	15	25	427	239	666
15:30	0	0	0	208	0	0	0	114	25	35	48	68	3	165	6	25	415	282	697
15:45	0	0	0	219	0	0	0	108	42	38	40	123	6	126	14	34	484	266	750
Total	0	0	0	742	0	0	0	435	112	139	181	410	18	551	43	129	1716	1044	2760
16:00	0	0	0	189	0	0	0	83	39	33	36	123	6	134	13	35	430	261	691
16:15	0	0	0	168	0	0	0	92	47	32	39	117	14	147	11	34	411	290	701
16:30	2	0	0	225	0	0	0	129	34	37	57	117	17	146	14	21	492	307	799
16:45	0	0	0	194	0	0	0	118	36	39	56	103	12	147	12	53	468	302	770
Total	2	0	0	776	0	0	0	422	156	141	188	460	49	574	50	143	1801	1160	2961
17:00	0	0	0	215	0	0	0	97	24	29	45	99	15	125	18	60	471	256	727
17:15	0	0	0	165	0	0	0	97	31	31	64	83	11	143	9	50	395	289	684
17:30	0	0	0	191	0	0	0	112	40	33	44	90	4	157	16	47	440	294	734
17:45	0	0	0	212	0	0	0	106	37	35	51	103	14	131	18	62	483	286	769
Total	0	0	0	783	0	0	0	412	132	128	204	375	44	556	61	219	1789	1125	2914
Grand Total	2	0	0	3101	0	0	0	1710	506	519	818	1712	155	2259	214	606	7129	4473	11602
Apprch %	100	0	0		0	0	0		27.5	28.2	44.4		5.9	86	8.1				
Total %	0	0	0		0	0	0		11.3	11.6	18.3		3.5	50.5	4.8		61.4	38.6	
Cars	0	0	0		0	0	0		491	517	771		152	2224	205		0	0	11488
% Cars	0	0	0	100	0	0	0	100	97	99.6	94.3	99.9	98.1	98.5	95.8	100	0	0	99
Trucks	2	0	0		0	0	0		15	2	47		3	35	9		0	0	114
% Trucks	100	0	0	0	0	0	0	0	3	0.4	5.7	0.1	1.9	1.5	4.2	0	0	0	1

	Hereford St From North				Boylston St From East				Dalton St From South				Boylston 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 14:00 to 17:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 16:00																	
16:00	0	0	0	0	0	0	0	0	39	33	36	108	6	134	13	153	261
16:15	0	0	0	0	0	0	0	0	47	32	39	118	14	147	11	172	290
16:30	2	0	0	2	0	0	0	0	34	37	57	128	17	146	14	177	307
16:45	0	0	0	0	0	0	0	0	36	39	56	131	12	147	12	171	302
Total Volume	2	0	0	2	0	0	0	0	156	141	188	485	49	574	50	673	1160
% App. Total	100	0	0		0	0	0		32.2	29.1	38.8		7.3	85.3	7.4		
PHF	.250	.000	.000	.250	.000	.000	.000	.000	.830	.904	.825	.926	.721	.976	.893	.951	.945

Accurate Counts
978-664-2565

File Name : 125500A1
Site Code : 12550001
Start Date : 9/16/2006
Page No : 2



Accurate Counts
978-664-2565

N/S Street : Gloucester Street
E/W Street: Boylston Street
City/State : Boston, MA
Weather : Overcast

File Name : 125500A2
Site Code : 12550002
Start Date : 9/16/2006
Page No : 1

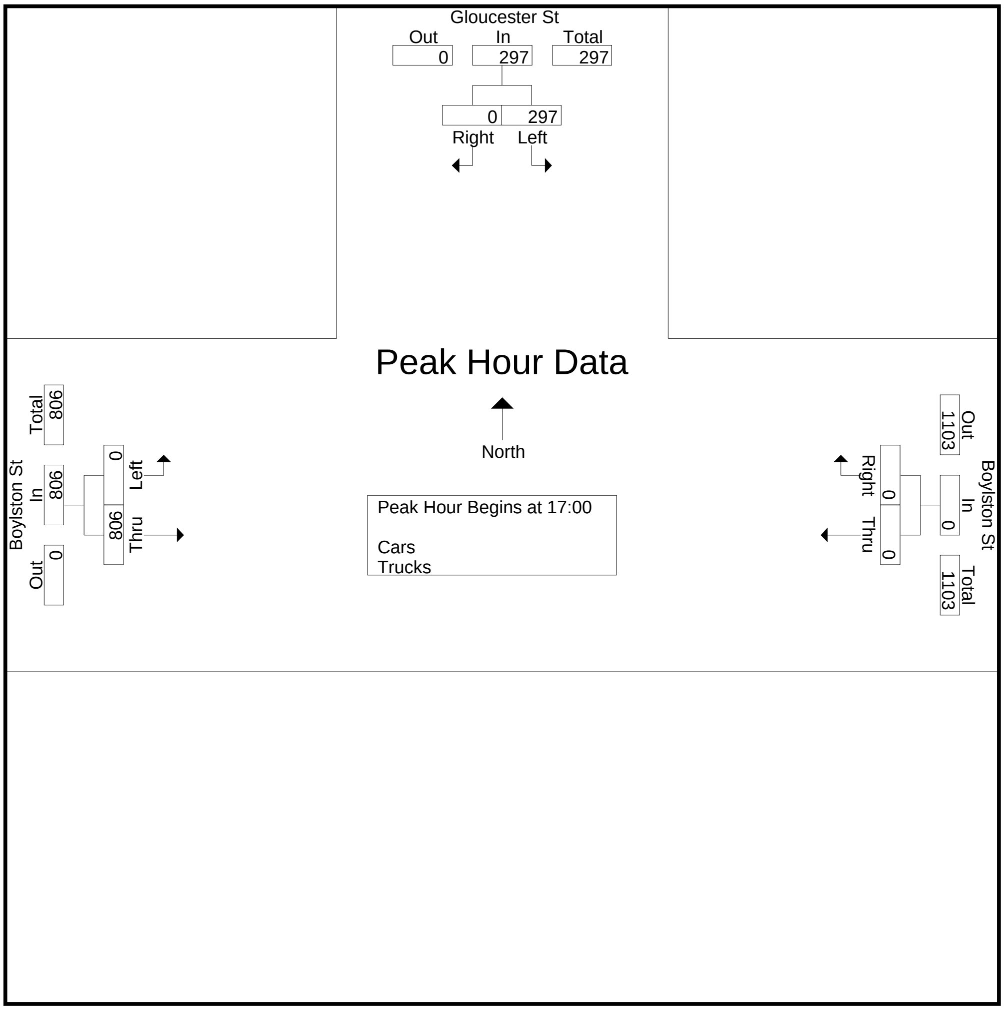
Groups Printed- Cars - Trucks

	Gloucester St From North			Boylston St From East			Boylston St From West					
Start Time	Left	Right	Peds	Thru	Right	Peds	Left	Thru	Peds	Exclu. Total	Inclu. Total	Int. Total
14:00	75	0	235	0	0	36	0	198	112	383	273	656
14:15	87	0	252	0	0	14	0	175	113	379	262	641
14:30	81	0	273	0	0	38	0	181	114	425	262	687
14:45	78	0	309	0	0	38	0	204	189	536	282	818
Total	321	0	1069	0	0	126	0	758	528	1723	1079	2802
15:00	72	0	232	0	0	49	0	170	100	381	242	623
15:15	61	0	252	0	0	51	0	148	171	474	209	683
15:30	84	0	280	0	0	23	0	171	148	451	255	706
15:45	63	0	296	0	0	41	0	152	158	495	215	710
Total	280	0	1060	0	0	164	0	641	577	1801	921	2722
16:00	94	0	292	0	0	33	0	186	152	477	280	757
16:15	78	0	272	0	0	58	0	184	159	489	262	751
16:30	74	0	317	0	0	40	0	175	175	532	249	781
16:45	77	0	316	0	0	49	0	185	184	549	262	811
Total	323	0	1197	0	0	180	0	730	670	2047	1053	3100
17:00	62	0	328	0	0	47	0	193	164	539	255	794
17:15	77	0	269	0	0	33	0	212	187	489	289	778
17:30	92	0	277	0	0	44	0	200	154	475	292	767
17:45	66	0	355	0	0	47	0	201	154	556	267	823
Total	297	0	1229	0	0	171	0	806	659	2059	1103	3162
Grand Total	1221	0	4555	0	0	641	0	2935	2434	7630	4156	11786
Apprch %	100	0		0	0		0	100				
Total %	29.4	0		0	0		0	70.6		64.7	35.3	
Cars	1213	0		0	0		0	2842		0	0	11682
% Cars	99.3	0	100	0	0	100	0	96.8	99.9	0	0	99.1
Trucks	8	0		0	0		0	93		0	0	104
% Trucks	0.7	0	0	0	0	0	0	3.2	0.1	0	0	0.9

	Gloucester St From North			Boylston St From East			Boylston St From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 14:00 to 17:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 17:00										
17:00	62	0	62	0	0	0	0	193	193	255
17:15	77	0	77	0	0	0	0	212	212	289
17:30	92	0	92	0	0	0	0	200	200	292
17:45	66	0	66	0	0	0	0	201	201	267
Total Volume	297	0	297	0	0	0	0	806	806	1103
% App. Total	100	0		0	0		0	100		
PHF	.807	.000	.807	.000	.000	.000	.000	.950	.950	.944

Accurate Counts
978-664-2565

File Name : 125500A2
Site Code : 12550002
Start Date : 9/16/2006
Page No : 2



Accurate Counts
978-664-2565

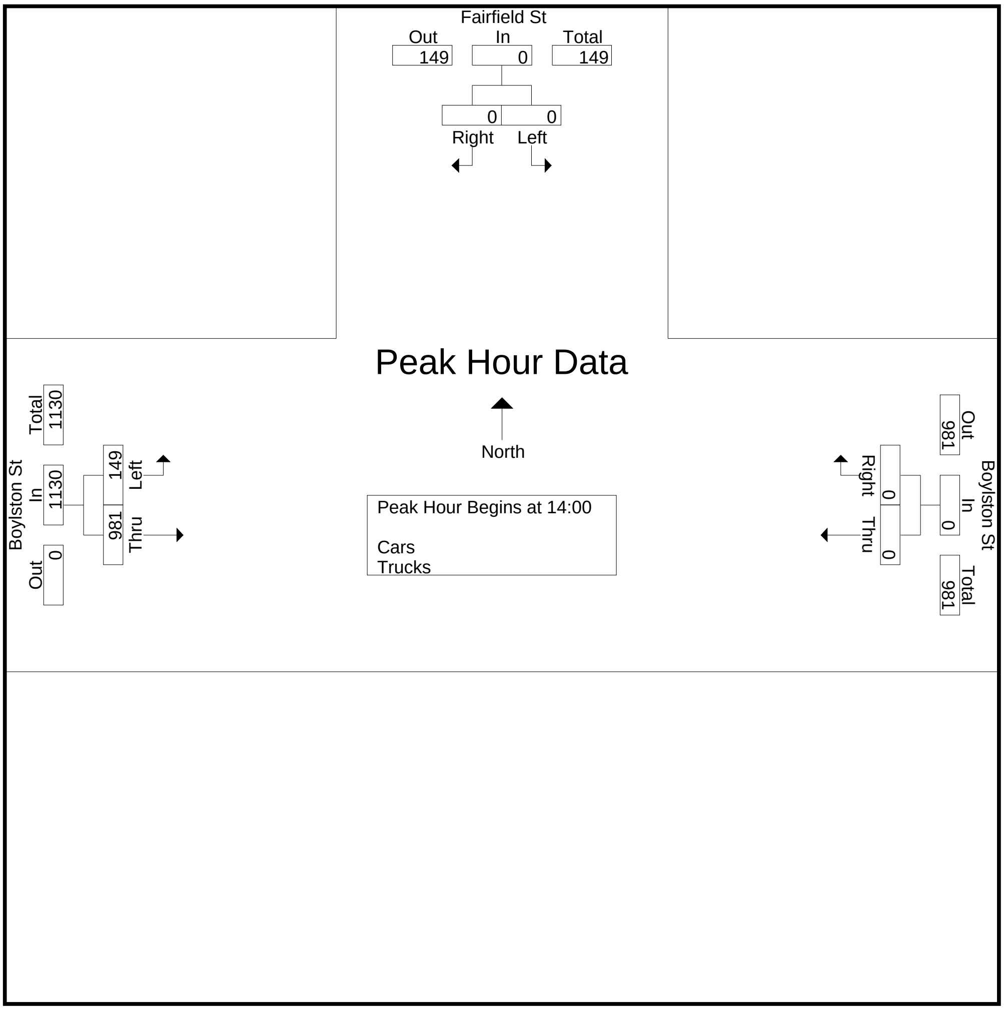
N/S Street : Fairfield Street
E/W Street: Boylston Street
City/State : Boston, MA
Weather : Overcast

File Name : 125500A3
Site Code : 12550003
Start Date : 9/16/2006
Page No : 1

Groups Printed- Cars - Trucks

	Fairfield St From North			Boylston St From East			Boylston St From West					
Start Time	Left	Right	Peds	Thru	Right	Peds	Left	Thru	Peds	Exclu. Total	Inclu. Total	Int. Total
14:00	0	0	248	0	0	0	46	217	37	285	263	548
14:15	0	0	263	0	0	0	37	244	41	304	281	585
14:30	0	0	226	0	0	0	36	237	59	285	273	558
14:45	0	0	234	0	0	0	30	283	69	303	313	616
Total	0	0	971	0	0	0	149	981	206	1177	1130	2307
15:00	0	0	208	0	0	0	32	216	52	260	248	508
15:15	0	0	302	0	0	0	38	205	38	340	243	583
15:30	0	0	272	0	0	0	38	218	48	320	256	576
15:45	0	0	323	0	0	0	35	191	27	350	226	576
Total	0	0	1105	0	0	0	143	830	165	1270	973	2243
16:00	0	0	232	0	0	0	21	227	41	273	248	521
16:15	0	0	283	0	0	0	35	218	57	340	253	593
16:30	0	0	253	0	0	0	39	220	92	345	259	604
16:45	0	0	242	0	0	0	38	244	60	302	282	584
Total	0	0	1010	0	0	0	133	909	250	1260	1042	2302
17:00	0	0	281	0	0	0	27	221	43	324	248	572
17:15	0	0	284	0	0	0	37	240	41	325	277	602
17:30	0	0	240	0	0	0	34	233	46	286	267	553
17:45	0	0	203	0	0	0	33	219	31	234	252	486
Total	0	0	1008	0	0	0	131	913	161	1169	1044	2213
Grand Total	0	0	4094	0	0	0	556	3633	782	4876	4189	9065
Apprch %	0	0		0	0		13.3	86.7				
Total %	0	0		0	0		13.3	86.7		53.8	46.2	
Cars	0	0		0	0		555	3622		0	0	9053
% Cars	0	0	100	0	0	0	99.8	99.7	100	0	0	99.9
Trucks	0	0		0	0		1	11		0	0	12
% Trucks	0	0	0	0	0	0	0.2	0.3	0	0	0	0.1

	Fairfield St From North			Boylston St From East			Boylston St From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 14:00 to 17:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 14:00										
14:00	0	0	0	0	0	0	46	217	263	263
14:15	0	0	0	0	0	0	37	244	281	281
14:30	0	0	0	0	0	0	36	237	273	273
14:45	0	0	0	0	0	0	30	283	313	313
Total Volume	0	0	0	0	0	0	149	981	1130	1130
% App. Total	0	0		0	0		13.2	86.8		
PHF	.000	.000	.000	.000	.000	.000	.810	.867	.903	.903


Fairfield St
Out
149
In
0
Total
149
0
0
Right
Left
Peak Hour Data
North
Peak Hour Begins at 14:00
Cars
Trucks
Boylston St
Total
1130
In
1130
Out
0
149
Left
981
Thru
Boylston St
Out
981
In
0
Total
981
0
Right
0
Thru

N/S Street : East Ring Road
E/W Street: Boylston Street
City/State : Boston, MA
Weather : Overcast

File Name : 125500A4
Site Code : 12550004
Start Date : 9/16/2006

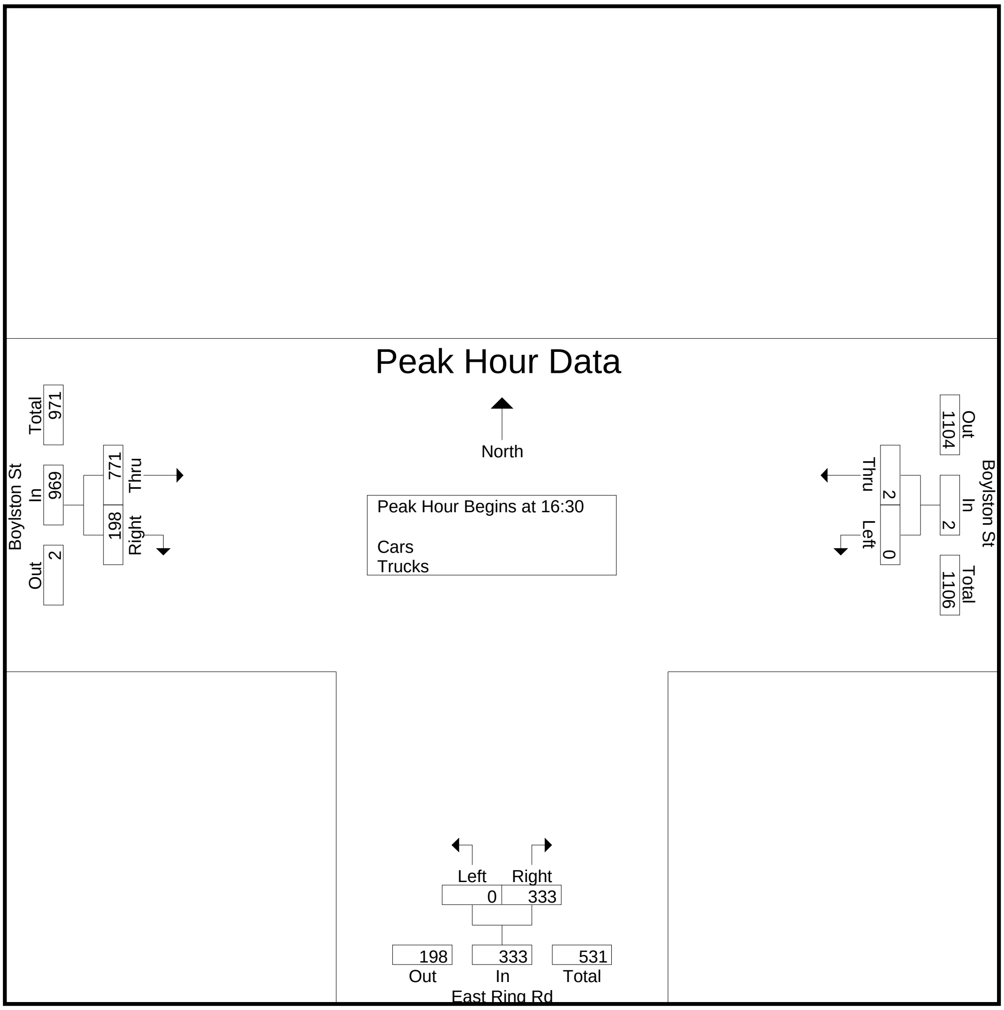
Groups Printed- Cars - Trucks

	Boylston St From East			East Ring Rd From South			Boylston St From West					
Start Time	Left	Thru	Peds	Left	Right	Peds	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
14:00	0	0	82	0	80	145	179	36	21	248	295	543
14:15	0	0	102	0	71	141	197	48	3	246	316	562
14:30	0	0	127	0	70	162	182	54	5	294	306	600
14:45	0	0	86	0	77	188	226	55	4	278	358	636
Total	0	0	397	0	298	636	784	193	33	1066	1275	2341
15:00	0	0	133	0	83	208	173	44	1	342	300	642
15:15	0	0	116	0	81	172	175	41	0	288	297	585
15:30	0	0	116	0	79	184	186	31	0	300	296	596
15:45	0	0	117	0	65	172	150	40	0	289	255	544
Total	0	0	482	0	308	736	684	156	1	1219	1148	2367
16:00	0	0	86	0	74	131	188	42	0	217	304	521
16:15	0	0	116	0	106	159	151	51	2	277	308	585
16:30	0	0	94	0	80	153	194	41	1	248	315	563
16:45	0	0	185	0	73	181	192	50	16	382	315	697
Total	0	0	481	0	333	624	725	184	19	1124	1242	2366
17:00	0	0	131	0	80	191	192	50	18	340	322	662
17:15	0	2	134	0	100	176	193	57	4	314	352	666
17:30	0	0	137	0	89	164	175	45	3	304	309	613
17:45	0	0	120	0	73	141	178	43	5	266	294	560
Total	0	2	522	0	342	672	738	195	30	1224	1277	2501
Grand Total	0	2	1882	0	1281	2668	2931	728	83	4633	4942	9575
Apprch %	0	100		0	100		80.1	19.9				
Total %	0	0		0	25.9		59.3	14.7		48.4	51.6	
Cars	0	2		0	1280		2919	727		0	0	9561
% Cars	0	100	100	0	99.9	100	99.6	99.9	100	0	0	99.9
Trucks	0	0		0	1		12	1		0	0	14
% Trucks	0	0	0	0	0.1	0	0.4	0.1	0	0	0	0.1

	Boylston St From East			East Ring Rd From South			Boylston St From West			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 14:00 to 17:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 16:30										
16:30	0	0	0	0	80	80	194	41	235	315
16:45	0	0	0	0	73	73	192	50	242	315
17:00	0	0	0	0	80	80	192	50	242	322
17:15	0	2	2	0	100	100	193	57	250	352
Total Volume	0	2	2	0	333	333	771	198	969	1304
% App. Total	0	100		0	100		79.6	20.4		
PHF	.000	.250	.250	.000	.833	.833	.994	.868	.969	.926

Accurate Counts
978-664-2565

File Name : 125500A4
Site Code : 12550004
Start Date : 9/16/2006
Page No : 2



Accurate Counts
978-664-2565

N/S Street : Exeter Street
E/W Street: Boylston Street
City/State : Boston, MA
Weather : Overcast

File Name : 125500A5
Site Code : 12550005
Start Date : 9/16/2006
Page No : 1

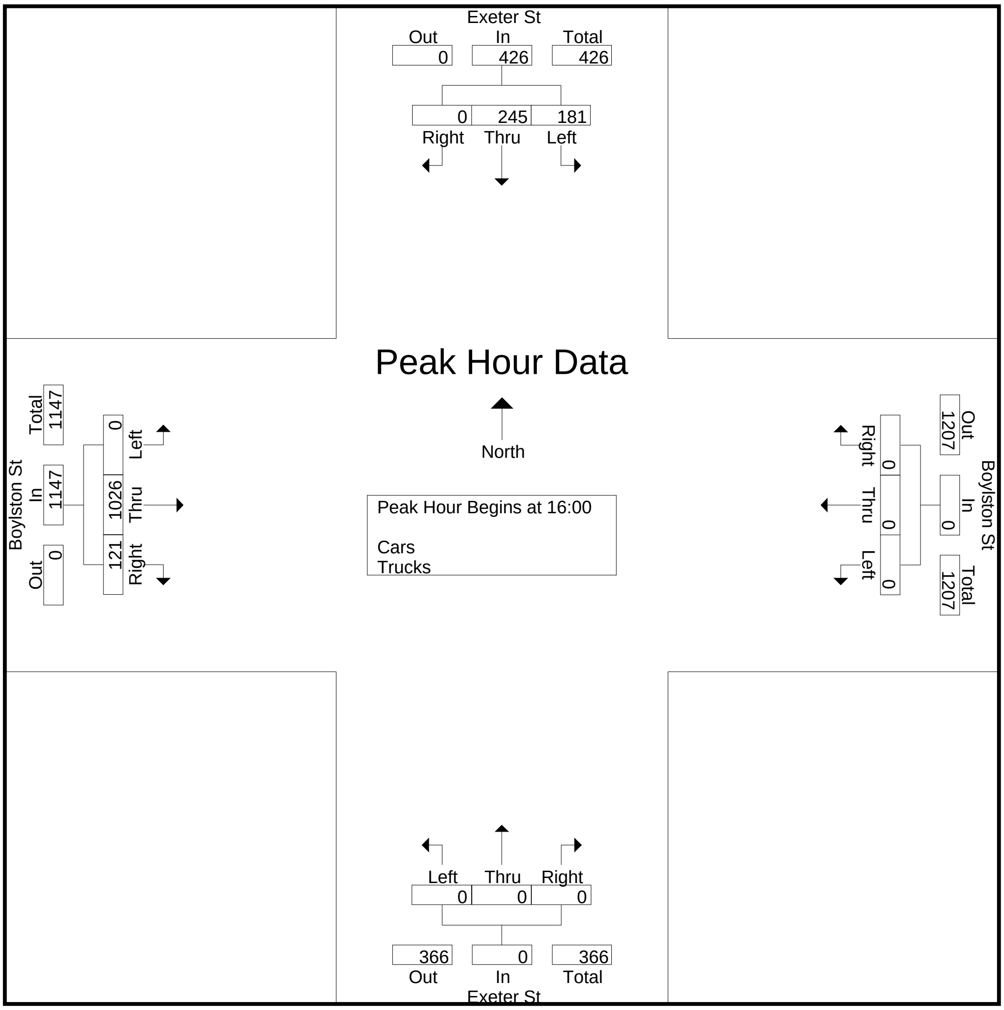
Groups Printed- Cars - Trucks

	Exeter St From North				Boylston St From East				Exeter St From South				Boylston 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
14:00	20	40	0	241	0	0	0	93	0	0	0	145	0	189	20	170	649	269	918
14:15	47	86	0	308	0	0	0	92	0	0	0	263	0	216	30	237	900	379	1279
14:30	41	84	0	483	0	0	0	140	0	0	0	511	0	193	35	182	1316	353	1669
14:45	48	83	0	563	0	0	0	227	0	0	0	573	0	265	34	361	1724	430	2154
Total	156	293	0	1595	0	0	0	552	0	0	0	1492	0	863	119	950	4589	1431	6020
15:00	36	60	0	790	0	0	0	238	0	0	0	836	0	211	79	341	2205	386	2591
15:15	43	63	0	623	0	0	0	292	0	0	0	600	0	221	33	410	1925	360	2285
15:30	46	61	0	675	0	0	0	196	0	0	0	749	0	237	45	318	1938	389	2327
15:45	44	58	0	689	0	0	0	209	0	0	0	1073	0	223	27	311	2282	352	2634
Total	169	242	0	2777	0	0	0	935	0	0	0	3258	0	892	184	1380	8350	1487	9837
16:00	49	67	0	656	0	0	0	248	0	0	0	821	0	274	30	411	2136	420	2556
16:15	55	64	0	625	0	0	0	287	0	0	0	836	0	223	17	331	2079	359	2438
16:30	22	51	0	518	0	0	0	236	0	0	0	996	0	265	42	286	2036	380	2416
16:45	55	63	0	338	0	0	0	158	0	0	0	782	0	264	32	367	1645	414	2059
Total	181	245	0	2137	0	0	0	929	0	0	0	3435	0	1026	121	1395	7896	1573	9469
17:00	33	61	0	609	0	0	0	281	0	0	0	779	0	232	37	371	2040	363	2403
17:15	37	75	0	359	0	0	0	188	0	0	0	585	0	245	29	191	1323	386	1709
17:30	45	61	0	355	0	0	0	149	0	0	0	616	0	259	40	325	1445	405	1850
17:45	49	72	0	474	0	0	0	143	0	0	0	650	0	236	36	229	1496	393	1889
Total	164	269	0	1797	0	0	0	761	0	0	0	2630	0	972	142	1116	6304	1547	7851
Grand Total	670	1049	0	8306	0	0	0	3177	0	0	0	10815	0	3753	566	4841	27139	6038	33177
Apprch %	39	61	0		0	0	0		0	0	0		0	86.9	13.1				
Total %	11.1	17.4	0		0	0	0		0	0	0		0	62.2	9.4		81.8	18.2	
Cars	663	1045	0		0	0	0		0	0	0		0	3653	559		0	0	33059
% Cars	99	99.6	0	100	0	0	0	100	0	0	0	100	0	97.3	98.8	100	0	0	99.6
Trucks	7	4	0		0	0	0		0	0	0		0	100	7		0	0	118
% Trucks	1	0.4	0	0	0	0	0	0	0	0	0	0	0	2.7	1.2	0	0	0	0.4

	Exeter St From North				Boylston St From East				Exeter St From South				Boylston 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 14:00 to 17:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 16:00																	
16:00	49	67	0	116	0	0	0	0	0	0	0	0	0	274	30	304	420
16:15	55	64	0	119	0	0	0	0	0	0	0	0	0	223	17	240	359
16:30	22	51	0	73	0	0	0	0	0	0	0	0	0	265	42	307	380
16:45	55	63	0	118	0	0	0	0	0	0	0	0	0	264	32	296	414
Total Volume	181	245	0	426	0	0	0	0	0	0	0	0	0	1026	121	1147	1573
% App. Total	42.5	57.5	0		0	0	0		0	0	0		0	89.5	10.5		
PHF	.823	.914	.000	.895	.000	.000	.000	.000	.000	.000	.000	.000	.000	.936	.720	.934	.936

Accurate Counts
978-664-2565

File Name : 125500A5
Site Code : 12550005
Start Date : 9/16/2006
Page No : 2



Accurate Counts
978-664-2565

N/S Street : East Ring Rd / Harcourt St
E/W Street: Huntington Avenue
City/State : Boston, MA
Weather : Overcast

File Name : 125500A6
Site Code : 12550006
Start Date : 9/16/2006
Page No : 1

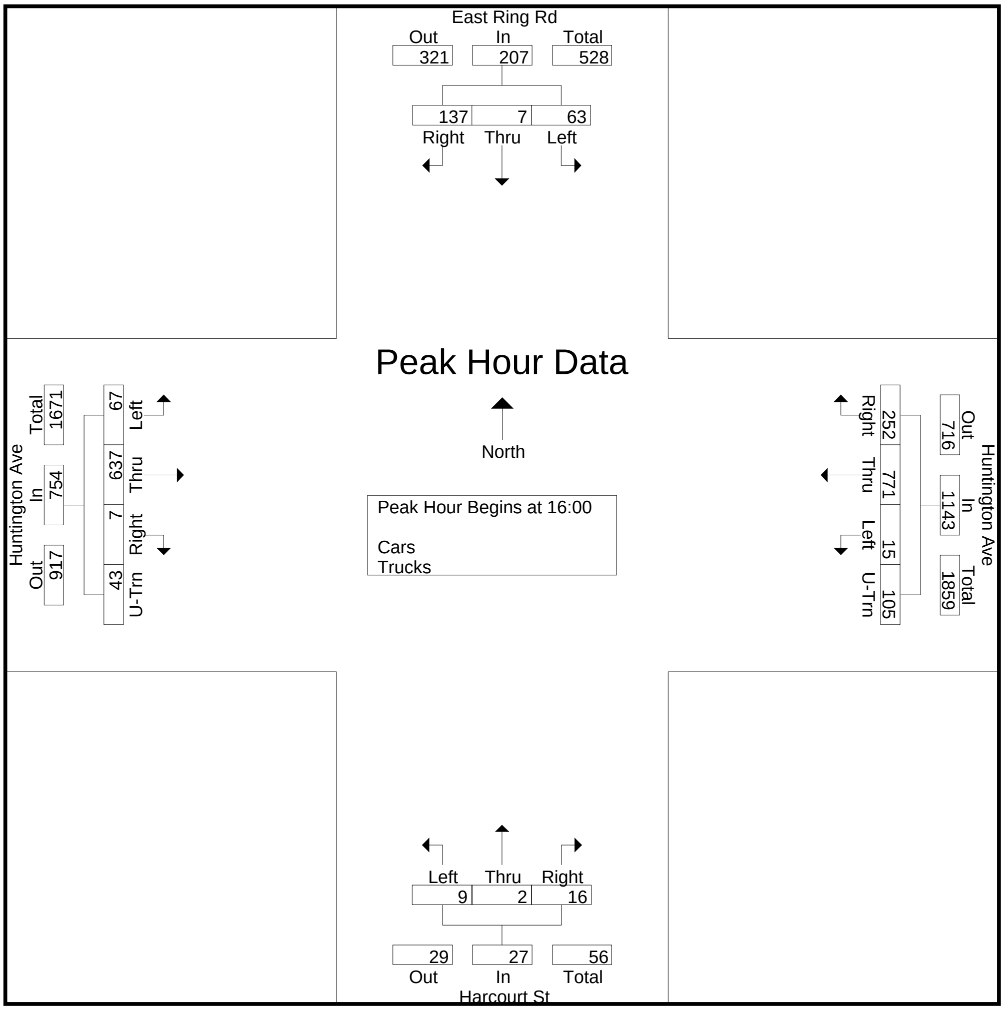
Groups Printed- Cars - Trucks

	East Ring Rd From North			Huntington Ave From East				Harcourt St From South			Huntington Ave From West				
Start Time	Left	Thru	Right	Left	Thru	Right	U-Trn	Left	Thru	Right	Left	Thru	Right	U-Trn	Int. Total
14:00	10	0	30	6	174	40	14	1	1	3	15	127	3	7	431
14:15	16	1	31	3	180	49	18	2	0	3	24	138	1	10	476
14:30	26	1	23	6	176	38	28	3	1	3	20	150	1	10	486
14:45	25	1	36	5	207	60	25	1	1	2	18	163	1	8	553
Total	77	3	120	20	737	187	85	7	3	11	77	578	6	35	1946
15:00	23	0	26	5	181	60	18	5	0	4	17	146	2	6	493
15:15	11	2	31	6	183	60	27	1	0	4	22	145	0	6	498
15:30	12	3	27	0	186	63	22	1	0	1	13	125	2	6	461
15:45	20	3	32	6	183	61	24	4	0	6	13	139	14	12	517
Total	66	8	116	17	733	244	91	11	0	15	65	555	18	30	1969
16:00	9	0	40	2	185	60	27	3	1	2	9	154	1	15	508
16:15	20	3	36	8	196	66	21	1	1	9	21	145	3	5	535
16:30	18	4	32	3	186	71	32	3	0	3	15	159	1	7	534
16:45	16	0	29	2	204	55	25	2	0	2	22	179	2	16	554
Total	63	7	137	15	771	252	105	9	2	16	67	637	7	43	2131
17:00	12	0	32	4	178	58	27	4	0	6	12	129	5	15	482
17:15	20	3	34	4	202	60	23	2	0	4	21	140	0	6	519
17:30	13	2	30	4	188	65	20	1	0	10	14	134	0	3	484
17:45	13	2	29	6	170	46	31	4	2	1	20	139	0	9	472
Total	58	7	125	18	738	229	101	11	2	21	67	542	5	33	1957
Grand Total	264	25	498	70	2979	912	382	38	7	63	276	2312	36	141	8003
Apprch %	33.5	3.2	63.3	1.6	68.6	21	8.8	35.2	6.5	58.3	10	83.6	1.3	5.1	
Total %	3.3	0.3	6.2	0.9	37.2	11.4	4.8	0.5	0.1	0.8	3.4	28.9	0.4	1.8	
Cars	264	25	494	67	2879	888	382	36	7	56	276	2241	33	141	7789
% Cars	100	100	99.2	95.7	96.6	97.4	100	94.7	100	88.9	100	96.9	91.7	100	97.3
Trucks	0	0	4	3	100	24	0	2	0	7	0	71	3	0	214
% Trucks	0	0	0.8	4.3	3.4	2.6	0	5.3	0	11.1	0	3.1	8.3	0	2.7

	East Ring Rd From North				Huntington Ave From East					Harcourt St From South				Huntington Ave From West					
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	U-Trn	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	U-Trn	App. Total	Int. Total
Peak Hour Analysis From 14:00 to 17:45 - Peak 1 of 1																			
Peak Hour for Entire Intersection Begins at 16:00																			
16:00	9	0	40	49	2	185	60	27	274	3	1	2	6	9	154	1	15	179	508
16:15	20	3	36	59	8	196	66	21	291	1	1	9	11	21	145	3	5	174	535
16:30	18	4	32	54	3	186	71	32	292	3	0	3	6	15	159	1	7	182	534
16:45	16	0	29	45	2	204	55	25	286	2	0	2	4	22	179	2	16	219	554
Total Volume	63	7	137	207	15	771	252	105	1143	9	2	16	27	67	637	7	43	754	2131
% App. Total	30.4	3.4	66.2		1.3	67.5	22	9.2		33.3	7.4	59.3		8.9	84.5	0.9	5.7		
PHF	.788	.438	.856	.877	.469	.945	.887	.820	.979	.750	.500	.444	.614	.761	.890	.583	.672	.861	.962

Accurate Counts
978-664-2565

File Name : 125500A6
Site Code : 12550006
Start Date : 9/16/2006
Page No : 2



Accurate Counts
978-664-2565

N/S Street : East Ring Rd / Harcourt St
E/W Street: Huntington Avenue
City/State : Boston, MA
Weather : Overcast

File Name : 125500A6
Site Code : 12550006
Start Date : 9/16/2006
Page No : 1

Groups Printed- Peds

	East Ring Rd From North				Huntington Ave From East				Harcourt St From South				Huntington Ave From West				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
14:00	0	0	0	266	0	0	0	202	0	0	0	36	0	0	0	47	551
14:15	0	0	0	300	0	0	0	168	0	0	0	44	0	0	0	52	564
14:30	0	0	0	250	0	0	0	146	0	0	0	63	0	0	0	72	531
14:45	0	0	0	240	0	0	0	141	0	0	0	52	0	0	0	55	488
Total	0	0	0	1056	0	0	0	657	0	0	0	195	0	0	0	226	2134
15:00	0	0	0	212	0	0	0	122	0	0	0	68	0	0	0	87	489
15:15	0	0	0	308	0	0	0	139	0	0	0	73	0	0	0	102	622
15:30	0	0	0	388	0	0	0	138	0	0	0	75	0	0	0	71	672
15:45	0	0	0	252	0	0	0	115	0	0	0	70	0	0	0	61	498
Total	0	0	0	1160	0	0	0	514	0	0	0	286	0	0	0	321	2281
16:00	0	0	0	284	0	0	0	144	0	0	0	103	0	0	0	69	600
16:15	0	0	0	318	0	0	0	149	0	0	0	78	0	0	0	77	622
16:30	0	0	0	276	0	0	0	136	0	0	0	110	0	0	0	69	591
16:45	0	0	0	328	0	0	0	146	0	0	0	75	0	0	0	74	623
Total	0	0	0	1206	0	0	0	575	0	0	0	366	0	0	0	289	2436
17:00	0	0	0	318	0	0	0	135	0	0	0	85	0	0	0	63	601
17:15	0	0	0	242	0	0	0	136	0	0	0	79	0	0	0	78	535
17:30	0	0	0	311	0	0	0	165	0	0	0	103	0	0	0	70	649
17:45	0	0	0	279	0	0	0	174	0	0	0	91	0	1	0	78	623
Total	0	0	0	1150	0	0	0	610	0	0	0	358	0	1	0	289	2408
Grand Total	0	0	0	4572	0	0	0	2356	0	0	0	1205	0	1	0	1125	9259
Apprch %	0	0	0	100	0	0	0	100	0	0	0	100	0	0.1	0	99.9	
Total %	0	0	0	49.4	0	0	0	25.4	0	0	0	13	0	0	0	12.2	

	East Ring Rd From North		Huntington Ave From East		Harcourt St From South		Huntington Ave From West		
Start Time	Peds	App. Total	Peds	App. Total	Peds	App. Total	Peds	App. Total	Int. Total
Peak Hour Analysis From 14:00 to 17:45 - Peak 1 of 1									
Peak Hour for Entire Intersection Begins at 16:15									
16:15	318	318	149	149	78	78	77	77	622
16:30	276	276	136	136	110	110	69	69	591
16:45	328	328	146	146	75	75	74	74	623
17:00	318	318	135	135	85	85	63	63	601
Total Volume	1240	1240	566	566	348	348	283	283	2437
% App. Total	100		100		100		100		
PHF	.945	.945	.950	.950	.791	.791	.919	.919	.978

Peak Hour Analysis From 14:00 to 17:45 - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	15:30		14:00		16:00		15:00	
+0 mins.	388	388	202	202	103	103	87	87
+15 mins.	252	252	168	168	78	78	102	102
+30 mins.	284	284	146	146	110	110	71	71
+45 mins.	318	318	141	141	75	75	61	61
Total Volume	1242	1242	657	657	366	366	321	321
% App. Total	100		100		100		100	
PHF	.800	.800	.813	.813	.832	.832	.787	.787

N/S Street : Exeter Street
E/W Street: Huntington Avenue
City/State : Boston, MA
Weather : Overcast

File Name : 125500A7
Site Code : 12550007
Start Date : 9/16/2006

Groups Printed- Cars - Trucks

	Exeter St From North						Hotel Dr From Northeast						Huntington Ave From East						Stuart St From South						Garage Dr From Southwest						Huntington Ave From West								
Start Time	Hard Left	Left	Thru	Bear Right	Right	Peds	Hard Left	Bear Left	Thru	Bear Right	Hard Right	Peds	Left	Bear Left	Thru	Right	Hard Right	Peds	Hard Left	Left	Thru	Bear Right	Right	Peds	Hard Left	Bear Left	Thru	Bear Right	Hard Right	Peds	Left	Bear Left	Thru	Right	Hard Right	Peds	Exclu. Total	Inclu. Total	Int. Total
14:00	0	0	72	7	84	151	0	0	0	20	0	0	46	11	166	0	0	93	0	0	0	0	0	52	6	0	0	0	34	0	0	0	156	0	1	55	351	603	954
14:15	0	0	70	11	84	194	0	1	0	33	0	0	36	15	151	0	0	75	0	0	0	0	0	44	8	0	0	0	27	0	0	0	174	0	3	10	323	613	936
14:30	0	0	68	13	88	131	0	1	0	36	0	0	48	12	153	0	0	82	0	0	0	0	0	46	7	0	0	0	34	0	0	0	201	0	5	43	302	666	968
14:45	0	0	67	10	83	133	0	4	0	35	0	0	29	7	176	0	0	80	0	0	0	0	0	39	3	0	0	0	27	0	0	0	217	0	0	33	285	658	943
Total	0	0	277	41	339	609	0	6	0	124	0	0	159	45	646	0	0	330	0	0	0	0	0	181	24	0	0	0	122	0	0	0	748	0	9	141	1261	2540	3801
15:00	0	0	77	4	78	190	0	1	0	43	0	0	57	13	128	0	0	94	0	0	0	0	0	45	9	0	0	0	44	0	0	0	224	0	11	59	388	689	1077
15:15	0	0	72	8	78	134	0	1	0	27	0	0	46	13	158	0	0	57	0	0	0	0	0	48	14	0	0	0	43	0	0	0	184	0	2	40	279	646	925
15:30	0	0	67	10	78	198	0	2	0	19	0	0	33	13	162	0	0	53	0	0	0	0	0	51	13	0	0	0	49	0	0	0	153	0	4	48	350	603	953
15:45	0	0	59	8	72	138	0	0	0	31	0	0	32	8	165	0	0	67	0	0	0	0	0	25	7	0	0	0	27	0	0	0	179	0	10	84	314	598	912
Total	0	0	275	30	306	660	0	4	0	120	0	0	168	47	613	0	0	271	0	0	0	0	0	169	43	0	0	0	163	0	0	0	740	0	27	231	1331	2536	3867
16:00	0	0	43	7	86	157	0	0	0	39	0	0	47	7	130	0	0	94	0	0	0	0	0	41	15	0	0	0	45	0	0	0	194	0	0	79	371	613	984
16:15	0	0	64	8	94	157	0	1	0	40	0	0	51	9	136	0	0	79	0	0	0	0	0	46	23	0	0	0	53	0	0	0	189	0	3	35	317	671	988
16:30	0	0	68	4	77	122	0	0	0	22	0	0	31	12	154	0	0	85	0	0	0	0	0	23	16	0	0	0	30	0	0	0	204	0	5	75	305	623	928
16:45	0	0	49	7	86	138	0	3	0	45	0	0	37	13	140	0	0	62	0	0	0	0	0	46	17	0	0	0	53	0	0	0	233	0	0	50	296	683	979

Total	0	0	224	26	343	574	0	4	0	146	0	0	166	41	560	0	0	320	0	0	0	0	0	156	71	0	0	0	181	0	0	0	820	0	8	239	1289	2590	3879

Accurate Counts
978-664-2565

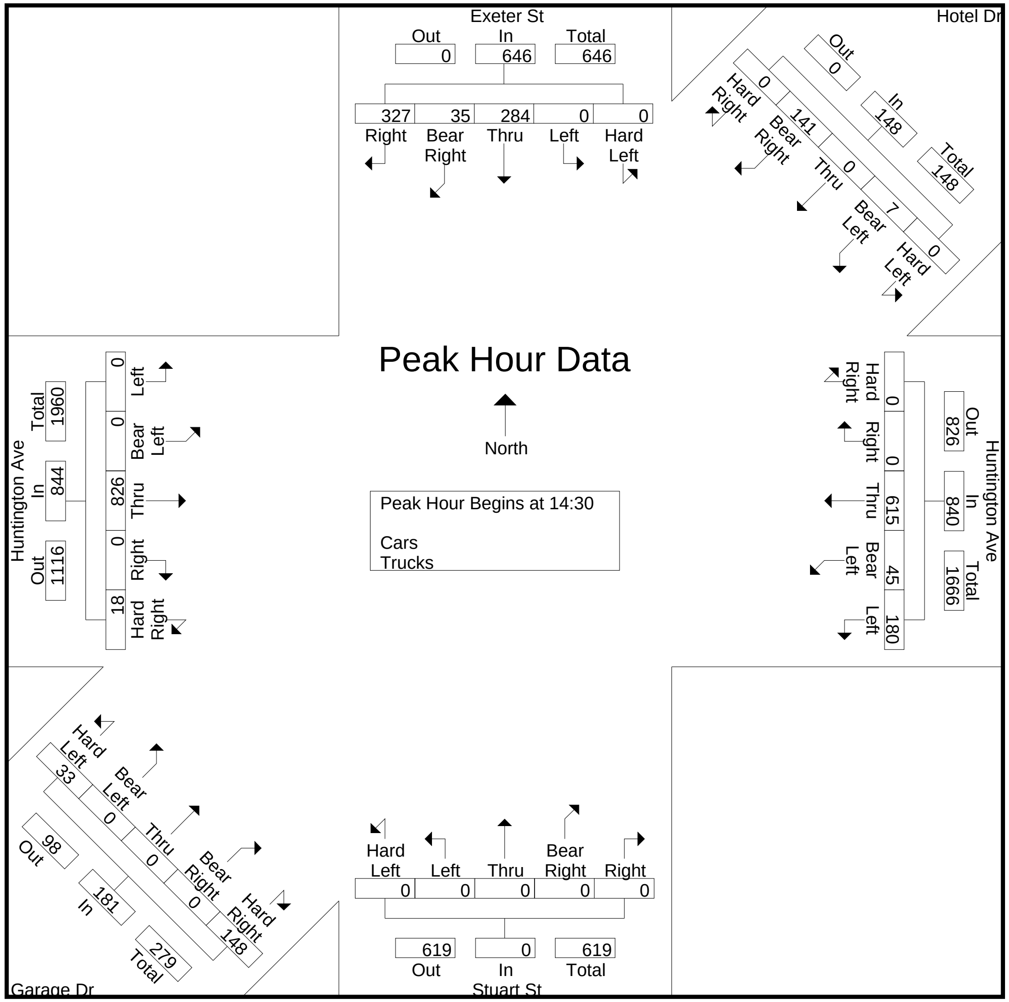
File Name : 125500A7
Site Code : 12550007
Start Date : 9/16/2006
Page No : 2

Groups Printed- Cars - Trucks

	Exeter St From North						Hotel Dr From Northeast						Huntington Ave From East						Stuart St From South						Garage Dr From Southwest						Huntington Ave From West								
Start Time	Hard Left	Left	Thru	Bear Right	Right	Peds	Hard Left	Bear Left	Thru	Bear Right	Hard Right	Peds	Left	Bear Left	Thru	Right	Hard Right	Peds	Hard Left	Left	Thru	Bear Right	Right	Peds	Hard Left	Bear Left	Thru	Bear Right	Hard Right	Peds	Left	Bear Left	Thru	Right	Hard Right	Peds	Exclu. Total	Inclu. Total	Int. Total
17:00	0	0	66	3	70	167	0	2	0	23	0	0	68	12	151	0	0	103	0	0	0	0	0	45	23	0	0	0	36	0	0	0	170	0	7	24	339	631	970
17:15	0	0	70	10	94	107	0	4	0	23	0	0	47	7	152	0	0	66	0	0	0	0	0	52	21	0	0	0	38	0	0	0	180	0	6	70	295	652	947
17:30	0	0	69	4	87	139	0	2	0	30	0	0	51	7	145	0	0	96	0	0	0	0	0	34	14	0	0	0	38	0	0	0	172	0	6	68	337	625	962
17:45	0	0	66	3	70	158	0	1	0	22	0	0	36	7	149	0	0	92	0	0	0	0	0	33	13	0	0	0	37	0	0	0	174	0	10	56	339	588	927
Total	0	0	271	20	321	571	0	9	0	98	0	0	202	33	597	0	0	357	0	0	0	0	0	164	71	0	0	0	149	0	0	0	696	0	29	218	1310	2496	3806
Grand Total	0	0	1047	117	1309	2414	0	23	0	488	0	0	695	166	2416	0	0	1278	0	0	0	0	0	670	209	0	0	0	615	0	0	0	3004	0	73	829	5191	10162	15353
Apprch %	0	0	42.3	4.7	52.9		0	4.5	0	95.5	0		21.2	5.1	73.7	0	0		0	0	0	0	0		25.4	0	0	0	74.6		0	0	97.6	0	2.4				
Total %	0	0	10.3	1.2	12.9		0	0.2	0	4.8	0		6.8	1.6	23.8	0	0		0	0	0	0	0		2.1	0	0	0	6.1		0	0	29.6	0	0.7		33.8	66.2	
Cars	0	0	1040	117	1294		0	23	0	488	0		667	166	2331	0	0		0	0	0	0	0		209	0	0	0	615		0	0	2953	0	73		0	0	15167
% Cars	0	0	99.3	100	98.9	100	0	100	0	100	0	0	96	100	96.5	0	0	100	0	0	0	0	0	100	100	0	0	0	100	0	0	0	98.3	0	100	100	0	0	98.8
Trucks	0	0	7	0	15		0	0	0	0	0		28	0	85	0	0		0	0	0	0	0		0	0	0	0	0		0	0	51	0	0		0	0	186
% Trucks	0	0	0.7	0	1.1	0	0	0	0	0	0	0	4	0	3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	0	0	0	0	0	1.2

	Exeter St From North						Hotel Dr From Northeast						Huntington Ave From East						Stuart St From South						Garage Dr From Southwest						Huntington Ave From West						
Start Time	Hard Left	Left	Thru	Bear Right	Right	App. Total	Hard Left	Bear Left	Thru	Bear Right	Hard Right	App. Total	Left	Bear Left	Thru	Right	Hard Right	App. Total	Hard Left	Left	Thru	Bear Right	Right	App. Total	Hard Left	Bear Left	Thru	Bear Right	Hard Right	App. Total	Left	Bear Left	Thru	Right	Hard Right	App. Total	Int. Total
Peak Hour Analysis From 14:00 to 17:45 - Peak 1 of 1																																					
Peak Hour for Entire Intersection Begins at 14:30																																					
14:30	0	0	68	13	88	169	0	1	0	36	0	37	48	12	153	0	0	213	0	0	0	0	0	0	7	0	0	0	34	41	0	0	201	0	5	206	666

14:45	0	0	67	10	83	160	0	4	0	35	0	39	29	7	176	0	0	212	0	0	0	0	0	0	3	0	0	0	27	30	0	0	217	0	0	217	658
15:00	0	0	77	4	78	159	0	1	0	43	0	44	57	13	128	0	0	198	0	0	0	0	0	0	9	0	0	0	44	53	0	0	224	0	11	235	689
15:15	0	0	72	8	78	158	0	1	0	27	0	28	46	13	158	0	0	217	0	0	0	0	0	0	14	0	0	0	43	57	0	0	184	0	2	186	646
Total Volume	0	0	284	35	327	646	0	7	0	141	0	148	180	45	615	0	0	840	0	0	0	0	0	0	33	0	0	0	148	181	0	0	826	0	18	844	2659
% App. Total	0	0	44	5.4	50.6		0	4.7	0	95.3	0		21.4	5.4	73.2	0	0		0	0	0	0	0		18.2	0	0	0	81.8		0	0	97.9	0	2.1		
PHF	.000	.000	.922	.673	.929	.956	.000	.438	.000	.820	.000	.841	.789	.865	.874	.000	.000	.968	.000	.000	.000	.000	.000	.000	.589	.000	.000	.000	.841	.794	.000	.000	.922	.000	.409	.898	.965



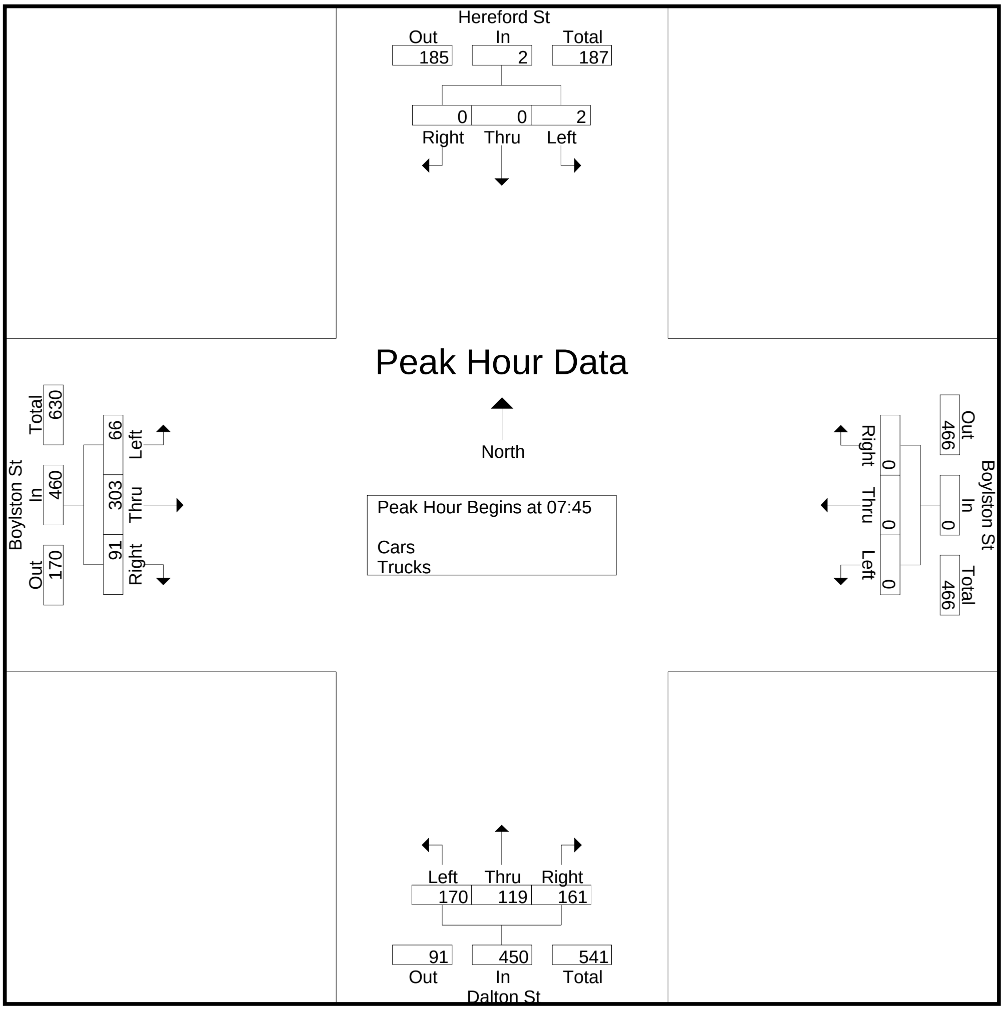
N/S Street : Hereford St / Dalton St
E/W Street: Boylston Street
City/State : Boston, MA
Weather : Overcast

File Name : 12550001
Site Code : 12550001
Start Date : 9/14/2006

Groups Printed- Cars - Trucks

	Hereford St From North				Boylston St From East				Dalton St From South				Boylston 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	0	0	0	11	0	0	0	15	31	13	32	13	14	63	11	10	49	164	213
07:15	0	0	2	10	0	0	0	11	27	17	34	14	12	54	13	15	50	159	209
07:30	0	0	0	25	0	0	0	24	46	21	34	15	17	75	21	12	76	214	290
07:45	0	0	0	29	0	0	0	22	56	25	39	26	13	84	18	18	95	235	330
Total	0	0	2	75	0	0	0	72	160	76	139	68	56	276	63	55	270	772	1042
08:00	0	0	0	29	0	0	0	49	43	29	33	36	18	70	29	28	142	222	364
08:15	2	0	0	36	0	0	0	31	39	33	40	48	19	67	19	32	147	219	366
08:30	0	0	0	44	0	0	0	24	32	32	49	40	16	82	25	29	137	236	373
08:45	0	0	0	76	0	0	0	49	35	17	41	53	8	85	19	24	202	205	407
Total	2	0	0	185	0	0	0	153	149	111	163	177	61	304	92	113	628	882	1510
Grand Total	2	0	2	260	0	0	0	225	309	187	302	245	117	580	155	168	898	1654	2552
Apprch %	50	0	50		0	0	0		38.7	23.4	37.8		13.7	68.1	18.2				
Total %	0.1	0	0.1		0	0	0		18.7	11.3	18.3		7.1	35.1	9.4		35.2	64.8	
Cars	0	0	0		0	0	0		274	179	235		110	516	151		0	0	2363
% Cars	0	0	0	100	0	0	0	100	88.7	95.7	77.8	100	94	89	97.4	100	0	0	92.6
Trucks	2	0	2		0	0	0		35	8	67		7	64	4		0	0	189
% Trucks	100	0	100	0	0	0	0	0	11.3	4.3	22.2	0	6	11	2.6	0	0	0	7.4

	Hereford St From North				Boylston St From East				Dalton St From South				Boylston St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45																	
07:45	0	0	0	0	0	0	0	0	56	25	39	120	13	84	18	115	235
08:00	0	0	0	0	0	0	0	0	43	29	33	105	18	70	29	117	222
08:15	2	0	0	2	0	0	0	0	39	33	40	112	19	67	19	105	219
08:30	0	0	0	0	0	0	0	0	32	32	49	113	16	82	25	123	236
Total Volume	2	0	0	2	0	0	0	0	170	119	161	450	66	303	91	460	912
% App. Total	100	0	0		0	0	0		37.8	26.4	35.8		14.3	65.9	19.8		
PHF	.250	.000	.000	.250	.000	.000	.000	.000	.759	.902	.821	.938	.868	.902	.784	.935	.966


Hereford St
Out In Total
185 2 187
0 0 2
Right Thru Left
Peak Hour Data
North
Peak Hour Begins at 07:45
Cars
Trucks
Boylston St
Total 630
In 460
Out 170
66 Left
303 Thru
91 Right
Boylston St
Out 466
In 0
Total 466
Right 0
Thru 0
Left 0
Left Thru Right
170 119 161
91 450 541
Out In Total
Dalton St

Accurate Counts
978-664-2565

N/S Street : Hereford St / Dalton St
E/W Street: Boylston Street
City/State : Boston, MA
Weather : Overcast

File Name : 12550001
Site Code : 12550001
Start Date : 9/14/2006
Page No : 1

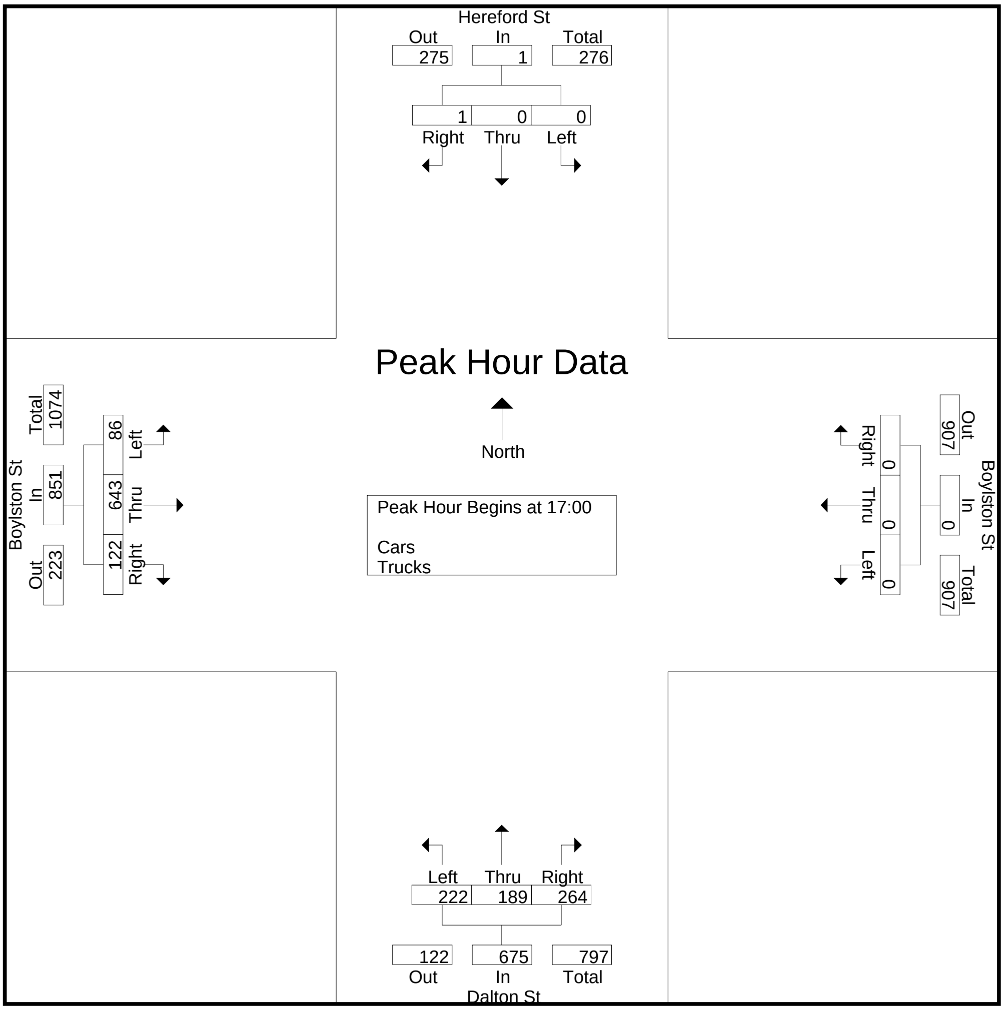
Groups Printed- Cars - Trucks

	Hereford St From North				Boylston St From East				Dalton St From South				Boylston St From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
16:00	0	0	0	234	0	0	0	47	27	28	55	85	17	123	37	60	426	287	713
16:15	0	0	0	122	0	0	0	21	47	37	58	67	25	135	32	39	249	334	583
16:30	0	0	0	111	0	0	0	25	40	50	64	32	32	117	14	40	208	317	525
16:45	0	0	0	121	0	0	0	30	38	52	55	35	18	166	23	43	229	352	581
Total	0	0	0	588	0	0	0	123	152	167	232	219	92	541	106	182	1112	1290	2402
17:00	0	0	0	200	0	0	0	32	50	47	65	40	21	151	25	48	320	359	679
17:15	0	0	1	128	0	0	0	41	54	39	63	59	15	167	21	68	296	360	656
17:30	0	0	0	137	0	0	0	32	62	46	72	76	18	170	26	54	299	394	693
17:45	0	0	0	144	0	0	0	45	56	57	64	79	32	155	50	64	332	414	746
Total	0	0	1	609	0	0	0	150	222	189	264	254	86	643	122	234	1247	1527	2774
Grand Total	0	0	1	1197	0	0	0	273	374	356	496	473	178	1184	228	416	2359	2817	5176
Apprch %	0	0	100		0	0	0		30.5	29	40.5		11.2	74.5	14.3				
Total %	0	0	0		0	0	0		13.3	12.6	17.6		6.3	42	8.1		45.6	54.4	
Cars	0	0	0		0	0	0		353	350	462		175	1146	225		0	0	5070
% Cars	0	0	0	100	0	0	0	100	94.4	98.3	93.1	100	98.3	96.8	98.7	100	0	0	98
Trucks	0	0	1		0	0	0		21	6	34		3	38	3		0	0	106
% Trucks	0	0	100	0	0	0	0	0	5.6	1.7	6.9	0	1.7	3.2	1.3	0	0	0	2

	Hereford St From North				Boylston St From East				Dalton St From South				Boylston St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 17:00																	
17:00	0	0	0	0	0	0	0	0	50	47	65	162	21	151	25	197	359
17:15	0	0	1	1	0	0	0	0	54	39	63	156	15	167	21	203	360
17:30	0	0	0	0	0	0	0	0	62	46	72	180	18	170	26	214	394
17:45	0	0	0	0	0	0	0	0	56	57	64	177	32	155	50	237	414
Total Volume	0	0	1	1	0	0	0	0	222	189	264	675	86	643	122	851	1527
% App. Total	0	0	100		0	0	0		32.9	28	39.1		10.1	75.6	14.3		
PHF	.000	.000	.250	.250	.000	.000	.000	.000	.895	.829	.917	.938	.672	.946	.610	.898	.922

Accurate Counts
978-664-2565

File Name : 12550001
Site Code : 12550001
Start Date : 9/14/2006
Page No : 2



Accurate Counts
978-664-2565

N/S Street : Gloucester Street
E/W Street: Boylston Street
City/State : Boston, MA
Weather : Overcast

File Name : 12550002
Site Code : 12550002
Start Date : 9/14/2006

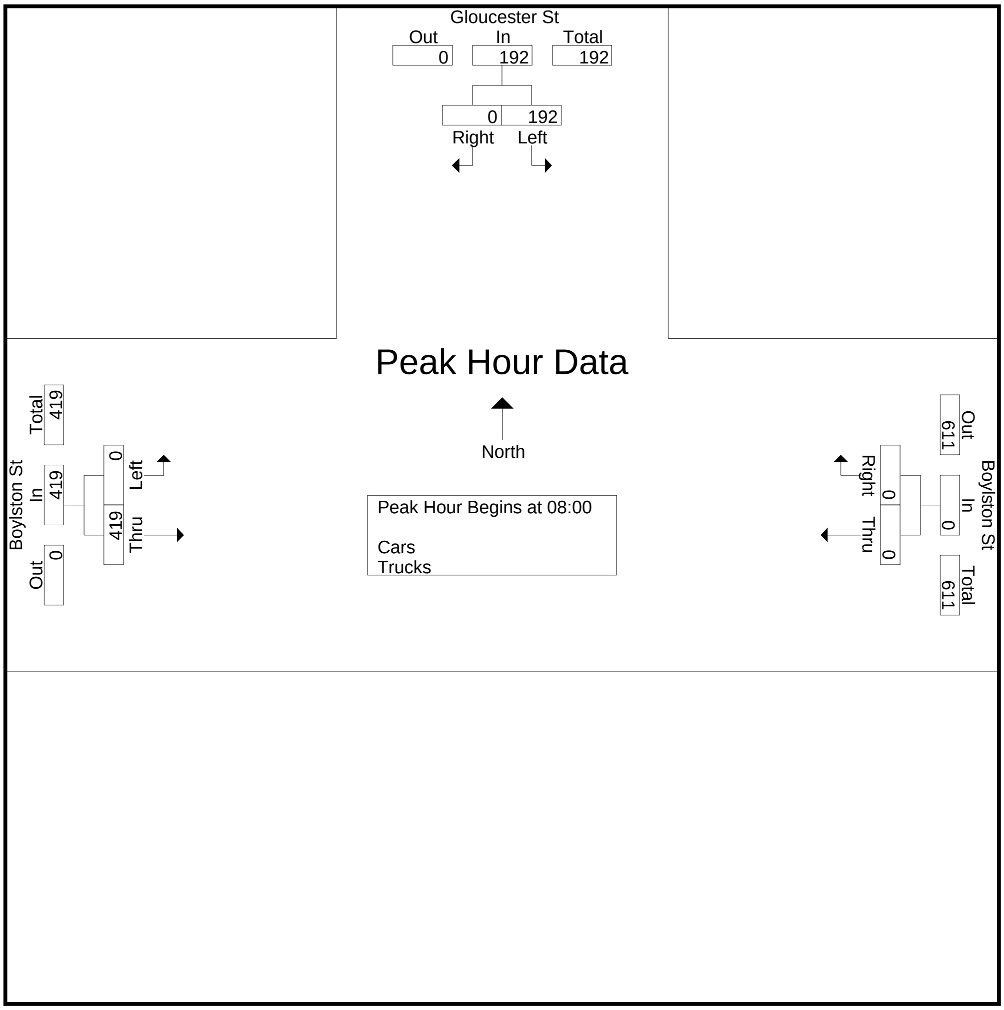
Groups Printed- Cars - Trucks

	Gloucester St From North			Boylston St From East			Boylston St From West					
Start Time	Left	Right	Peds	Thru	Right	Peds	Left	Thru	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00	22	0	16	0	0	4	0	97	7	27	119	146
07:15	20	0	22	0	0	7	0	89	9	38	109	147
07:30	41	0	23	0	0	7	0	69	8	38	110	148
07:45	51	0	31	0	0	5	0	92	24	60	143	203
Total	134	0	92	0	0	23	0	347	48	163	481	644
08:00	35	0	35	0	0	9	0	88	26	70	123	193
08:15	48	0	50	0	0	12	0	90	19	81	138	219
08:30	54	0	79	0	0	28	0	120	28	135	174	309
08:45	55	0	109	0	0	21	0	121	47	177	176	353
Total	192	0	273	0	0	70	0	419	120	463	611	1074
Grand Total	326	0	365	0	0	93	0	766	168	626	1092	1718
Apprch %	100	0		0	0		0	100				
Total %	29.9	0		0	0		0	70.1		36.4	63.6	
Cars	294	0		0	0		0	652		0	0	1572
% Cars	90.2	0	100	0	0	100	0	85.1	100	0	0	91.5
Trucks	32	0		0	0		0	114		0	0	146
% Trucks	9.8	0	0	0	0	0	0	14.9	0	0	0	8.5

	Gloucester St From North			Boylston St From East			Boylston St From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 08:00										
08:00	35	0	35	0	0	0	0	88	88	123
08:15	48	0	48	0	0	0	0	90	90	138
08:30	54	0	54	0	0	0	0	120	120	174
08:45	55	0	55	0	0	0	0	121	121	176
Total Volume	192	0	192	0	0	0	0	419	419	611
% App. Total	100	0		0	0		0	100		
PHF	.873	.000	.873	.000	.000	.000	.000	.866	.866	.868

Accurate Counts
978-664-2565

File Name : 12550002
Site Code : 12550002
Start Date : 9/14/2006
Page No : 2



Accurate Counts
978-664-2565

N/S Street : Fairfield Street
E/W Street: Boylston Street
City/State : Boston, MA
Weather : Overcast

File Name : 12550003
Site Code : 12550003
Start Date : 9/14/2006
Page No : 1

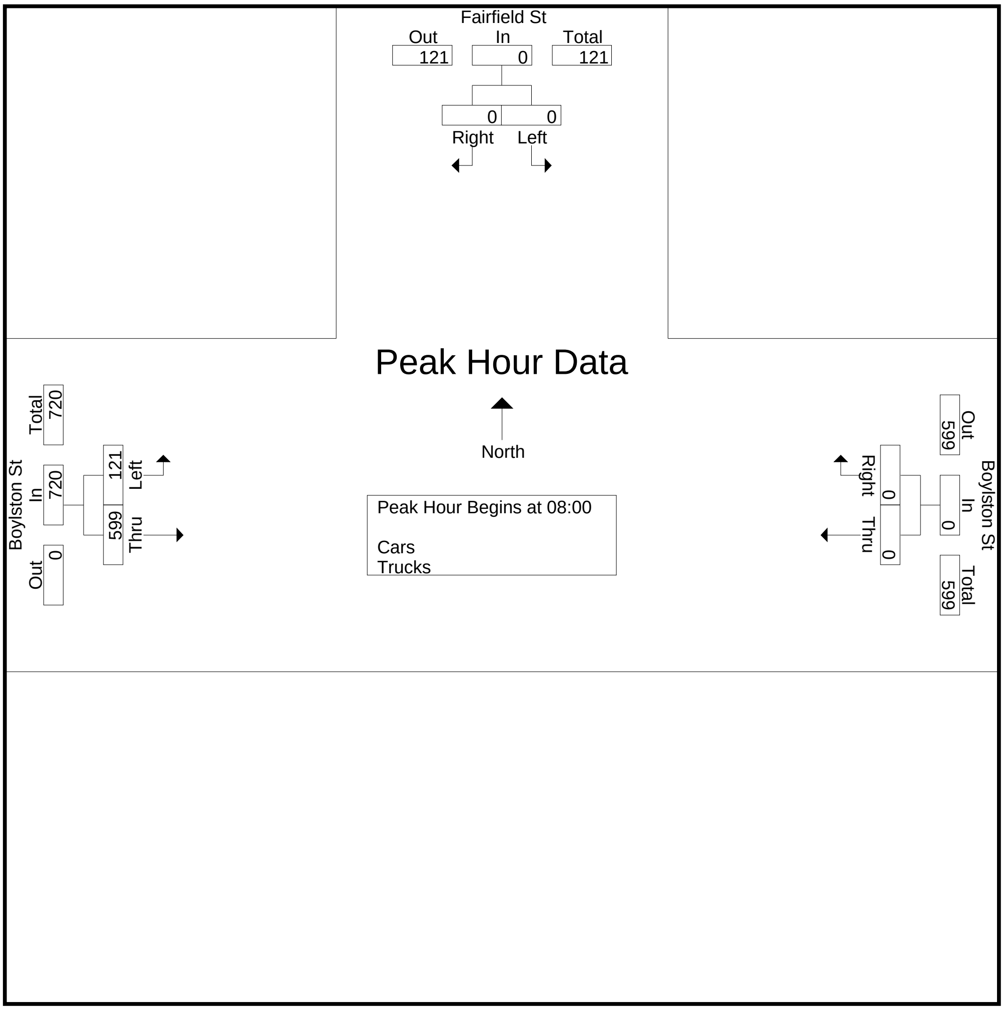
Groups Printed- Cars - Trucks

	Fairfield St From North			Boylston St From East			Boylston St From West					
Start Time	Left	Right	Peds	Thru	Right	Peds	Left	Thru	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00	0	0	28	0	0	0	14	106	2	30	120	150
07:15	0	0	49	0	0	0	16	111	3	52	127	179
07:30	0	0	69	0	0	0	24	140	10	79	164	243
07:45	0	0	97	0	0	0	23	144	5	102	167	269
Total	0	0	243	0	0	0	77	501	20	263	578	841
08:00	0	0	99	0	0	0	32	138	7	106	170	276
08:15	0	0	134	0	0	0	26	138	9	143	164	307
08:30	0	0	156	0	0	0	31	151	8	164	182	346
08:45	0	0	185	0	0	0	32	172	2	187	204	391
Total	0	0	574	0	0	0	121	599	26	600	720	1320
Grand Total	0	0	817	0	0	0	198	1100	46	863	1298	2161
Apprch %	0	0		0	0		15.3	84.7				
Total %	0	0		0	0		15.3	84.7		39.9	60.1	
Cars	0	0		0	0		173	1011		0	0	2047
% Cars	0	0	100	0	0	0	87.4	91.9	100	0	0	94.7
Trucks	0	0		0	0		25	89		0	0	114
% Trucks	0	0	0	0	0	0	12.6	8.1	0	0	0	5.3

	Fairfield St From North			Boylston St From East			Boylston St From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 08:00										
08:00	0	0	0	0	0	0	32	138	170	170
08:15	0	0	0	0	0	0	26	138	164	164
08:30	0	0	0	0	0	0	31	151	182	182
08:45	0	0	0	0	0	0	32	172	204	204
Total Volume	0	0	0	0	0	0	121	599	720	720
% App. Total	0	0		0	0		16.8	83.2		
PHF	.000	.000	.000	.000	.000	.000	.945	.871	.882	.882

Accurate Counts
978-664-2565

File Name : 12550003
Site Code : 12550003
Start Date : 9/14/2006
Page No : 2



Accurate Counts
978-664-2565

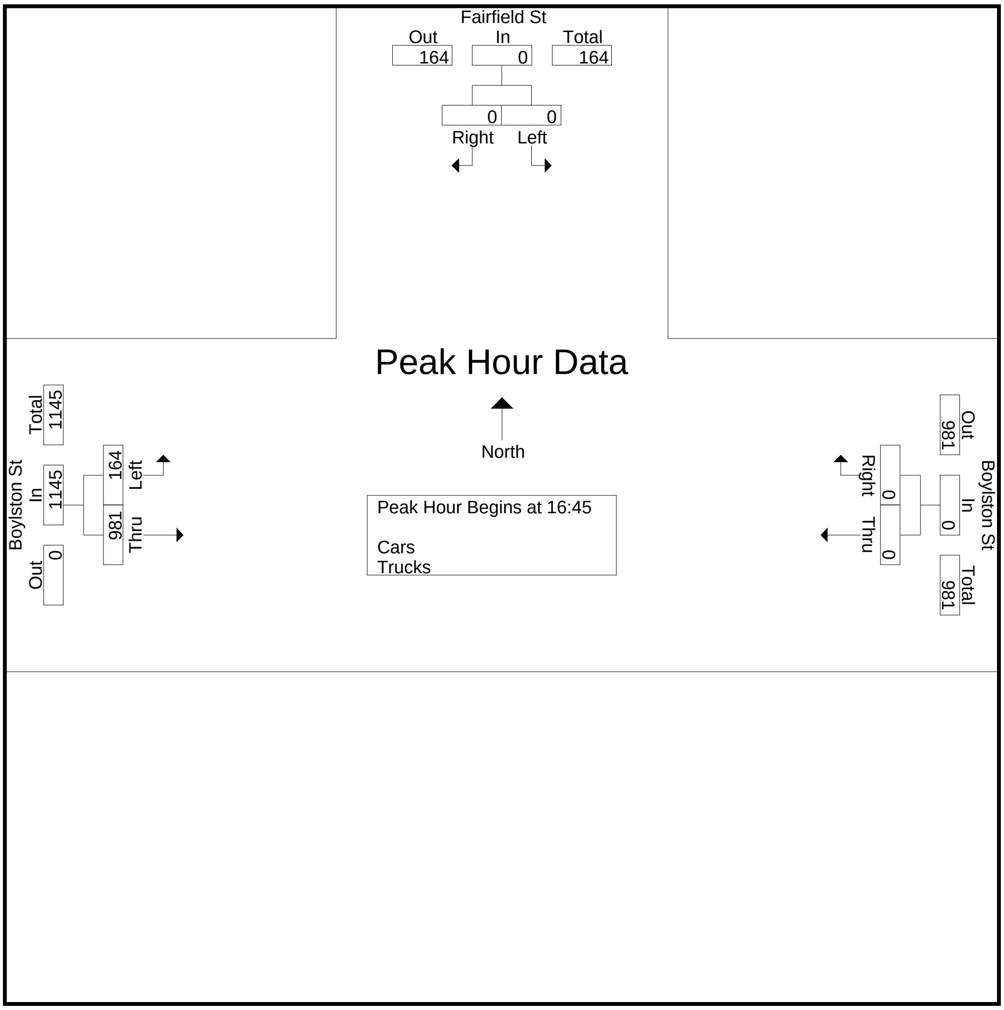
N/S Street : Fairfield Street
E/W Street: Boylston Street
City/State : Boston, MA
Weather : Overcast

File Name : 12550003
Site Code : 12550003
Start Date : 9/14/2006

Groups Printed- Cars - Trucks

	Fairfield St From North			Boylston St From East			Boylston St From West					
Start Time	Left	Right	Peds	Thru	Right	Peds	Left	Thru	Peds	Exclu. Total	Inclu. Total	Int. Total
16:00	0	0	146	0	0	0	24	184	7	153	208	361
16:15	0	0	138	0	0	0	32	203	8	146	235	381
16:30	0	0	157	0	0	0	36	224	4	161	260	421
16:45	0	0	141	0	0	0	40	259	12	153	299	452
Total	0	0	582	0	0	0	132	870	31	613	1002	1615
17:00	0	0	157	0	0	0	36	237	17	174	273	447
17:15	0	0	130	0	0	0	48	228	17	147	276	423
17:30	0	0	177	0	0	0	40	257	12	189	297	486
17:45	0	0	172	0	0	0	36	263	8	180	299	479
Total	0	0	636	0	0	0	160	985	54	690	1145	1835
Grand Total	0	0	1218	0	0	0	292	1855	85	1303	2147	3450
Apprch %	0	0		0	0		13.6	86.4				
Total %	0	0		0	0		13.6	86.4		37.8	62.2	
Cars	0	0		0	0		292	1838		0	0	3433
% Cars	0	0	100	0	0	0	100	99.1	100	0	0	99.5
Trucks	0	0		0	0		0	17		0	0	17
% Trucks	0	0	0	0	0	0	0	0.9	0	0	0	0.5

	Fairfield St From North			Boylston St From East			Boylston St From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 16:45										
16:45	0	0	0	0	0	0	40	259	299	299
17:00	0	0	0	0	0	0	36	237	273	273
17:15	0	0	0	0	0	0	48	228	276	276
17:30	0	0	0	0	0	0	40	257	297	297
Total Volume	0	0	0	0	0	0	164	981	1145	1145
% App. Total	0	0		0	0		14.3	85.7		
PHF	.000	.000	.000	.000	.000	.000	.854	.947	.957	.957


Fairfield St
Out
In
Total
164
0
164
0
0
Right
Left
Peak Hour Data
North
Boylston St
Total
1145
In
1145
Out
0
164
Left
981
Thru
Peak Hour Begins at 16:45
Cars
Trucks
Boylston St
Out
981
In
0
Total
981
Right
0
Thru
0

Accurate Counts
978-664-2565

N/S Street : East Ring Road
E/W Street: Boylston Street
City/State : Boston, MA
Weather : Overcast

File Name : 12550004
Site Code : 12550004
Start Date : 9/14/2006
Page No : 1

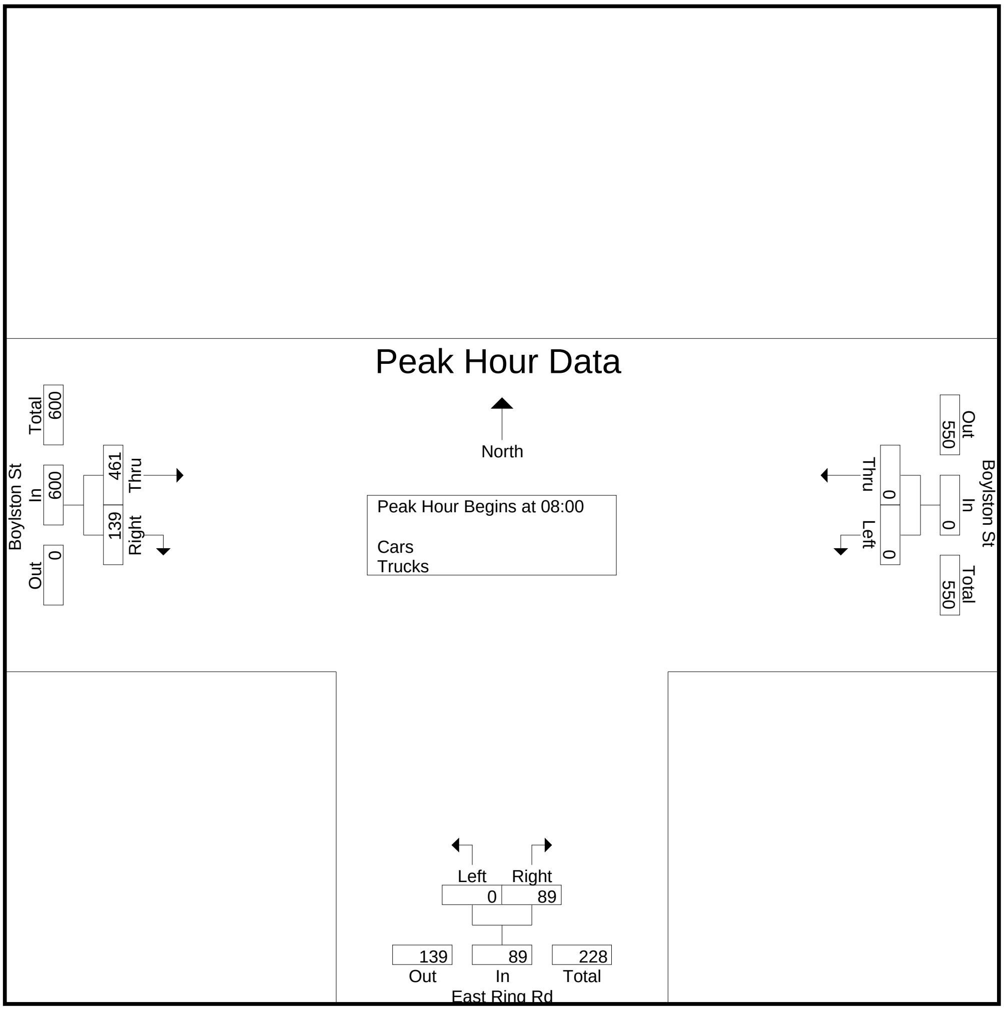
Groups Printed- Cars - Trucks

	Boylston St From East			East Ring Rd From South			Boylston St From West					
Start Time	Left	Thru	Peds	Left	Right	Peds	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00	0	0	6	0	24	1	88	16	0	7	128	135
07:15	0	0	27	0	14	0	97	18	0	27	129	156
07:30	0	0	25	0	23	1	99	35	0	26	157	183
07:45	0	0	31	0	20	0	115	27	0	31	162	193
Total	0	0	89	0	81	2	399	96	0	91	576	667
08:00	0	0	32	0	30	0	109	31	3	35	170	205
08:15	0	0	64	0	17	3	99	38	0	67	154	221
08:30	0	0	43	0	20	0	121	28	0	43	169	212
08:45	0	0	43	0	22	2	132	42	0	45	196	241
Total	0	0	182	0	89	5	461	139	3	190	689	879
Grand Total	0	0	271	0	170	7	860	235	3	281	1265	1546
Apprch %	0	0		0	100		78.5	21.5				
Total %	0	0		0	13.4		68	18.6		18.2	81.8	
Cars	0	0		0	163		802	222		0	0	1468
% Cars	0	0	100	0	95.9	100	93.3	94.5	100	0	0	95
Trucks	0	0		0	7		58	13		0	0	78
% Trucks	0	0	0	0	4.1	0	6.7	5.5	0	0	0	5

	Boylston St From East			East Ring Rd From South			Boylston St From West			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 08:00										
08:00	0	0	0	0	30	30	109	31	140	170
08:15	0	0	0	0	17	17	99	38	137	154
08:30	0	0	0	0	20	20	121	28	149	169
08:45	0	0	0	0	22	22	132	42	174	196
Total Volume	0	0	0	0	89	89	461	139	600	689
% App. Total	0	0		0	100		76.8	23.2		
PHF	.000	.000	.000	.000	.742	.742	.873	.827	.862	.879

Accurate Counts
978-664-2565

File Name : 12550004
Site Code : 12550004
Start Date : 9/14/2006
Page No : 2



N/S Street : East Ring Road
E/W Street: Boylston Street
City/State : Boston, MA
Weather : Overcast

File Name : 12550004
Site Code : 12550004
Start Date : 9/14/2006

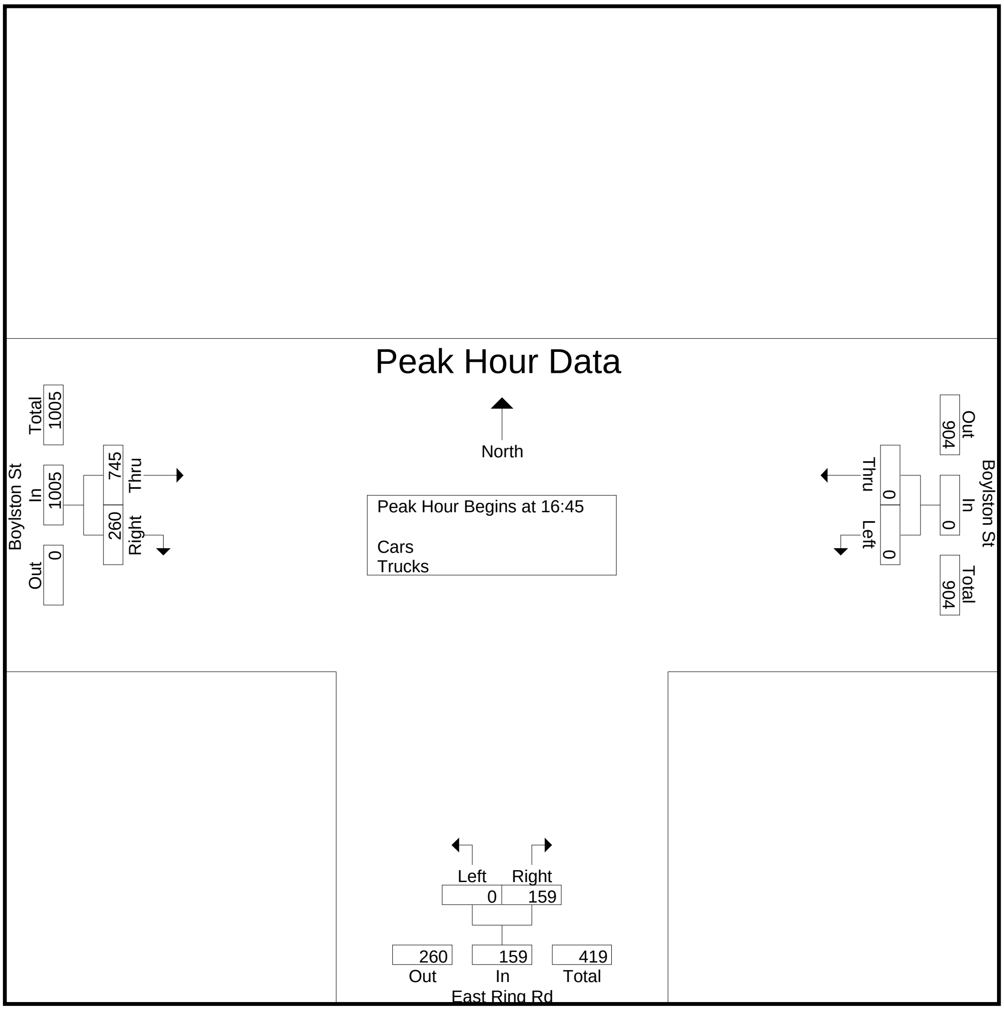
Groups Printed- Cars - Trucks

	Boylston St From East			East Ring Rd From South			Boylston St From West					
Start Time	Left	Thru	Peds	Left	Right	Peds	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
16:00	0	0	17	0	39	52	134	38	7	76	211	287
16:15	0	0	9	0	34	48	170	41	1	58	245	303
16:30	0	0	5	0	38	37	196	50	0	42	284	326
16:45	0	0	27	0	43	48	185	65	0	75	293	368
Total	0	0	58	0	154	185	685	194	8	251	1033	1284
17:00	0	0	1	0	45	44	167	73	1	46	285	331
17:15	0	0	2	0	24	68	202	50	0	70	276	346
17:30	0	0	0	0	47	58	191	72	2	60	310	370
17:45	0	0	0	0	21	44	202	63	2	46	286	332
Total	0	0	3	0	137	214	762	258	5	222	1157	1379
Grand Total	0	0	61	0	291	399	1447	452	13	473	2190	2663
Apprch %	0	0		0	100		76.2	23.8				
Total %	0	0		0	13.3		66.1	20.6		17.8	82.2	
Cars	0	0		0	289		1433	452		0	0	2647
% Cars	0	0	100	0	99.3	100	99	100	100	0	0	99.4
Trucks	0	0		0	2		14	0		0	0	16
% Trucks	0	0	0	0	0.7	0	1	0	0	0	0	0.6

	Boylston St From East			East Ring Rd From South			Boylston St From West			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 16:45										
16:45	0	0	0	0	43	43	185	65	250	293
17:00	0	0	0	0	45	45	167	73	240	285
17:15	0	0	0	0	24	24	202	50	252	276
17:30	0	0	0	0	47	47	191	72	263	310
Total Volume	0	0	0	0	159	159	745	260	1005	1164
% App. Total	0	0		0	100		74.1	25.9		
PHF	.000	.000	.000	.000	.846	.846	.922	.890	.955	.939

Accurate Counts
978-664-2565

File Name : 12550004
Site Code : 12550004
Start Date : 9/14/2006
Page No : 2



N/S Street : Exeter Street
E/W Street: Boylston Street
City/State : Boston, MA
Weather : Overcast

File Name : 12550005
Site Code : 12550005
Start Date : 9/14/2006

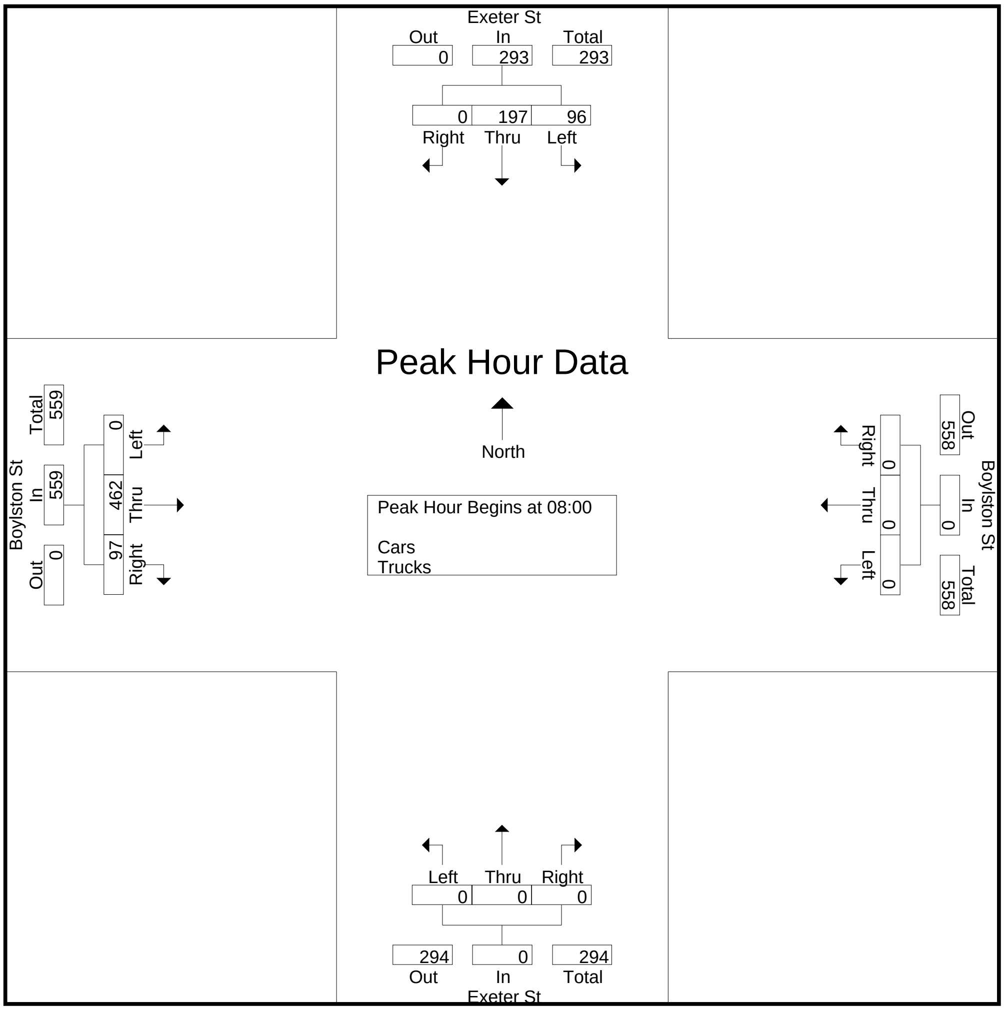
Groups Printed- Cars - Trucks

	Exeter St From North				Boylston St From East				Exeter St From South				Boylston 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	18	41	0	67	0	0	0	22	0	0	0	26	0	82	25	24	139	166	305
07:15	10	38	0	67	0	0	0	29	0	0	0	29	0	89	14	20	145	151	296
07:30	14	39	0	132	0	0	0	48	0	0	0	44	0	100	21	40	264	174	438
07:45	18	48	0	148	0	0	0	61	0	0	0	74	0	110	25	55	338	201	539
Total	60	166	0	414	0	0	0	160	0	0	0	173	0	381	85	139	886	692	1578
08:00	26	45	0	146	0	0	0	71	0	0	0	65	0	122	22	68	350	215	565
08:15	22	48	0	192	0	0	0	66	0	0	0	63	0	95	24	53	374	189	563
08:30	14	53	0	242	0	0	0	52	0	0	0	90	0	123	20	66	450	210	660
08:45	34	51	0	251	0	0	0	78	0	0	0	92	0	122	31	88	509	238	747
Total	96	197	0	831	0	0	0	267	0	0	0	310	0	462	97	275	1683	852	2535
Grand Total	156	363	0	1245	0	0	0	427	0	0	0	483	0	843	182	414	2569	1544	4113
Apprch %	30.1	69.9	0		0	0	0		0	0	0		0	82.2	17.8				
Total %	10.1	23.5	0		0	0	0		0	0	0		0	54.6	11.8		62.5	37.5	
Cars	143	351	0		0	0	0		0	0	0		0	713	164		0	0	3940
% Cars	91.7	96.7	0	100	0	0	0	100	0	0	0	100	0	84.6	90.1	100	0	0	95.8
Trucks	13	12	0		0	0	0		0	0	0		0	130	18		0	0	173
% Trucks	8.3	3.3	0	0	0	0	0	0	0	0	0	0	0	15.4	9.9	0	0	0	4.2

	Exeter St From North				Boylston St From East				Exeter St From South				Boylston St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00																	
08:00	26	45	0	71	0	0	0	0	0	0	0	0	0	122	22	144	215
08:15	22	48	0	70	0	0	0	0	0	0	0	0	0	95	24	119	189
08:30	14	53	0	67	0	0	0	0	0	0	0	0	0	123	20	143	210
08:45	34	51	0	85	0	0	0	0	0	0	0	0	0	122	31	153	238
Total Volume	96	197	0	293	0	0	0	0	0	0	0	0	0	462	97	559	852
% App. Total	32.8	67.2	0		0	0	0		0	0	0		0	82.6	17.4		
PHF	.706	.929	.000	.862	.000	.000	.000	.000	.000	.000	.000	.000	.000	.939	.782	.913	.895

Accurate Counts
978-664-2565

File Name : 12550005
Site Code : 12550005
Start Date : 9/14/2006
Page No : 2



N/S Street : Exeter Street
E/W Street: Boylston Street
City/State : Boston, MA
Weather : Overcast

File Name : 12550005
Site Code : 12550005
Start Date : 9/14/2006

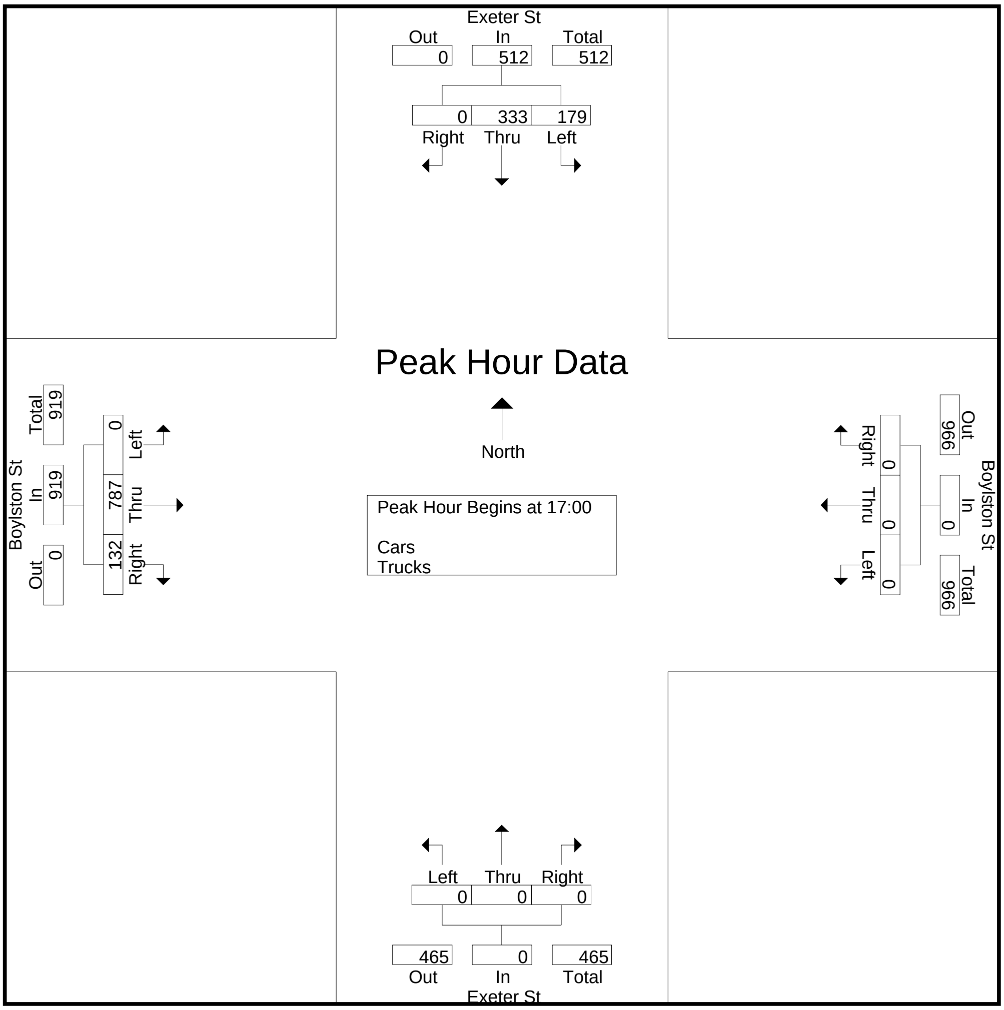
Groups Printed- Cars - Trucks

	Exeter St From North				Boylston St From East				Exeter St From South				Boylston St From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
16:00	33	63	0	158	0	0	0	45	0	0	0	151	0	149	41	88	442	286	728
16:15	34	94	0	173	0	0	0	63	0	0	0	137	0	163	23	79	452	314	766
16:30	46	70	0	195	0	0	0	61	0	0	0	184	0	186	34	86	526	336	862
16:45	37	82	0	183	0	0	0	51	0	0	0	151	0	184	35	73	458	338	796
Total	150	309	0	709	0	0	0	220	0	0	0	623	0	682	133	326	1878	1274	3152
17:00	50	94	0	213	0	0	0	61	0	0	0	142	0	185	38	70	486	367	853
17:15	35	69	0	204	0	0	0	52	0	0	0	183	0	203	21	86	525	328	853
17:30	46	82	0	266	0	0	0	71	0	0	0	183	0	191	37	86	606	356	962
17:45	48	88	0	230	0	0	0	56	0	0	0	172	0	208	36	77	535	380	915
Total	179	333	0	913	0	0	0	240	0	0	0	680	0	787	132	319	2152	1431	3583
Grand Total	329	642	0	1622	0	0	0	460	0	0	0	1303	0	1469	265	645	4030	2705	6735
Apprch %	33.9	66.1	0		0	0	0		0	0	0		0	84.7	15.3				
Total %	12.2	23.7	0		0	0	0		0	0	0		0	54.3	9.8		59.8	40.2	
Cars	325	634	0		0	0	0		0	0	0		0	1384	253		0	0	6626
% Cars	98.8	98.8	0	100	0	0	0	100	0	0	0	100	0	94.2	95.5	100	0	0	98.4
Trucks	4	8	0		0	0	0		0	0	0		0	85	12		0	0	109
% Trucks	1.2	1.2	0	0	0	0	0	0	0	0	0	0	0	5.8	4.5	0	0	0	1.6

	Exeter St From North				Boylston St From East				Exeter St From South				Boylston St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 17:00																	
17:00	50	94	0	144	0	0	0	0	0	0	0	0	0	185	38	223	367
17:15	35	69	0	104	0	0	0	0	0	0	0	0	0	203	21	224	328
17:30	46	82	0	128	0	0	0	0	0	0	0	0	0	191	37	228	356
17:45	48	88	0	136	0	0	0	0	0	0	0	0	0	208	36	244	380
Total Volume	179	333	0	512	0	0	0	0	0	0	0	0	0	787	132	919	1431
% App. Total	35	65	0		0	0	0		0	0	0		0	85.6	14.4		
PHF	.895	.886	.000	.889	.000	.000	.000	.000	.000	.000	.000	.000	.000	.946	.868	.942	.941

Accurate Counts
978-664-2565

File Name : 12550005
Site Code : 12550005
Start Date : 9/14/2006
Page No : 2



N/S Street : East Ring Rd / Harcourt St
E/W Street: Huntington Avenue
City/State : Boston, MA
Weather : Overcast

File Name : 12550006
Site Code : 12550006
Start Date : 9/14/2006
Page No : 1

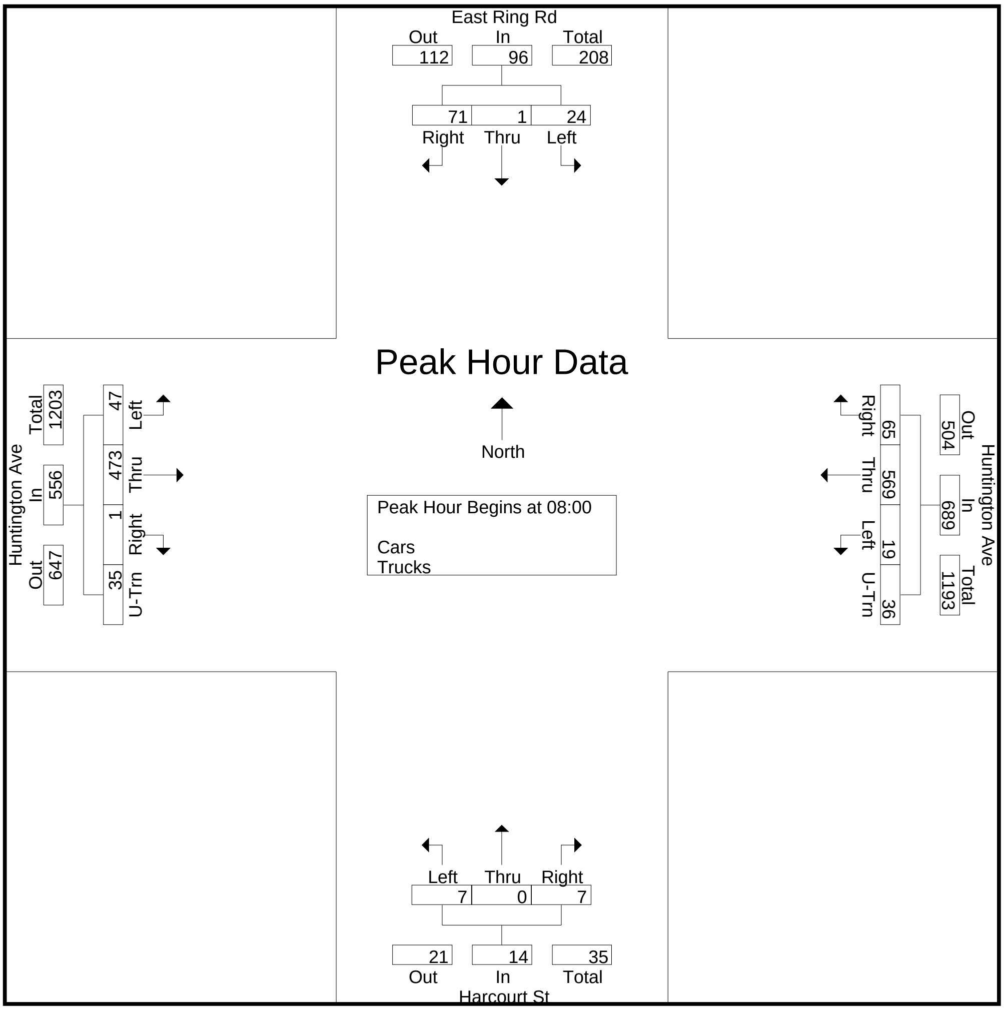
Groups Printed- Cars - Trucks

	East Ring Rd From North			Huntington Ave From East				Harcourt St From South			Huntington Ave From West				
Start Time	Left	Thru	Right	Left	Thru	Right	U-Trn	Left	Thru	Right	Left	Thru	Right	U-Trn	Int. Total
07:00	4	0	10	4	114	17	6	2	0	6	11	73	1	3	251
07:15	6	0	11	1	133	16	5	1	0	4	8	106	3	6	300
07:30	3	0	16	6	128	17	6	2	0	2	12	141	3	6	342
07:45	8	0	17	4	138	19	7	4	1	2	10	122	1	9	342
Total	21	0	54	15	513	69	24	9	1	14	41	442	8	24	1235
08:00	4	0	20	4	147	15	8	1	0	1	16	111	1	11	339
08:15	12	1	16	4	122	14	9	2	0	1	7	97	0	7	292
08:30	5	0	20	7	153	19	8	2	0	3	13	130	0	8	368
08:45	3	0	15	4	147	17	11	2	0	2	11	135	0	9	356
Total	24	1	71	19	569	65	36	7	0	7	47	473	1	35	1355
Grand Total	45	1	125	34	1082	134	60	16	1	21	88	915	9	59	2590
Apprch %	26.3	0.6	73.1	2.6	82.6	10.2	4.6	42.1	2.6	55.3	8.2	85.4	0.8	5.5	
Total %	1.7	0	4.8	1.3	41.8	5.2	2.3	0.6	0	0.8	3.4	35.3	0.3	2.3	
Cars	44	1	113	29	989	106	60	11	1	16	85	877	6	59	2397
% Cars	97.8	100	90.4	85.3	91.4	79.1	100	68.8	100	76.2	96.6	95.8	66.7	100	92.5
Trucks	1	0	12	5	93	28	0	5	0	5	3	38	3	0	193
% Trucks	2.2	0	9.6	14.7	8.6	20.9	0	31.2	0	23.8	3.4	4.2	33.3	0	7.5

	East Ring Rd From North				Huntington Ave From East					Harcourt St From South				Huntington Ave From West					
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	U-Trn	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	U-Trn	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																			
Peak Hour for Entire Intersection Begins at 08:00																			
08:00	4	0	20	24	4	147	15	8	174	1	0	1	2	16	111	1	11	139	339
08:15	12	1	16	29	4	122	14	9	149	2	0	1	3	7	97	0	7	111	292
08:30	5	0	20	25	7	153	19	8	187	2	0	3	5	13	130	0	8	151	368
08:45	3	0	15	18	4	147	17	11	179	2	0	2	4	11	135	0	9	155	356
Total Volume	24	1	71	96	19	569	65	36	689	7	0	7	14	47	473	1	35	556	1355
% App. Total	25	1	74		2.8	82.6	9.4	5.2		50	0	50		8.5	85.1	0.2	6.3		
PHF	.500	.250	.888	.828	.679	.930	.855	.818	.921	.875	.000	.583	.700	.734	.876	.250	.795	.897	.921

Accurate Counts
978-664-2565

File Name : 12550006
Site Code : 12550006
Start Date : 9/14/2006
Page No : 2



Accurate Counts
978-664-2565

N/S Street : East Ring Rd / Harcourt St
E/W Street: Huntington Avenue
City/State : Boston, MA
Weather : Overcast

File Name : 12550006
Site Code : 12550006
Start Date : 9/14/2006

Groups Printed- Peds

	East Ring Rd From North	Huntington Ave From East	Harcourt St From South	Huntington Ave From West	
Start Time	Peds	Peds	Peds	Peds	Int. Total
07:00	6	26	19	28	79
07:15	20	23	5	26	74
07:30	16	14	11	30	71
07:45	19	38	8	35	100
Total	61	101	43	119	324
08:00	14	31	7	50	102
08:15	30	24	24	21	99
08:30	77	39	30	19	165
08:45	77	41	25	19	162
Total	198	135	86	109	528
Grand Total	259	236	129	228	852
Apprch %	100	100	100	100	
Total %	30.4	27.7	15.1	26.8	

	East Ring Rd From North		Huntington Ave From East		Harcourt St From South		Huntington Ave From West		
Start Time	Peds	App. Total	Peds	App. Total	Peds	App. Total	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1									
Peak Hour for Entire Intersection Begins at 08:00									
08:00	14	14	31	31	7	7	50	50	102
08:15	30	30	24	24	24	24	21	21	99
08:30	77	77	39	39	30	30	19	19	165
08:45	77	77	41	41	25	25	19	19	162
Total Volume	198	198	135	135	86	86	109	109	528
% App. Total	100		100		100		100		
PHF	.643	.643	.823	.823	.717	.717	.545	.545	.800

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

	08:00		08:00		08:00		07:15	
+0 mins.	14	14	31	31	7	7	26	26
+15 mins.	30	30	24	24	24	24	30	30
+30 mins.	77	77	39	39	30	30	35	35
+45 mins.	77	77	41	41	25	25	50	50
Total Volume	198	198	135	135	86	86	141	141
% App. Total	100		100		100		100	
PHF	.643	.643	.823	.823	.717	.717	.705	.705

Accurate Counts
978-664-2565

N/S Street : East Ring Rd / Harcourt St
E/W Street: Huntington Avenue
City/State : Boston, MA
Weather : Overcast

File Name : 12550006
Site Code : 12550006
Start Date : 9/14/2006
Page No : 1

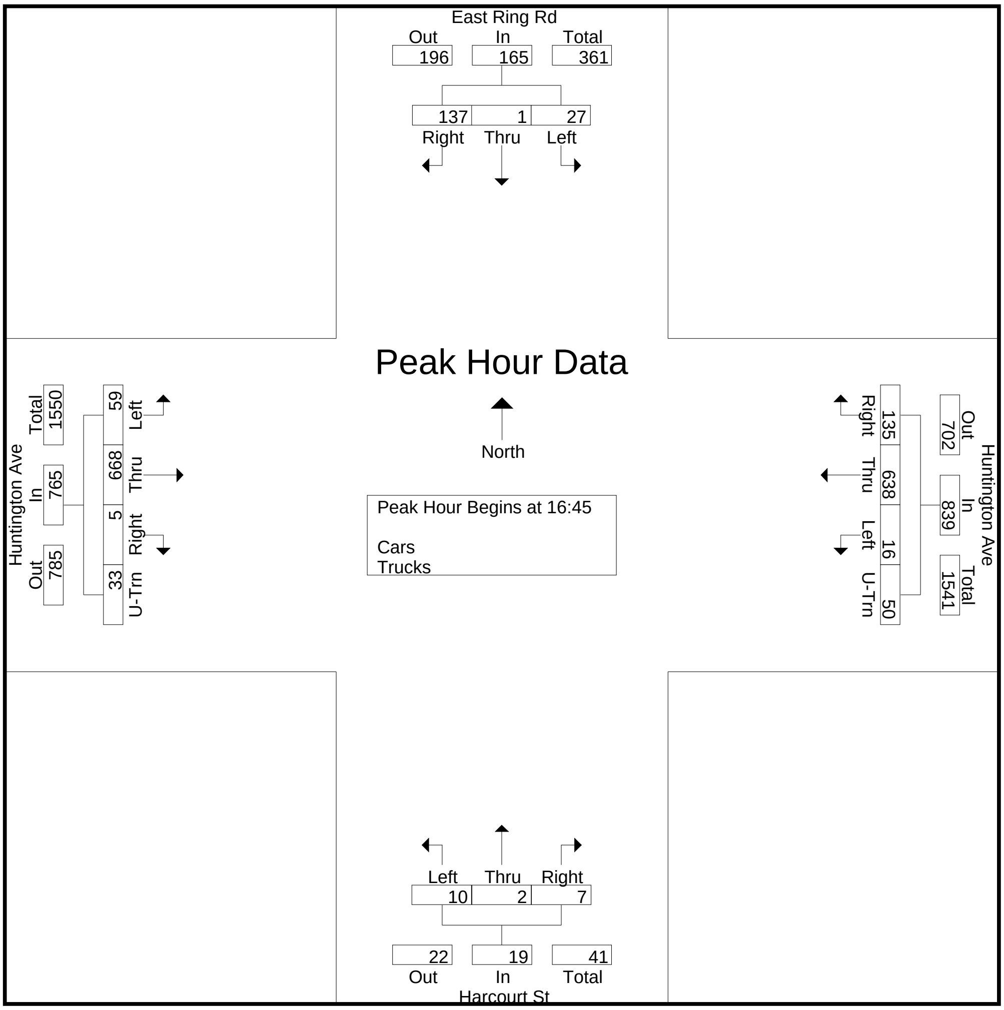
Groups Printed- Cars - Trucks

	East Ring Rd From North			Huntington Ave From East				Harcourt St From South			Huntington Ave From West				
Start Time	Left	Thru	Right	Left	Thru	Right	U-Trn	Left	Thru	Right	Left	Thru	Right	U-Trn	Int. Total
16:00	6	1	26	3	154	23	13	0	0	4	14	150	0	4	398
16:15	13	0	21	1	140	25	14	3	0	1	20	150	6	3	397
16:30	4	0	32	8	147	30	16	4	0	2	16	188	0	10	457
16:45	9	0	34	10	154	37	7	5	1	2	16	161	1	8	445
Total	32	1	113	22	595	115	50	12	1	9	66	649	7	25	1697
17:00	5	0	31	1	145	24	19	3	1	2	16	170	2	10	429
17:15	4	0	25	3	177	33	15	1	0	1	9	166	1	7	442
17:30	9	1	47	2	162	41	9	1	0	2	18	171	1	8	472
17:45	14	0	27	5	133	32	21	2	1	2	14	142	1	7	401
Total	32	1	130	11	617	130	64	7	2	7	57	649	5	32	1744
Grand Total	64	2	243	33	1212	245	114	19	3	16	123	1298	12	57	3441
Apprch %	20.7	0.6	78.6	2.1	75.6	15.3	7.1	50	7.9	42.1	8.3	87.1	0.8	3.8	
Total %	1.9	0.1	7.1	1	35.2	7.1	3.3	0.6	0.1	0.5	3.6	37.7	0.3	1.7	
Cars	62	2	241	24	1162	226	114	11	3	12	119	1270	10	57	3313
% Cars	96.9	100	99.2	72.7	95.9	92.2	100	57.9	100	75	96.7	97.8	83.3	100	96.3
Trucks	2	0	2	9	50	19	0	8	0	4	4	28	2	0	128
% Trucks	3.1	0	0.8	27.3	4.1	7.8	0	42.1	0	25	3.3	2.2	16.7	0	3.7

	East Ring Rd From North				Huntington Ave From East					Harcourt St From South				Huntington Ave From West					
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	U-Trn	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	U-Trn	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																			
Peak Hour for Entire Intersection Begins at 16:45																			
16:45	9	0	34	43	10	154	37	7	208	5	1	2	8	16	161	1	8	186	445
17:00	5	0	31	36	1	145	24	19	189	3	1	2	6	16	170	2	10	198	429
17:15	4	0	25	29	3	177	33	15	228	1	0	1	2	9	166	1	7	183	442
17:30	9	1	47	57	2	162	41	9	214	1	0	2	3	18	171	1	8	198	472
Total Volume	27	1	137	165	16	638	135	50	839	10	2	7	19	59	668	5	33	765	1788
% App. Total	16.4	0.6	83		1.9	76	16.1	6		52.6	10.5	36.8		7.7	87.3	0.7	4.3		
PHF	.750	.250	.729	.724	.400	.901	.823	.658	.920	.500	.500	.875	.594	.819	.977	.625	.825	.966	.947

Accurate Counts
978-664-2565

File Name : 12550006
Site Code : 12550006
Start Date : 9/14/2006
Page No : 2



N/S Street : East Ring Rd / Harcourt St
E/W Street: Huntington Avenue
City/State : Boston, MA
Weather : Overcast

File Name : 12550006
Site Code : 12550006
Start Date : 9/14/2006

Groups Printed- Peds

	East Ring Rd From North	Huntington Ave From East	Harcourt St From South	Huntington Ave From West	
Start Time	Peds	Peds	Peds	Peds	Int. Total
16:00	98	35	12	4	149
16:15	84	43	22	1	150
16:30	78	61	19	5	163
16:45	75	40	19	6	140
Total	335	179	72	16	602
17:00	109	33	19	13	174
17:15	98	52	34	16	200
17:30	94	69	31	14	208
17:45	66	59	14	8	147
Total	367	213	98	51	729
Grand Total	702	392	170	67	1331
Apprch %	100	100	100	100	
Total %	52.7	29.5	12.8	5	

	East Ring Rd From North		Huntington Ave From East		Harcourt St From South		Huntington Ave From West		
Start Time	Peds	App. Total	Peds	App. Total	Peds	App. Total	Peds	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1									
Peak Hour for Entire Intersection Begins at 17:00									
17:00	109	109	33	33	19	19	13	13	174
17:15	98	98	52	52	34	34	16	16	200
17:30	94	94	69	69	31	31	14	14	208
17:45	66	66	59	59	14	14	8	8	147
Total Volume	367	367	213	213	98	98	51	51	729
% App. Total	100		100		100		100		
PHF	.842	.842	.772	.772	.721	.721	.797	.797	.876

Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	16:45		17:00		16:45		17:00	
+0 mins.	75	75	33	33	19	19	13	13
+15 mins.	109	109	52	52	19	19	16	16
+30 mins.	98	98	69	69	34	34	14	14
+45 mins.	94	94	59	59	31	31	8	8
Total Volume	376	376	213	213	103	103	51	51
% App. Total	100		100		100		100	
PHF	.862	.862	.772	.772	.757	.757	.797	.797

Accurate Counts
978-664-2565

N/S Street : Exeter Street
E/W Street: Huntington Avenue
City/State : Boston, MA
Weather : Overcast

File Name : 12550007
Site Code : 12550007
Start Date : 9/14/2006
Page No : 1

Groups Printed- Cars - Trucks

	Exeter St From North						Hotel Dr From Northeast						Huntington Ave From East					
Start Time	Hard Left	Left	Thru	Bear Right	Right	Peds	Hard Left	Bear Left	Thru	Bear Right	Hard Right	Peds	Left	Bear Left	Thru	Right	Hard Right	Peds
07:00	0	0	40	2	43	18	0	1	0	1	0	0	4	13	87	0	0	25
07:15	0	2	37	2	37	25	0	0	0	3	0	0	13	9	104	0	0	13
07:30	0	0	38	1	41	29	0	1	0	3	0	0	16	15	103	0	0	27
07:45	0	3	42	6	42	28	0	0	0	10	0	0	10	18	114	0	0	43
Total	0	5	157	11	163	100	0	2	0	17	0	0	43	55	408	0	0	108
08:00	0	0	35	9	33	22	0	0	0	2	0	0	13	22	120	0	0	35
08:15	0	0	42	7	30	45	0	1	0	9	0	0	13	22	128	0	0	49
08:30	0	1	29	9	40	64	0	0	0	4	0	0	14	26	129	0	0	47
08:45	0	0	31	10	36	47	0	0	0	12	0	0	13	26	112	0	0	41
Total	0	1	137	35	139	178	0	1	0	27	0	0	53	96	489	0	0	172
Grand Total	0	6	294	46	302	278	0	3	0	44	0	0	96	151	897	0	0	280
Apprch %	0	0.9	45.4	7.1	46.6		0	6.4	0	93.6	0		8.4	13.2	78.4	0	0	
Total %	0	0.2	9.6	1.5	9.9		0	0.1	0	1.4	0		3.1	4.9	29.3	0	0	
Cars	0	6	271	46	283		0	3	0	44	0		78	151	771	0	0	
% Cars	0	100	92.2	100	93.7	100	0	100	0	100	0	0	81.2	100	86	0	0	100

	Stuart St From South						Garage Dr From Southwest						Huntington Ave From West								
Start Time	Hard Left	Left	Thru	Bear Right	Right	Peds	Hard Left	Bear Left	Thru	Bear Right	Hard Right	Peds	Left	Bear Left	Thru	Right	Hard Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00	0	0	0	0	0	13	3	0	0	0	9	0	0	0	84	2	0	3	59	289	348
07:15	0	0	0	0	0	21	3	0	0	0	13	0	1	0	125	0	2	17	76	351	427
07:30	0	0	0	0	0	28	4	0	0	0	13	0	1	0	166	1	1	11	95	404	499
07:45	0	0	0	0	0	21	8	0	0	0	11	0	0	0	130	0	1	8	100	395	495
Total	0	0	0	0	0	83	18	0	0	0	46	0	2	0	505	3	4	39	330	1439	1769
08:00	0	0	0	0	0	8	2	0	0	0	17	0	0	0	120	0	5	10	75	378	453
08:15	0	0	0	0	0	4	7	0	0	0	25	0	1	0	123	0	2	10	108	410	518
08:30	0	0	0	0	0	7	12	0	0	0	17	0	2	0	144	0	2	8	126	429	555
08:45	0	0	0	0	0	22	6	0	0	0	15	0	0	0	138	0	3	8	118	402	520
Total	0	0	0	0	0	41	27	0	0	0	74	0	3	0	525	0	12	36	427	1619	2046
Grand Total	0	0	0	0	0	124	45	0	0	0	120	0	5	0	1030	3	16	75	757	3058	3815
Apprch %	0	0	0	0	0		27.3	0	0	0	72.7		0.5	0	97.7	0.3	1.5				
Total %	0	0	0	0	0		1.5	0	0	0	3.9		0.2	0	33.7	0.1	0.5		19.8	80.2	
Cars	0	0	0	0	0		45	0	0	0	120		5	0	982	2	16		0	0	3580
% Cars	0	0	0	0	0	100	100	0	0	0	100	0	100	0	95.3	66.7	100	100	0	0	93.8

Accurate Counts
978-664-2565

File Name : 12550007
Site Code : 12550007
Start Date : 9/14/2006
Page No : 2

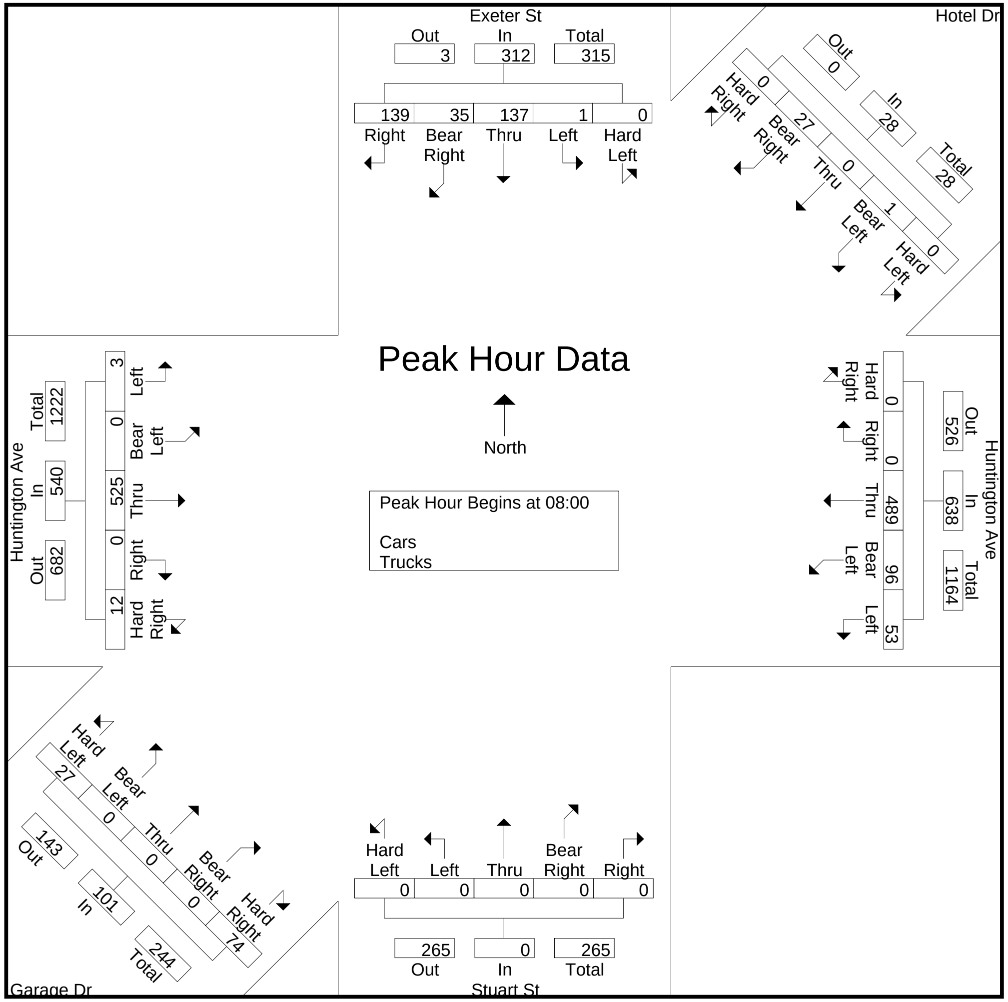
Groups Printed- Cars - Trucks

	Exeter St From North						Hotel Dr From Northeast						Huntington Ave From East						Stuart St From South						Garage Dr From Southwest						Huntington Ave From West								
	Hard Left	Left	Thru	Bear Right	Right	Peds	Hard Left	Bear Left	Thru	Bear Right	Hard Right	Peds	Left	Bear Left	Thru	Right	Hard Right	Peds	Hard Left	Left	Thru	Bear Right	Right	Peds	Hard Left	Bear Left	Thru	Bear Right	Hard Right	Peds	Left	Bear Left	Thru	Right	Hard Right	Peds	Exclu. Total	Inclu. Total	Int. Total
Trucks	0	0	23	0	19		0	0	0	0	0		18	0	126	0	0		0	0	0	0	0		0	0	0	0	0		0	0	48	1	0		0	0	235
% Trucks	0	0	7.8	0	6.3	0	0	0	0	0	0	0	18.8	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.7	33.3	0	0	0	0	6.2

	Exeter St From North						Hotel Dr From Northeast						Huntington Ave From East						Stuart St From South						Garage Dr From Southwest						Huntington Ave From West						
Start Time	Hard Left	Left	Thru	Bear Right	Right	App. Total	Hard Left	Bear Left	Thru	Bear Right	Hard Right	App. Total	Left	Bear Left	Thru	Right	Hard Right	App. Total	Hard Left	Left	Thru	Bear Right	Right	App. Total	Hard Left	Bear Left	Thru	Bear Right	Hard Right	App. Total	Left	Bear Left	Thru	Right	Hard Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																																					
Peak Hour for Entire Intersection Begins at 08:00																																					
08:00	0	0	35	9	33	77	0	0	0	2	0	2	13	22	120	0	0	155	0	0	0	0	0	0	2	0	0	0	17	19	0	0	120	0	5	125	378
08:15	0	0	42	7	30	79	0	1	0	9	0	10	13	22	128	0	0	163	0	0	0	0	0	0	7	0	0	0	25	32	1	0	123	0	2	126	410
08:30	0	1	29	9	40	79	0	0	0	4	0	4	14	26	129	0	0	169	0	0	0	0	0	0	12	0	0	0	17	29	2	0	144	0	2	148	429
08:45	0	0	31	10	36	77	0	0	0	12	0	12	13	26	112	0	0	151	0	0	0	0	0	0	6	0	0	0	15	21	0	0	138	0	3	141	402
Total Volume	0	1	137	35	139	312	0	1	0	27	0	28	53	96	489	0	0	638	0	0	0	0	0	0	27	0	0	0	74	101	3	0	525	0	12	540	1619
% App. Total	0	0.3	43.9	11.2	44.6		0	3.6	0	96.4	0		8.3	15	76.6	0	0		0	0	0	0	0		26.7	0	0	0	73.3		0.6	0	97.2	0	2.2		
PHF	.000	.250	.815	.875	.869	.987	.000	.250	.000	.563	.000	.583	.946	.923	.948	.000	.000	.944	.000	.000	.000	.000	.000	.000	.563	.000	.000	.000	.740	.789	.375	.000	.911	.000	.600	.912	.943

Accurate Counts
978-664-2565

File Name : 12550007
Site Code : 12550007
Start Date : 9/14/2006
Page No : 3



Accurate Counts
978-664-2565

N/S Street : Exeter Street
E/W Street: Huntington Avenue
City/State : Boston, MA
Weather : Overcast

File Name : 12550007
Site Code : 12550007
Start Date : 9/14/2006
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Groups Printed- Cars - Trucks

	Exeter St From North						Hotel Dr From Northeast						Huntington Ave From East						Stuart St From South						Garage Dr From Southwest						Huntington Ave From West								
Start Time	Hard Left	Left	Thru	Bear Right	Right	Peds	Hard Left	Bear Left	Thru	Bear Right	Hard Right	Peds	Left	Bear Left	Thru	Right	Hard Right	Peds	Hard Left	Left	Thru	Bear Right	Right	Peds	Hard Left	Bear Left	Thru	Bear Right	Hard Right	Peds	Left	Bear Left	Thru	Right	Hard Right	Peds	Exclu. Total	Inclu. Total	Int. Total
16:00	0	1	56	4	68	43	0	1	0	6	0	0	12	9	94	0	0	34	0	0	0	0	0	16	7	0	0	0	29	0	0	0	170	0	1	8	101	458	559
16:15	0	2	64	5	60	48	0	2	0	7	0	0	18	4	115	0	0	12	0	0	0	0	0	9	13	0	0	0	35	0	0	0	178	0	2	14	83	505	588
16:30	0	1	56	3	56	47	0	1	0	17	0	0	15	4	112	0	0	17	0	0	0	0	0	5	10	0	0	0	42	0	0	0	204	0	1	15	84	522	606
16:45	0	0	63	1	68	40	0	1	0	10	0	0	13	10	126	0	0	28	0	0	0	0	0	11	8	0	0	0	39	0	1	0	178	0	0	14	93	518	611
Total	0	4	239	13	252	178	0	5	0	40	0	0	58	27	447	0	0	91	0	0	0	0	0	41	38	0	0	0	145	0	1	0	730	0	4	51	361	2003	2364
17:00	0	0	68	5	68	61	0	0	0	10	0	0	15	6	83	0	0	51	0	0	0	0	0	30	13	0	0	0	35	0	1	0	190	0	2	24	166	496	662
17:15	0	0	60	3	64	41	0	0	0	7	0	0	12	11	138	0	0	33	0	0	0	0	0	27	13	0	0	0	31	0	1	0	185	0	3	13	114	528	642
17:30	0	2	59	10	69	79	0	0	0	8	0	0	15	14	123	0	0	39	0	0	0	0	0	34	9	0	0	0	40	0	0	0	201	0	7	33	185	557	742
17:45	0	1	81	5	65	58	0	0	0	7	0	0	13	15	124	0	0	22	0	0	0	0	0	24	11	0	0	0	51	0	1	0	169	0	6	20	124	549	673
Total	0	3	268	23	266	239	0	0	0	32	0	0	55	46	468	0	0	145	0	0	0	0	0	115	46	0	0	0	157	0	3	0	745	0	18	90	589	2130	2719
Grand Total	0	7	507	36	518	417	0	5	0	72	0	0	113	73	915	0	0	236	0	0	0	0	0	156	84	0	0	0	302	0	4	0	1475	0	22	141	950	4133	5083
Apprch %	0	0.7	47.5	3.4	48.5		0	6.5	0	93.5	0		10.3	6.6	83.1	0	0		0	0	0	0	0		21.8	0	0	0	78.2		0.3	0	98.3	0	1.5				
Total %	0	0.2	12.3	0.9	12.5		0	0.1	0	1.7	0		2.7	1.8	22.1	0	0		0	0	0	0	0		2	0	0	0	7.3		0.1	0	35.7	0	0.5		18.7	81.3	
Cars	0	7	496	36	504		0	5	0	72	0		107	73	849	0	0		0	0	0	0	0		84	0	0	0	302		4	0	1442	0	22		0	0	4953
% Cars	0	100	97.8	100	97.3	100	0	100	0	100	0	0	94.7	100	92.8	0	0	100	0	0	0	0	0	100	100	0	0	0	100	0	100	0	97.8	0	100	100	0	0	97.4

Accurate Counts
978-664-2565

File Name : 12550007
Site Code : 12550007
Start Date : 9/14/2006
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Groups Printed- Cars - Trucks

	Exeter St From North						Hotel Dr From Northeast						Huntington Ave From East						Stuart St From South						Garage Dr From Southwest						Huntington Ave From West								
	Hard Left	Left	Thru	Bear Right	Right	Peds	Hard Left	Bear Left	Thru	Bear Right	Hard Right	Peds	Left	Bear Left	Thru	Right	Hard Right	Peds	Hard Left	Left	Thru	Bear Right	Right	Peds	Hard Left	Bear Left	Thru	Bear Right	Hard Right	Peds	Left	Bear Left	Thru	Right	Hard Right	Peds	Exclu. Total	Inclu. Total	Int. Total
Trucks	0	0	11	0	14		0	0	0	0	0		6	0	66	0	0		0	0	0	0	0		0	0	0	0	0		0	0	33	0	0		0	0	130
% Trucks	0	0	2.2	0	2.7	0	0	0	0	0	0	0	5.3	0	7.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.2	0	0	0	0	0	2.6

	Exeter St From North						Hotel Dr From Northeast						Huntington Ave From East						Stuart St From South						Garage Dr From Southwest						Huntington Ave From West						
Start Time	Hard Left	Left	Thru	Bear Right	Right	App. Total	Hard Left	Bear Left	Thru	Bear Right	Hard Right	App. Total	Left	Bear Left	Thru	Right	Hard Right	App. Total	Hard Left	Left	Thru	Bear Right	Right	App. Total	Hard Left	Bear Left	Thru	Bear Right	Hard Right	App. Total	Left	Bear Left	Thru	Right	Hard Right	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																																					
Peak Hour for Entire Intersection Begins at 17:00																																					
17:00	0	0	68	5	68	141	0	0	0	10	0	10	15	6	83	0	0	104	0	0	0	0	0	0	13	0	0	0	35	48	1	0	190	0	2	193	496
17:15	0	0	60	3	64	127	0	0	0	7	0	7	12	11	138	0	0	161	0	0	0	0	0	0	13	0	0	0	31	44	1	0	185	0	3	189	528
17:30	0	2	59	10	69	140	0	0	0	8	0	8	15	14	123	0	0	152	0	0	0	0	0	0	9	0	0	0	40	49	0	0	201	0	7	208	557
17:45	0	1	81	5	65	152	0	0	0	7	0	7	13	15	124	0	0	152	0	0	0	0	0	0	11	0	0	0	51	62	1	0	169	0	6	176	549
Total Volume	0	3	268	23	266	560	0	0	0	32	0	32	55	46	468	0	0	569	0	0	0	0	0	0	46	0	0	0	157	203	3	0	745	0	18	766	2130
% App. Total	0	0.5	47.9	4.1	47.5		0	0	0	100	0		9.7	8.1	82.2	0	0		0	0	0	0	0		22.7	0	0	0	77.3		0.4	0	97.3	0	2.3		
PHF	.000	.375	.827	.575	.964	.921	.000	.000	.000	.800	.000	.800	.917	.767	.848	.000	.000	.884	.000	.000	.000	.000	.000	.000	.885	.000	.000	.000	.770	.819	.750	.000	.927	.000	.643	.921	.956

Accurate Counts
978-664-2565

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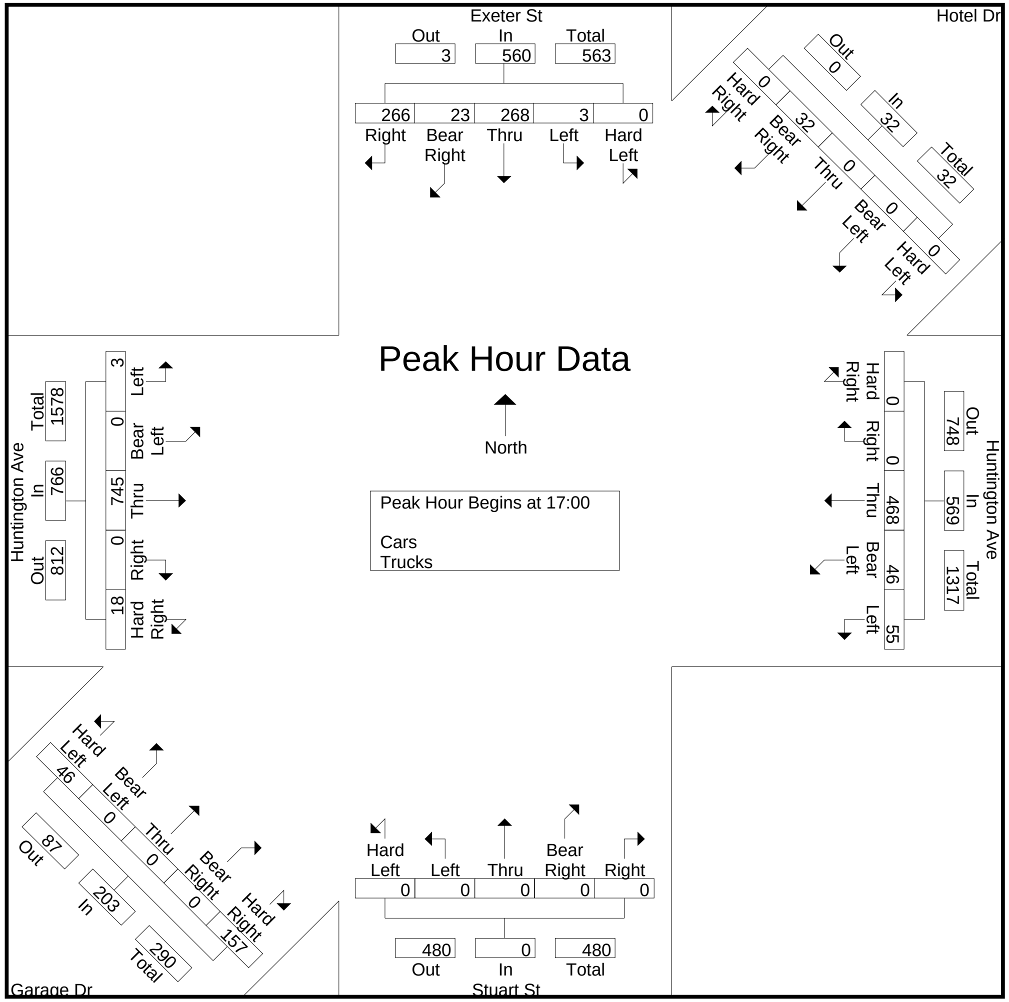


C – TRIP GENERATION & MODE SHARE ASSUMPTIONS

Trip Generation (Exeter)

Component		Weekday Daily	Weekday Morning			Weekday Afternoon			Weekend Daily	Saturday Peak		
			Total	Enter	Exit	Total	Enter	Exit		Total	Enter	Exit
Apartment	200	1352	102	20	81	128	83	45	1314	101	51	51
Retail (19,175	2,500	44	1	1	0	4	2	2	56	6	3	3
Subtotal		1396	102	20	81	132	85	47	1370	107	54	53
VOR				1.2	1.2		1.2	1.2			1.2	1.2
People Trips	Residential			24	98		100	54			61	61
	Retail			1	0		2	3			3	3
Residential Mode Share	Auto			21%	21%		21%	21%			27%	27%
	Transit			15%	15%		15%	15%			23%	23%
	Walk			64%	64%		64%	64%			50%	50%
Retail Mode Share	Auto			33%	33%		33%	33%			33%	33%
	Transit			31%	31%		31%	31%			19%	19%
	Walk			36%	36%		36%	36%			49%	49%
People Trips	Auto			5	21		21	11			16	16
	Transit			4	15		15	8			14	14
	Walk			16	63		64	34			30	30
People Trips	Auto			0	0		1	1			1	1
	Transit			0	0		1	1			1	1
	Walk			0	0		1	1			2	2
Total People Trips	Auto			5	21		22	12			18	17
	Transit			4	15		16	9			15	15
	Walk			16	63		65	35			32	32
Total Auto Trips				**4**	**17**		**18**	**10**			**15**	**15**

Trip Generation (Boylston)

Component		Weekday Daily	Weekday Morning Total	Weekday Morning Enter	Weekday Morning Exit	Weekday Afternoon Total	Weekday Afternoon Enter	Weekday Afternoon Exit	Weekend Daily	Saturday Peak Total	Saturday Peak Enter	Saturday Peak Exit
Office	369,000	3646	533	469	64	492	84	408	808	106	57	49
Retail	51,000	882	17	10	7	84	40	44	1120	112	58	54
Subtotal		4527	533	469	64	576	124	452	1928	219	116	103
VOR				1.2	1.2		1.2	1.2			1.2	1.2
People Trips	Office			563	77		100	490			69	59
	Retail			13	8		48	52			70	65
Office Mode Share	Auto			37%	37%		37%	37%			52%	52%
	Transit			38%	38%		38%	38%			26%	26%
	Walk			25%	25%		25%	25%			22%	22%
Retail Mode Share	Auto			33%	33%		33%	33%			33%	33%
	Transit			31%	31%		31%	31%			19%	19%
	Walk			36%	36%		36%	36%			49%	49%
Office People Trips	Auto			208	28		37	181			36	31
	Transit			214	29		38	186			18	15
	Walk			141	19		25	123			15	13
Retail People Trips	Auto			4	3		16	17			23	21
	Transit			4	2		15	16			13	12
	Walk			5	3		17	19			34	32
Total People Trips	Auto			212	31		53	199			59	52
	Transit			218	32		53	203			31	28
	Walk			145	22		43	141			50	45
Total Auto Trips				**177**	**26**		**44**	**166**			**49**	**43**

Trip Generation (Total)

Component			Weekday Daily	Weekday Morning			Weekday Afternoon			Weekend Daily	Saturday Peak		
				Total	**Enter**	**Exit**	**Total**	**Enter**	**Exit**		**Total**	**Enter**	**Exit**
Office		369,000	3646	533	469	64	492	84	408	808	106	57	49
Residential		200	102	102	20	81	128	83	45	1314	101	51	51
Retail		53,500	924	18	11	7	88	42	46	1174	118	61	57
Subtotal			4672	533	469	64	708	209	499	3296	325	169	156
VOR					1.2	1.2		1.2	1.2			1.2	1.2
People Trips	Office				563	77		100	490			69	59
	Residential				24	98		100	54			61	61
	Retail				13	8		51	55			74	68
Office Mode Share	Auto				37%	37%		37%	37%			52%	52%
	Transit				38%	38%		38%	38%			26%	26%
	Walk				25%	25%		25%	25%			22%	22%
Residential Mode Share	Auto				21%	21%		21%	21%			27%	27%
	Transit				15%	15%		15%	15%			23%	23%
	Walk				64%	64%		64%	64%			50%	50%
Retail Mode Share	Auto				33%	33%		33%	33%			33%	33%
	Transit				31%	31%		31%	31%			19%	19%
	Walk				36%	36%		36%	36%			49%	49%
Office People Trips	Auto				208	28		37	181			36	31
	Transit				214	29		38	186			18	15
	Walk				141	19		25	123			15	13
Residential People Trips	Auto				5	21		21	11			16	16
	Transit				4	15		15	8			14	14
	Walk				16	63		64	34			30	30
Retail People Trips	Auto				4	3		17	18			24	22
	Transit				4	3		16	17			14	13
	Walk				5	3		18	20			36	33
Total People Trips	Auto				218	52		75	211			77	69
	Transit				222	46		69	211			46	42
	Walk				161	85		107	177			82	77
Total Auto Trips					**181**	**43**		**62**	**176**			**64**	**58**

Vehicle Trips

	AM		PM		Sat	
	Entering	**Exiting**	**Entering**	**Exiting**	**Entering**	**Exiting**
Approved Trips	**118**	**18**	**33**	**114**	**38**	**34**
Exeter Trips	4	17	18	10	15	15
Boylston Trips	177	26	44	166	49	43
Total	181	43	62	176	64	58
Delta	**63**	**25**	**29**	**62**	**26**	**24**

D – TRAFFIC ANALYSIS

Signalized Intersections

2006 Existing Conditions

2011 Approved Program

2011 Build Conditions (Exeter Residences only)

2011 Build Conditions (888 Boylston only)

2011 Build Conditions (Both projects)

2011 Build Conditions – Mitigation (Exeter Residences only)

2011 Build Conditions – Mitigation (888 Boylston only)

2011 Build Conditions – Mitigation (Both projects)

Signalized Intersections

- Boylston Street at Dalton Street
- Boylston Street at Gloucester Street
- Boylston Street at East Ring Road
- Boylston Street at Exeter Street
- Huntington Avenue at Exeter Street/ Stuart Street
- Huntington Avenue at East Ring Road

2006 Existing Conditions

Morning (AM)

Movement	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	12	11	12	12	12	12	10	12	10	12	12	12
Total Lost time (s)		4.0					4.0	4.0				
Lane Util. Factor		0.95					1.00	1.00				
Frpb, ped/bikes		0.89					1.00	0.85				
Flpb, ped/bikes		0.92					0.64	1.00				
Frt		0.97					1.00	0.92				
Flt Protected		0.99					0.95	1.00				
Satd. Flow (prot)		2293					879	1169				
Flt Permitted		0.99					0.95	1.00				
Satd. Flow (perm)		2293					879	1169				
Volume (vph)	65	300	90	0	0	0	170	120	160	0	0	0
Peak-hour factor, PHF	0.92	0.94	0.94	0.92	0.92	0.92	0.94	0.92	0.94	0.92	0.92	0.92
Adj. Flow (vph)	71	319	96	0	0	0	181	130	170	0	0	0
RTOR Reduction (vph)	0	16	0	0	0	0	0	54	0	0	0	0
Lane Group Flow (vph)	0	470	0	0	0	0	181	246	0	0	0	0
Confl. Peds. (#/hr)	138		150				107		126			
Heavy Vehicles (%)	6%	11%	3%	2%	2%	2%	11%	4%	22%	2%	2%	2%
Parking (#/hr)	0		0									
Turn Type	Perm						Perm					
Protected Phases		2						4				
Permitted Phases	2						4					
Actuated Green, G (s)		67.5					24.5	24.5				
Effective Green, g (s)		67.5					24.5	24.5				
Actuated g/C Ratio		0.68					0.24	0.24				
Clearance Time (s)		4.0					4.0	4.0				
Vehicle Extension (s)		3.0					3.0	3.0				
Lane Grp Cap (vph)		1548					215	286				
v/s Ratio Prot								c0.21				
v/s Ratio Perm		0.20					0.21					
v/c Ratio		0.30					0.84	0.86				
Uniform Delay, d1		6.6					35.9	36.1				
Progression Factor		1.00					1.00	1.00				
Incremental Delay, d2		0.5					24.6	21.7				
Delay (s)		7.1					60.5	57.8				
Level of Service		A					E	E				
Approach Delay (s)		7.1			0.0			58.8			0.0	
Approach LOS		A			A			E			A	

Intersection Summary			
HCM Average Control Delay	32.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	44.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑			↰↰	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	12	12	12
Total Lost time (s)		4.0			4.0	
Lane Util. Factor		0.91			0.97	
Frt		1.00			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		3793			2722	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		3793			2722	
Volume (vph)	0	420	0	0	190	0
Peak-hour factor, PHF	0.92	0.87	0.92	0.92	0.87	0.92
Adj. Flow (vph)	0	483	0	0	218	0
RTOR Reduction (vph)	0	0	0	0	200	0
Lane Group Flow (vph)	0	483	0	0	18	0
Heavy Vehicles (%)	2%	15%	2%	2%	10%	2%
Parking (#/hr)	0	0			0	
Turn Type						
Protected Phases		2			4	
Permitted Phases						
Actuated Green, G (s)		83.6			8.4	
Effective Green, g (s)		83.6			8.4	
Actuated g/C Ratio		0.84			0.08	
Clearance Time (s)		4.0			4.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		3171			229	
v/s Ratio Prot		c0.13			c0.01	
v/s Ratio Perm						
v/c Ratio		0.15			0.08	
Uniform Delay, d1		1.5			42.2	
Progression Factor		1.10			1.00	
Incremental Delay, d2		0.1			0.2	
Delay (s)		1.8			42.4	
Level of Service		A			D	
Approach Delay (s)		1.8	0.0		42.4	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	14.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.15		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	21.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↱					↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	11
Total Lost time (s)	4.0					4.0
Lane Util. Factor	0.95					1.00
Frt	0.96					0.86
Flt Protected	1.00					1.00
Satd. Flow (prot)	2790					1375
Flt Permitted	1.00					1.00
Satd. Flow (perm)	2790					1375
Volume (vph)	460	140	0	0	0	90
Peak-hour factor, PHF	0.86	0.86	0.92	0.92	0.92	0.74
Adj. Flow (vph)	535	163	0	0	0	122
RTOR Reduction (vph)	18	0	0	0	0	110
Lane Group Flow (vph)	680	0	0	0	0	12
Heavy Vehicles (%)	7%	6%	2%	2%	2%	4%
Parking (#/hr)	0	0				
Turn Type						custom
Protected Phases	2					4
Permitted Phases						
Actuated Green, G (s)	81.9					10.1
Effective Green, g (s)	81.9					10.1
Actuated g/C Ratio	0.82					0.10
Clearance Time (s)	4.0					4.0
Vehicle Extension (s)	3.0					3.0
Lane Grp Cap (vph)	2285					139
v/s Ratio Prot	c0.24					c0.01
v/s Ratio Perm						
v/c Ratio	0.30					0.09
Uniform Delay, d1	2.2					40.8
Progression Factor	0.28					1.00
Incremental Delay, d2	0.3					0.3
Delay (s)	0.9					41.1
Level of Service	A					D
Approach Delay (s)	0.9			0.0	41.1	
Approach LOS	A			A	D	

Intersection Summary			
HCM Average Control Delay	6.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	32.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	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	
Lane Util. Factor		0.91									0.95	
Frpb, ped/bikes		0.94									1.00	
Flpb, ped/bikes		1.00									0.89	
Frt		0.97									1.00	
Flt Protected		1.00									0.98	
Satd. Flow (prot)		3619									2584	
Flt Permitted		1.00									0.98	
Satd. Flow (perm)		3619									2584	
Volume (vph)	0	460	100	0	0	0	0	0	0	100	200	0
Peak-hour factor, PHF	0.91	0.91	0.91	0.92	0.92	0.92	0.92	0.92	0.92	0.86	0.86	0.86
Adj. Flow (vph)	0	505	110	0	0	0	0	0	0	116	233	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	79	0
Lane Group Flow (vph)	0	615	0	0	0	0	0	0	0	0	270	0
Confl. Peds. (#/hr)			310							267		
Heavy Vehicles (%)	2%	15%	10%	2%	2%	2%	2%	2%	2%	8%	3%	2%
Parking (#/hr)		0	0							0	0	
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		76.5									15.5	
Effective Green, g (s)		76.5									15.5	
Actuated g/C Ratio		0.76									0.16	
Clearance Time (s)		4.0									4.0	
Vehicle Extension (s)		3.0									3.0	
Lane Grp Cap (vph)		2769									401	
v/s Ratio Prot		c0.17										
v/s Ratio Perm											0.10	
v/c Ratio		0.22									0.67	
Uniform Delay, d1		3.3									39.9	
Progression Factor		0.57									1.00	
Incremental Delay, d2		0.2									4.4	
Delay (s)		2.1									44.3	
Level of Service		A									D	
Approach Delay (s)		2.1			0.0			0.0			44.3	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM Average Control Delay	17.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	33.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBL	NBR2	SBL	SBT	SBR	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	12	16	12	12	12	12	10	12
Total Lost time (s)	4.0	4.0		4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		0.95		0.76			1.00	0.91
Frpb, ped/bikes	1.00	1.00		0.96		1.00			1.00	1.00
Flpb, ped/bikes	0.96	1.00		0.96		1.00			1.00	1.00
Frt	1.00	0.85		0.93		0.85			1.00	1.00
Flt Protected	0.95	1.00		0.98		1.00			0.95	1.00
Satd. Flow (prot)	1449	1357		2907		3134			1420	4095
Flt Permitted	0.43	1.00		0.98		1.00			0.95	1.00
Satd. Flow (perm)	652	1357		2907		3134			1420	4095
Volume (vph)	30	75	140	35	140	525	15	55	100	520
Peak-hour factor, PHF	0.78	0.78	0.98	0.98	0.98	0.91	0.91	0.94	0.94	0.94
Adj. Flow (vph)	38	96	143	36	143	577	16	59	106	553
RTOR Reduction (vph)	0	78	0	0	0	2	0	0	20	0
Lane Group Flow (vph)	38	18	0	322	0	591	0	0	145	553
Confl. Peds. (#/hr)	36	41	41		36					
Heavy Vehicles (%)	0%	0%	8%	0%	6%	5%	33%	19%	0%	14%
Parking (#/hr)			0		0					
Turn Type	D.Pm	custom	Perm			custom		custom	custom	
Protected Phases		4		4		3		1 2	1 2	2 3
Permitted Phases	4		4					1 2 3 4	1 2	
Actuated Green, G (s)	19.0	19.0		19.0		35.0			34.0	53.8
Effective Green, g (s)	19.0	19.0		19.0		35.0			34.0	53.8
Actuated g/C Ratio	0.19	0.19		0.19		0.35			0.34	0.54
Clearance Time (s)	4.0	4.0		4.0		4.0				
Vehicle Extension (s)	3.0	3.0		3.0		3.0				
Lane Grp Cap (vph)	124	258		552		1097			483	2203
v/s Ratio Prot		0.01				c0.19			c0.10	0.14
v/s Ratio Perm	0.06			0.11						
v/c Ratio	0.31	0.07		0.58		0.54			0.30	0.25
Uniform Delay, d1	34.8	33.3		36.9		26.0			24.3	12.3
Progression Factor	1.00	1.00		0.66		1.00			1.00	1.00
Incremental Delay, d2	1.4	0.1		1.3		1.9			0.4	0.3
Delay (s)	36.2	33.4		25.5		27.9			24.6	12.6
Level of Service	D	C		C		C			C	B
Approach Delay (s)				25.5						15.4
Approach LOS				C						B

Intersection Summary			
HCM Average Control Delay	22.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	59.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	12	12	11	11	12	12	12
Total Lost time (s)		4.0			4.0			4.0	4.0			4.0
Lane Util. Factor		1.00			1.00			1.00	0.95			1.00
Frt		0.93			0.90			1.00	1.00			1.00
Flt Protected		0.98			0.99			0.95	1.00			0.95
Satd. Flow (prot)		1220			1411			1543	3017			1540
Flt Permitted		0.88			0.91			0.22	1.00			0.30
Satd. Flow (perm)		1102			1307			356	3017			482
Volume (vph)	10	0	10	25	1	70	35	50	470	1	35	20
Peak-hour factor, PHF	0.70	0.70	0.70	0.83	0.83	0.83	0.90	0.90	0.90	0.90	0.92	0.92
Adj. Flow (vph)	14	0	14	30	1	84	39	56	522	1	38	22
RTOR Reduction (vph)	0	12	0	0	72	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	16	0	0	43	0	0	95	523	0	0	60
Heavy Vehicles (%)	31%	0%	24%	2%	0%	10%	0%	3%	4%	33%	0%	15%
Parking (#/hr)												
Turn Type	Perm			Perm			Perm	pm+pt			Perm	pm+pt
Protected Phases		4			8			5	2			1
Permitted Phases	4			8			2	2			6	6
Actuated Green, G (s)		11.0			11.0			32.0	20.0			32.0
Effective Green, g (s)		12.0			12.0			34.0	21.0			34.0
Actuated g/C Ratio		0.14			0.14			0.40	0.25			0.40
Clearance Time (s)		5.0			5.0			5.0	5.0			5.0
Lane Grp Cap (vph)		157			187			328	754			359
v/s Ratio Prot								c0.04	0.17			0.03
v/s Ratio Perm		0.01			c0.03			0.07				0.04
v/c Ratio		0.10			0.23			0.29	0.69			0.17
Uniform Delay, d1		31.3			31.9			16.5	28.6			15.8
Progression Factor		1.00			1.00			1.00	1.00			1.00
Incremental Delay, d2		1.3			2.9			2.2	5.2			1.0
Delay (s)		32.6			34.8			18.8	33.8			16.8
Level of Service		C			C			B	C			B
Approach Delay (s)		32.6			34.8				31.5			
Approach LOS		C			C				C			

Intersection Summary			
HCM Average Control Delay	34.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	84.0	Sum of lost time (s)	38.0
Intersection Capacity Utilization	39.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SWT	SWR
Lane Configurations		
Ideal Flow (vphpl)	1900	1900
Lane Width	12	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	2981	1045
Flt Permitted	1.00	1.00
Satd. Flow (perm)	2981	1045
Volume (vph)	570	65
Peak-hour factor, PHF	0.92	0.92
Adj. Flow (vph)	620	71
RTOR Reduction (vph)	0	53
Lane Group Flow (vph)	620	18
Heavy Vehicles (%)	9%	21%
Parking (#/hr)		0
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	20.0	20.0
Effective Green, g (s)	21.0	21.0
Actuated g/C Ratio	0.25	0.25
Clearance Time (s)	5.0	5.0
Lane Grp Cap (vph)	745	261
v/s Ratio Prot	c0.21	
v/s Ratio Perm		0.02
v/c Ratio	0.83	0.07
Uniform Delay, d1	29.8	24.0
Progression Factor	1.00	1.00
Incremental Delay, d2	10.5	0.5
Delay (s)	40.4	24.5
Level of Service	D	C
Approach Delay (s)	37.0	
Approach LOS	D	

Intersection Summary

Evening (PM)

Movement	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	12	11	12	12	12	12	10	12	10	12	12	12
Total Lost time (s)		4.0					4.0	4.0				
Lane Util. Factor		0.95					1.00	1.00				
Frpb, ped/bikes		0.92					1.00	0.82				
Flpb, ped/bikes		0.92					0.44	1.00				
Frt		0.98					1.00	0.91				
Flt Protected		0.99					0.95	1.00				
Satd. Flow (prot)		2537					635	1222				
Flt Permitted		0.99					0.95	1.00				
Satd. Flow (perm)		2537					635	1222				
Volume (vph)	90	645	120	0	0	0	220	190	265	0	0	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.92	0.92	0.92	0.94	0.94	0.94	0.92	0.92	0.92
Adj. Flow (vph)	100	717	133	0	0	0	234	202	282	0	0	0
RTOR Reduction (vph)	0	13	0	0	0	0	0	50	0	0	0	0
Lane Group Flow (vph)	0	937	0	0	0	0	234	434	0	0	0	0
Confl. Peds. (#/hr)	609		254				234		150			
Heavy Vehicles (%)	2%	3%	1%	2%	2%	2%	6%	2%	7%	2%	2%	2%
Parking (#/hr)	0		0									
Turn Type	Perm						Perm					
Protected Phases		2						4				
Permitted Phases	2						4					
Actuated Green, G (s)		62.0					30.0	30.0				
Effective Green, g (s)		62.0					30.0	30.0				
Actuated g/C Ratio		0.62					0.30	0.30				
Clearance Time (s)		4.0					4.0	4.0				
Vehicle Extension (s)		3.0					3.0	3.0				
Lane Grp Cap (vph)		1573					191	367				
v/s Ratio Prot								0.35				
v/s Ratio Perm		0.37					c0.37					
v/c Ratio		0.60					1.23	1.18				
Uniform Delay, d1		11.4					35.0	35.0				
Progression Factor		1.00					1.00	1.00				
Incremental Delay, d2		1.7					138.8	106.2				
Delay (s)		13.1					173.8	141.2				
Level of Service		B					F	F				
Approach Delay (s)		13.1			0.0			151.8			0.0	
Approach LOS		B			A			F			A	

Intersection Summary			
HCM Average Control Delay	72.8	HCM Level of Service	E
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	68.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	12	12	12
Total Lost time (s)		4.0			4.0	
Lane Util. Factor		0.91			0.97	
Frt		1.00			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		4115			2964	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		4115			2964	
Volume (vph)	0	750	0	0	340	0
Peak-hour factor, PHF	0.88	0.88	0.92	0.92	0.84	0.84
Adj. Flow (vph)	0	852	0	0	405	0
RTOR Reduction (vph)	0	0	0	0	345	0
Lane Group Flow (vph)	0	852	0	0	60	0
Heavy Vehicles (%)	0%	6%	2%	2%	1%	0%
Parking (#/hr)		0			0	
Turn Type						
Protected Phases		2			7	
Permitted Phases						
Actuated Green, G (s)		82.9			9.1	
Effective Green, g (s)		82.9			9.1	
Actuated g/C Ratio		0.83			0.09	
Clearance Time (s)		4.0			4.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		3411			270	
v/s Ratio Prot		c0.21			c0.02	
v/s Ratio Perm						
v/c Ratio		0.25			0.22	
Uniform Delay, d1		1.8			42.2	
Progression Factor		1.77			1.00	
Incremental Delay, d2		0.1			0.4	
Delay (s)		3.4			42.6	
Level of Service		A			D	
Approach Delay (s)		3.4	0.0		42.6	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	16.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	33.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↱					↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	11
Total Lost time (s)	4.0					4.0
Lane Util. Factor	0.95					1.00
Frt	0.96					0.86
Flt Protected	1.00					1.00
Satd. Flow (prot)	2945					1416
Flt Permitted	1.00					1.00
Satd. Flow (perm)	2945					1416
Volume (vph)	745	260	0	0	0	160
Peak-hour factor, PHF	0.96	0.96	0.92	0.92	0.85	0.85
Adj. Flow (vph)	776	271	0	0	0	188
RTOR Reduction (vph)	12	0	0	0	0	133
Lane Group Flow (vph)	1035	0	0	0	0	55
Heavy Vehicles (%)	1%	0%	2%	2%	0%	1%
Parking (#/hr)	0	0				
Turn Type						custom
Protected Phases	2					8
Permitted Phases						
Actuated Green, G (s)	82.6					9.4
Effective Green, g (s)	82.6					9.4
Actuated g/C Ratio	0.83					0.09
Clearance Time (s)	4.0					4.0
Vehicle Extension (s)	3.0					3.0
Lane Grp Cap (vph)	2433					133
v/s Ratio Prot	c0.35					c0.04
v/s Ratio Perm						
v/c Ratio	0.43					0.41
Uniform Delay, d1	2.3					42.7
Progression Factor	1.00					1.00
Incremental Delay, d2	0.5					2.1
Delay (s)	2.9					44.8
Level of Service	A					D
Approach Delay (s)	2.9			0.0	44.8	
Approach LOS	A			A	D	

Intersection Summary			
HCM Average Control Delay	9.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	49.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	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	
Lane Util. Factor		0.91									0.95	
Frpb, ped/bikes		0.94									1.00	
Flpb, ped/bikes		1.00									0.89	
Frt		0.98									1.00	
Flt Protected		1.00									0.98	
Satd. Flow (prot)		3920									2664	
Flt Permitted		1.00									0.98	
Satd. Flow (perm)		3920									2664	
Volume (vph)	0	790	130	0	0	0	0	0	0	180	330	0
Peak-hour factor, PHF	0.94	0.94	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.89	0.89	0.89
Adj. Flow (vph)	0	840	138	0	0	0	0	0	0	202	371	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	89	0
Lane Group Flow (vph)	0	978	0	0	0	0	0	0	0	0	484	0
Confl. Peds. (#/hr)			680							240		
Heavy Vehicles (%)	0%	6%	4%	0%	0%	0%	0%	0%	0%	1%	1%	0%
Parking (#/hr)		0	0							0	0	
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		69.7									22.3	
Effective Green, g (s)		69.7									22.3	
Actuated g/C Ratio		0.70									0.22	
Clearance Time (s)		4.0									4.0	
Vehicle Extension (s)		3.0									3.0	
Lane Grp Cap (vph)		2732									594	
v/s Ratio Prot		c0.25										
v/s Ratio Perm											0.18	
v/c Ratio		0.36									0.82	
Uniform Delay, d1		6.1									36.9	
Progression Factor		1.23									1.00	
Incremental Delay, d2		0.3									8.5	
Delay (s)		7.9									45.4	
Level of Service		A									D	
Approach Delay (s)		7.9			0.0			0.0			45.4	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM Average Control Delay	21.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	44.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBL	NBR2	SBL	SBT	SBR	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	12	16	12	12	12	12	10	12
Total Lost time (s)	4.0	4.0		4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		0.95		0.76			1.00	0.91
Frpb, ped/bikes	1.00	1.00		0.90		1.00			1.00	1.00
Flpb, ped/bikes	0.95	1.00		0.87		1.00			1.00	1.00
Frt	1.00	0.85		0.93		0.85			1.00	1.00
Flt Protected	0.95	1.00		0.98		1.00			0.95	1.00
Satd. Flow (prot)	1442	1357		2554		3251			1478	4363
Flt Permitted	0.24	1.00		0.98		1.00			0.95	1.00
Satd. Flow (perm)	372	1357		2554		3251			1478	4363
Volume (vph)	50	160	270	25	270	745	20	55	50	500
Peak-hour factor, PHF	0.82	0.82	0.92	0.92	0.92	0.92	0.92	0.88	0.88	0.88
Adj. Flow (vph)	61	195	293	27	293	810	22	62	57	568
RTOR Reduction (vph)	0	140	0	0	0	2	0	0	41	0
Lane Group Flow (vph)	61	55	0	613	0	830	0	0	78	568
Confl. Peds. (#/hr)	90	115	115		90					
Heavy Vehicles (%)	0%	0%	2%	0%	3%	2%	0%	5%	0%	7%
Parking (#/hr)			0		0					
Turn Type	D.Pm	custom	Perm			custom		custom	custom	
Protected Phases		4		4		3		1 2	1 2!	2 3
Permitted Phases	4		4			2!		1 2 3 4	1 2	
Actuated Green, G (s)	28.1	28.1		28.1		46.9			25.3	50.9
Effective Green, g (s)	28.1	28.1		28.1		46.9			25.3	50.9
Actuated g/C Ratio	0.28	0.28		0.28		0.47			0.25	0.51
Clearance Time (s)	4.0	4.0		4.0		4.0				
Vehicle Extension (s)	3.0	3.0		3.0		3.0				
Lane Grp Cap (vph)	105	381		718		1655			374	2221
v/s Ratio Prot		0.04				c0.17			c0.05	0.13
v/s Ratio Perm	0.16			0.24		0.08				
v/c Ratio	0.58	0.14		0.85		0.50			0.21	0.26
Uniform Delay, d1	30.9	26.9		34.0		18.4			29.5	13.9
Progression Factor	1.00	1.00		1.02		1.00			1.00	1.00
Incremental Delay, d2	7.9	0.2		8.0		0.2			0.3	0.1
Delay (s)	38.8	27.1		42.7		18.7			29.7	13.9
Level of Service	D	C		D		B			C	B
Approach Delay (s)				42.7						16.7
Approach LOS				D						B

Intersection Summary			
HCM Average Control Delay	25.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	78.9%	ICU Level of Service	D
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	12	12	11	11	12	12	12
Total Lost time (s)		4.0			4.0			4.0	4.0			4.0
Lane Util. Factor		1.00			1.00			1.00	0.95			1.00
Frt		0.94			0.89			1.00	1.00			1.00
Flt Protected		0.98			0.99			0.95	1.00			0.95
Satd. Flow (prot)		1199			1488			1541	3073			1530
Flt Permitted		0.59			0.93			0.21	1.00			0.21
Satd. Flow (perm)		728			1399			347	3073			344
Volume (vph)	10	2	10	30	1	140	35	60	670	5	50	15
Peak-hour factor, PHF	0.59	0.59	0.59	0.72	0.72	0.72	0.97	0.97	0.97	0.97	0.92	0.92
Adj. Flow (vph)	17	3	17	42	1	194	36	62	691	5	54	16
RTOR Reduction (vph)	0	15	0	0	168	0	0	0	1	0	0	0
Lane Group Flow (vph)	0	22	0	0	69	0	0	98	695	0	0	70
Heavy Vehicles (%)	42%	0%	25%	3%	0%	1%	0%	3%	2%	17%	0%	27%
Parking (#/hr)												
Turn Type	Perm			Perm			Perm	pm+pt			Perm	pm+pt
Protected Phases		4			8			5	2			1
Permitted Phases	4			8			2	2			6	6
Actuated Green, G (s)		11.0			11.0			38.0	26.0			38.0
Effective Green, g (s)		12.0			12.0			40.0	27.0			40.0
Actuated g/C Ratio		0.13			0.13			0.44	0.30			0.44
Clearance Time (s)		5.0			5.0			5.0	5.0			5.0
Lane Grp Cap (vph)		97			187			327	922			324
v/s Ratio Prot								c0.04	c0.23			0.03
v/s Ratio Perm		0.03			c0.05			0.09				0.06
v/c Ratio		0.23			0.37			0.30	0.75			0.22
Uniform Delay, d1		34.9			35.5			15.8	28.5			15.5
Progression Factor		1.00			1.00			1.00	1.00			1.00
Incremental Delay, d2		5.4			5.5			2.3	5.7			1.5
Delay (s)		40.3			41.1			18.1	34.2			17.0
Level of Service		D			D			B	C			B
Approach Delay (s)		40.3			41.1				32.2			
Approach LOS		D			D				C			

Intersection Summary			
HCM Average Control Delay	32.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	38.0
Intersection Capacity Utilization	47.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SWT	SWR
Lane Configurations		
Ideal Flow (vphpl)	1900	1900
Lane Width	12	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	3124	1171
Flt Permitted	1.00	1.00
Satd. Flow (perm)	3124	1171
Volume (vph)	640	135
Peak-hour factor, PHF	0.92	0.92
Adj. Flow (vph)	696	147
RTOR Reduction (vph)	0	103
Lane Group Flow (vph)	696	44
Heavy Vehicles (%)	4%	8%
Parking (#/hr)		0
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	26.0	26.0
Effective Green, g (s)	27.0	27.0
Actuated g/C Ratio	0.30	0.30
Clearance Time (s)	5.0	5.0
Lane Grp Cap (vph)	937	351
v/s Ratio Prot	0.22	
v/s Ratio Perm		0.04
v/c Ratio	0.74	0.13
Uniform Delay, d1	28.4	22.9
Progression Factor	1.00	1.00
Incremental Delay, d2	5.3	0.7
Delay (s)	33.7	23.6
Level of Service	C	C
Approach Delay (s)	30.8	
Approach LOS	C	

Intersection Summary

Saturday

Movement	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	12	11	12	12	12	12	10	10	12	12	12	12
Total Lost time (s)		4.0					4.0	4.0				
Lane Util. Factor		0.95					1.00	1.00				
Frpb, ped/bikes		0.95					1.00	0.84				
Flpb, ped/bikes		0.94					0.46	1.00				
Frt		0.99					1.00	0.91				
Flt Protected		1.00					0.95	1.00				
Satd. Flow (prot)		2716					677	1186				
Flt Permitted		1.00					0.95	1.00				
Satd. Flow (perm)		2716					677	1186				
Volume (vph)	50	575	50	0	0	0	155	140	190	0	0	0
Peak-hour factor, PHF	0.95	0.95	0.95	0.92	0.92	0.92	0.93	0.93	0.93	0.92	0.92	0.92
Adj. Flow (vph)	53	605	53	0	0	0	167	151	204	0	0	0
RTOR Reduction (vph)	0	6	0	0	0	0	0	17	0	0	0	0
Lane Group Flow (vph)	0	705	0	0	0	0	167	338	0	0	0	0
Confl. Peds. (#/hr)	776		460				234		150			
Heavy Vehicles (%)	2%	2%	4%	2%	2%	2%	3%	0%	6%	0%	0%	0%
Parking (#/hr)	0		0									
Turn Type	Perm						Perm					
Protected Phases		2						4				
Permitted Phases	2						4					
Actuated Green, G (s)		52.3					27.7	27.7				
Effective Green, g (s)		53.3					28.7	28.7				
Actuated g/C Ratio		0.59					0.32	0.32				
Clearance Time (s)		5.0					5.0	5.0				
Vehicle Extension (s)		3.0					3.0	3.0				
Lane Grp Cap (vph)		1608					216	378				
v/s Ratio Prot								c0.29				
v/s Ratio Perm		0.26					0.25					
v/c Ratio		0.44					0.77	0.89				
Uniform Delay, d1		10.1					27.7	29.2				
Progression Factor		1.00					1.00	1.00				
Incremental Delay, d2		0.9					15.7	22.5				
Delay (s)		11.0					43.4	51.7				
Level of Service		B					D	D				
Approach Delay (s)		11.0			0.0			49.1			0.0	
Approach LOS		B			A			D			A	

Intersection Summary			
HCM Average Control Delay	27.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	53.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑			↰↰	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	12	12	12
Total Lost time (s)		4.0			4.0	
Lane Util. Factor		0.91			0.97	
Frt		1.00			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		4235			2964	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		4235			2964	
Volume (vph)	0	800	0	0	300	0
Peak-hour factor, PHF	0.95	0.95	0.92	0.92	0.81	0.81
Adj. Flow (vph)	0	842	0	0	370	0
RTOR Reduction (vph)	0	0	0	0	291	0
Lane Group Flow (vph)	0	842	0	0	79	0
Heavy Vehicles (%)	0%	3%	2%	2%	1%	0%
Parking (#/hr)		0			0	
Turn Type						
Protected Phases		2			4	
Permitted Phases						
Actuated Green, G (s)		72.7			9.3	
Effective Green, g (s)		72.7			9.3	
Actuated g/C Ratio		0.81			0.10	
Clearance Time (s)		4.0			4.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		3421			306	
v/s Ratio Prot		c0.20			c0.03	
v/s Ratio Perm						
v/c Ratio		0.25			0.26	
Uniform Delay, d1		2.1			37.2	
Progression Factor		0.79			1.00	
Incremental Delay, d2		0.1			0.5	
Delay (s)		1.8			37.6	
Level of Service		A			D	
Approach Delay (s)		1.8	0.0		37.6	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	12.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	33.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	11
Total Lost time (s)	4.0					4.0
Lane Util. Factor	0.95					1.00
Frt	0.97					0.86
Flt Protected	1.00					1.00
Satd. Flow (prot)	2991					1430
Flt Permitted	1.00					1.00
Satd. Flow (perm)	2991					1430
Volume (vph)	770	200	0	0	0	330
Peak-hour factor, PHF	0.97	0.97	0.92	0.92	0.83	0.83
Adj. Flow (vph)	794	206	0	0	0	398
RTOR Reduction (vph)	21	0	0	0	0	195
Lane Group Flow (vph)	979	0	0	0	0	203
Heavy Vehicles (%)	0%	0%	2%	2%	0%	0%
Parking (#/hr)	0	0				
Turn Type						custom
Protected Phases	2					8
Permitted Phases						
Actuated Green, G (s)	66.2					15.8
Effective Green, g (s)	66.2					15.8
Actuated g/C Ratio	0.74					0.18
Clearance Time (s)	4.0					4.0
Vehicle Extension (s)	3.0					3.0
Lane Grp Cap (vph)	2200					251
v/s Ratio Prot	c0.33					c0.14
v/s Ratio Perm						
v/c Ratio	0.44					0.81
Uniform Delay, d1	4.7					35.7
Progression Factor	1.00					1.00
Incremental Delay, d2	0.7					17.7
Delay (s)	5.3					53.3
Level of Service	A					D
Approach Delay (s)	5.3			0.0	53.3	
Approach LOS	A			A	D	

Intersection Summary			
HCM Average Control Delay	19.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	60.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	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	
Lane Util. Factor		0.91									0.95	
Frpb, ped/bikes		0.94									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.98									1.00	
Flt Protected		1.00									0.98	
Satd. Flow (prot)		4076									3010	
Flt Permitted		1.00									0.98	
Satd. Flow (perm)		4076									3010	
Volume (vph)	0	1025	120	0	0	0	0	0	0	180	245	0
Peak-hour factor, PHF	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.90	0.90	0.90
Adj. Flow (vph)	0	1102	129	0	0	0	0	0	0	200	272	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	63	0
Lane Group Flow (vph)	0	1231	0	0	0	0	0	0	0	0	409	0
Confl. Peds. (#/hr)			1700			929						
Heavy Vehicles (%)	0%	3%	1%	2%	2%	2%	2%	2%	2%	1%	0%	0%
Parking (#/hr)		0	0							0	0	
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		65.2									16.8	
Effective Green, g (s)		65.2									16.8	
Actuated g/C Ratio		0.72									0.19	
Clearance Time (s)		4.0									4.0	
Vehicle Extension (s)		3.0									3.0	
Lane Grp Cap (vph)		2953									562	
v/s Ratio Prot		c0.30										
v/s Ratio Perm											0.14	
v/c Ratio		0.42									0.73	
Uniform Delay, d1		4.9									34.4	
Progression Factor		0.76									1.00	
Incremental Delay, d2		0.4									4.7	
Delay (s)		4.1									39.1	
Level of Service		A									D	
Approach Delay (s)		4.1			0.0			0.0			39.1	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM Average Control Delay	13.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	46.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBL	NBR2	SBL	SBT	SBR	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	12	16	12	12	12	12	10	12
Total Lost time (s)	4.0	4.0		4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		0.95		0.76			1.00	0.91
Frpb, ped/bikes	1.00	1.00		0.85		1.00			1.00	1.00
Flpb, ped/bikes	0.92	1.00		0.85		1.00			1.00	1.00
Frt	1.00	0.85		0.93		0.85			1.00	1.00
Flt Protected	0.95	1.00		0.98		1.00			0.95	1.00
Satd. Flow (prot)	1397	1357		2400		3250			1505	4489
Flt Permitted	0.24	1.00		0.98		1.00			0.95	1.00
Satd. Flow (perm)	358	1357		2400		3250			1505	4489
Volume (vph)	35	150	285	35	280	825	20	190	45	655
Peak-hour factor, PHF	0.79	0.79	0.96	0.96	0.96	0.90	0.90	0.97	0.97	0.97
Adj. Flow (vph)	44	190	297	36	292	917	22	196	46	675
RTOR Reduction (vph)	0	137	0	0	0	2	0	0	47	0
Lane Group Flow (vph)	44	53	0	625	0	937	0	0	195	675
Confl. Peds. (#/hr)	175	178	178		175					
Heavy Vehicles (%)	0%	0%	1%	0%	1%	2%	0%	0%	4%	4%
Parking (#/hr)			0		0					
Turn Type	D.Pm	custom	Perm			custom		custom	custom	
Protected Phases		4		4		3		1 2	1 2	2 3
Permitted Phases	4		4					1 2 3 4	1 2	
Actuated Green, G (s)	25.3	25.3		25.3		26.6			26.1	41.0
Effective Green, g (s)	25.3	25.3		25.3		26.6			26.1	41.0
Actuated g/C Ratio	0.28	0.28		0.28		0.30			0.29	0.46
Clearance Time (s)	4.0	4.0		4.0		4.0				
Vehicle Extension (s)	3.0	3.0		3.0		3.0				
Lane Grp Cap (vph)	101	381		675		961			436	2045
v/s Ratio Prot		0.04				c0.29			c0.13	0.15
v/s Ratio Perm	0.12			0.26						
v/c Ratio	0.44	0.14		0.93		0.97			0.45	0.33
Uniform Delay, d1	26.5	24.2		31.4		31.4			26.1	15.7
Progression Factor	1.00	1.00		0.84		1.00			1.00	1.00
Incremental Delay, d2	3.0	0.2		17.6		23.6			0.7	0.1
Delay (s)	29.5	24.4		44.0		54.9			26.8	15.8
Level of Service	C	C		D		D			C	B
Approach Delay (s)				44.0						18.7
Approach LOS				D						B

Intersection Summary			
HCM Average Control Delay	37.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	91.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	12	12	11	11	12	12	12
Total Lost time (s)		4.0			4.0			4.0	4.0			4.0
Lane Util. Factor		1.00			1.00			1.00	0.95			1.00
Frt		0.92			0.91			1.00	1.00			1.00
Flt Protected		0.98			0.99			0.95	1.00			0.95
Satd. Flow (prot)		1435			1524			1570	3040			1610
Flt Permitted		0.72			0.90			0.19	1.00			0.19
Satd. Flow (perm)		1053			1388			322	3040			323
Volume (vph)	10	2	15	60	10	140	40	70	640	10	50	15
Peak-hour factor, PHF	0.61	0.61	0.61	0.88	0.88	0.88	0.86	0.86	0.86	0.86	0.98	0.98
Adj. Flow (vph)	16	3	25	68	11	159	47	81	744	12	51	15
RTOR Reduction (vph)	0	21	0	0	87	0	0	0	2	0	0	0
Lane Group Flow (vph)	0	23	0	0	151	0	0	128	755	0	0	66
Heavy Vehicles (%)	5%	0%	11%	0%	0%	1%	0%	0%	3%	8%	0%	4%
Parking (#/hr)												
Turn Type	Perm			Perm			Perm	pm+pt			Perm	pm+pt
Protected Phases		4			8			5	2			1
Permitted Phases	4			8			2	2			6	6
Actuated Green, G (s)		11.0			11.0			32.0	20.0			32.0
Effective Green, g (s)		12.0			12.0			34.0	21.0			34.0
Actuated g/C Ratio		0.14			0.14			0.40	0.25			0.40
Clearance Time (s)		5.0			5.0			5.0	5.0			5.0
Lane Grp Cap (vph)		150			198			323	760			330
v/s Ratio Prot								c0.06	c0.25			0.03
v/s Ratio Perm		0.02			c0.11			0.10				0.05
v/c Ratio		0.15			0.76			0.40	0.99			0.20
Uniform Delay, d1		31.5			34.6			17.1	31.4			16.7
Progression Factor		1.00			1.00			1.00	1.00			1.00
Incremental Delay, d2		2.1			24.1			3.6	30.9			1.4
Delay (s)		33.6			58.7			20.7	62.4			18.1
Level of Service		C			E			C	E			B
Approach Delay (s)		33.6			58.7				56.3			
Approach LOS		C			E				E			

Intersection Summary			
HCM Average Control Delay	47.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	84.0	Sum of lost time (s)	38.0
Intersection Capacity Utilization	53.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SWT	SWR
Lane Configurations		
Ideal Flow (vphpl)	1900	1900
Lane Width	12	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	3154	1228
Flt Permitted	1.00	1.00
Satd. Flow (perm)	3154	1228
Volume (vph)	640	135
Peak-hour factor, PHF	0.98	0.98
Adj. Flow (vph)	653	138
RTOR Reduction (vph)	0	104
Lane Group Flow (vph)	653	35
Heavy Vehicles (%)	3%	3%
Parking (#/hr)		0
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	20.0	20.0
Effective Green, g (s)	21.0	21.0
Actuated g/C Ratio	0.25	0.25
Clearance Time (s)	5.0	5.0
Lane Grp Cap (vph)	789	307
v/s Ratio Prot	0.21	
v/s Ratio Perm		0.03
v/c Ratio	0.83	0.11
Uniform Delay, d1	29.8	24.3
Progression Factor	1.00	1.00
Incremental Delay, d2	9.7	0.7
Delay (s)	39.5	25.0
Level of Service	D	C
Approach Delay (s)	35.5	
Approach LOS	D	

Intersection Summary

2011 Approved Program

Morning (AM)

Movement	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	12	11	12	12	12	12	10	12	10	12	12	12
Total Lost time (s)		4.0					4.0	4.0				
Lane Util. Factor		0.95					1.00	1.00				
Frpb, ped/bikes		0.91					1.00	0.84				
Flpb, ped/bikes		0.93					0.64	1.00				
Frt		0.97					1.00	0.91				
Flt Protected		0.99					0.95	1.00				
Satd. Flow (prot)		2360					879	1142				
Flt Permitted		0.99					0.95	1.00				
Satd. Flow (perm)		2360					879	1142				
Volume (vph)	70	390	95	0	0	0	180	125	195	0	0	0
Peak-hour factor, PHF	0.92	0.94	0.94	0.92	0.92	0.92	0.94	0.92	0.94	0.92	0.92	0.92
Adj. Flow (vph)	76	415	101	0	0	0	191	136	207	0	0	0
RTOR Reduction (vph)	0	14	0	0	0	0	0	61	0	0	0	0
Lane Group Flow (vph)	0	578	0	0	0	0	191	282	0	0	0	0
Confl. Peds. (#/hr)	138		150				107		126			
Heavy Vehicles (%)	6%	11%	3%	2%	2%	2%	11%	4%	22%	2%	2%	2%
Parking (#/hr)	0		0									
Turn Type	Perm						Perm					
Protected Phases		2						4				
Permitted Phases	2						4					
Actuated Green, G (s)		64.2					27.8	27.8				
Effective Green, g (s)		64.2					27.8	27.8				
Actuated g/C Ratio		0.64					0.28	0.28				
Clearance Time (s)		4.0					4.0	4.0				
Vehicle Extension (s)		3.0					3.0	3.0				
Lane Grp Cap (vph)		1515					244	317				
v/s Ratio Prot								c0.25				
v/s Ratio Perm		0.24					0.22					
v/c Ratio		0.38					0.78	0.89				
Uniform Delay, d1		8.5					33.3	34.6				
Progression Factor		1.00					1.00	1.00				
Incremental Delay, d2		0.7					15.0	25.2				
Delay (s)		9.2					48.3	59.9				
Level of Service		A					D	E				
Approach Delay (s)		9.2			0.0			55.7			0.0	
Approach LOS		A			A			E			A	

Intersection Summary			
HCM Average Control Delay	31.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	50.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑			↰↰	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	12	12	12
Total Lost time (s)		4.0			4.0	
Lane Util. Factor		0.91			0.97	
Frt		1.00			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		3793			2722	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		3793			2722	
Volume (vph)	0	540	0	0	260	0
Peak-hour factor, PHF	0.92	0.87	0.92	0.92	0.87	0.92
Adj. Flow (vph)	0	621	0	0	299	0
RTOR Reduction (vph)	0	0	0	0	274	0
Lane Group Flow (vph)	0	621	0	0	25	0
Heavy Vehicles (%)	2%	15%	2%	2%	10%	2%
Parking (#/hr)	0	0			0	
Turn Type						
Protected Phases		2			4	
Permitted Phases						
Actuated Green, G (s)		83.6			8.4	
Effective Green, g (s)		83.6			8.4	
Actuated g/C Ratio		0.84			0.08	
Clearance Time (s)		4.0			4.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		3171			229	
v/s Ratio Prot		c0.16			c0.01	
v/s Ratio Perm						
v/c Ratio		0.20			0.11	
Uniform Delay, d1		1.6			42.3	
Progression Factor		0.95			1.00	
Incremental Delay, d2		0.1			0.2	
Delay (s)		1.6			42.6	
Level of Service		A			D	
Approach Delay (s)		1.6	0.0		42.6	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	14.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.19		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	26.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↱					↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	11
Total Lost time (s)	4.0					4.0
Lane Util. Factor	0.95					1.00
Frt	0.94					0.86
Flt Protected	1.00					1.00
Satd. Flow (prot)	2727					1375
Flt Permitted	1.00					1.00
Satd. Flow (perm)	2727					1375
Volume (vph)	485	305	0	0	0	135
Peak-hour factor, PHF	0.86	0.86	0.92	0.92	0.92	0.74
Adj. Flow (vph)	564	355	0	0	0	182
RTOR Reduction (vph)	62	0	0	0	0	164
Lane Group Flow (vph)	857	0	0	0	0	18
Heavy Vehicles (%)	7%	6%	2%	2%	2%	4%
Parking (#/hr)	0	0				
Turn Type						custom
Protected Phases	2					4
Permitted Phases						
Actuated Green, G (s)	81.9					10.1
Effective Green, g (s)	81.9					10.1
Actuated g/C Ratio	0.82					0.10
Clearance Time (s)	4.0					4.0
Vehicle Extension (s)	3.0					3.0
Lane Grp Cap (vph)	2233					139
v/s Ratio Prot	c0.31					c0.01
v/s Ratio Perm						
v/c Ratio	0.38					0.13
Uniform Delay, d1	2.4					41.0
Progression Factor	0.39					1.00
Incremental Delay, d2	0.5					0.4
Delay (s)	1.4					41.4
Level of Service	A					D
Approach Delay (s)	1.4			0.0	41.4	
Approach LOS	A			A	D	

Intersection Summary			
HCM Average Control Delay	8.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	41.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	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	
Lane Util. Factor		0.91									0.95	
Frpb, ped/bikes		0.94									1.00	
Flpb, ped/bikes		1.00									0.89	
Frt		0.97									1.00	
Flt Protected		1.00									0.98	
Satd. Flow (prot)		3611									2582	
Flt Permitted		1.00									0.98	
Satd. Flow (perm)		3611									2582	
Volume (vph)	0	510	115	0	0	0	0	0	0	105	210	0
Peak-hour factor, PHF	0.91	0.91	0.91	0.92	0.92	0.92	0.92	0.92	0.92	0.86	0.86	0.86
Adj. Flow (vph)	0	560	126	0	0	0	0	0	0	122	244	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	79	0
Lane Group Flow (vph)	0	686	0	0	0	0	0	0	0	0	287	0
Confl. Peds. (#/hr)			310							267		
Heavy Vehicles (%)	2%	15%	10%	2%	2%	2%	2%	2%	2%	8%	3%	2%
Parking (#/hr)		0	0							0	0	
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		76.1									15.9	
Effective Green, g (s)		76.1									15.9	
Actuated g/C Ratio		0.76									0.16	
Clearance Time (s)		4.0									4.0	
Vehicle Extension (s)		3.0									3.0	
Lane Grp Cap (vph)		2748									411	
v/s Ratio Prot		c0.19										
v/s Ratio Perm											0.11	
v/c Ratio		0.25									0.70	
Uniform Delay, d1		3.5									39.8	
Progression Factor		0.57									1.00	
Incremental Delay, d2		0.2									5.1	
Delay (s)		2.2									44.9	
Level of Service		A									D	
Approach Delay (s)		2.2			0.0			0.0			44.9	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM Average Control Delay	17.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	34.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBL	NBR2	SBL	SBT	SBR	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	12	16	12	12	12	12	10	12
Total Lost time (s)	4.0	4.0		4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		0.95		0.76			1.00	0.91
Frpb, ped/bikes	1.00	1.00		0.96		1.00			1.00	1.00
Flpb, ped/bikes	0.96	1.00		0.95		1.00			1.00	1.00
Frt	1.00	0.85		0.94		0.85			1.00	1.00
Flt Protected	0.95	1.00		0.98		1.00			0.95	1.00
Satd. Flow (prot)	1451	1357		2886		3135			1418	4095
Flt Permitted	0.37	1.00		0.98		1.00			0.95	1.00
Satd. Flow (perm)	566	1357		2886		3135			1418	4095
Volume (vph)	30	80	160	35	145	560	15	60	105	550
Peak-hour factor, PHF	0.78	0.78	0.98	0.98	0.98	0.91	0.91	0.94	0.94	0.94
Adj. Flow (vph)	38	103	163	36	148	615	16	64	112	585
RTOR Reduction (vph)	0	86	0	0	0	2	0	0	21	0
Lane Group Flow (vph)	38	17	0	347	0	629	0	0	155	585
Confl. Peds. (#/hr)	36	41	41		36					
Heavy Vehicles (%)	0%	0%	8%	0%	6%	5%	33%	19%	0%	14%
Parking (#/hr)			0		0					
Turn Type	D.Pm	custom	Perm			custom		custom	custom	
Protected Phases		4		4		3		1 2	1 2	2 3
Permitted Phases	4		4					1 2 3 4	1 2	
Actuated Green, G (s)	16.9	16.9		16.9		32.1			39.0	54.6
Effective Green, g (s)	16.9	16.9		16.9		32.1			39.0	54.6
Actuated g/C Ratio	0.17	0.17		0.17		0.32			0.39	0.55
Clearance Time (s)	4.0	4.0		4.0		4.0				
Vehicle Extension (s)	3.0	3.0		3.0		3.0				
Lane Grp Cap (vph)	96	229		488		1006			553	2236
v/s Ratio Prot		0.01				c0.20			c0.11	0.14
v/s Ratio Perm	0.07			0.12						
v/c Ratio	0.40	0.08		0.71		0.63			0.28	0.26
Uniform Delay, d1	37.0	35.0		39.2		28.8			20.9	12.0
Progression Factor	1.00	1.00		0.72		1.00			1.00	1.00
Incremental Delay, d2	2.7	0.1		4.0		2.9			0.3	0.3
Delay (s)	39.7	35.1		32.3		31.8			21.2	12.3
Level of Service	D	D		C		C			C	B
Approach Delay (s)				32.3						14.4
Approach LOS				C						B

Intersection Summary			
HCM Average Control Delay	25.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	60.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	12	12	11	11	12	12	12
Total Lost time (s)		4.0			4.0			4.0	4.0			4.0
Lane Util. Factor		1.00			1.00			1.00	0.95			1.00
Frt		0.93			0.89			1.00	1.00			1.00
Flt Protected		0.98			0.99			0.95	1.00			0.95
Satd. Flow (prot)		1220			1393			1542	3020			1540
Flt Permitted		0.82			0.93			0.20	1.00			0.27
Satd. Flow (perm)		1026			1313			317	3020			437
Volume (vph)	10	0	10	25	0	100	35	55	500	0	35	20
Peak-hour factor, PHF	0.70	0.70	0.70	0.83	0.83	0.83	0.90	0.90	0.90	0.90	0.92	0.92
Adj. Flow (vph)	14	0	14	30	0	120	39	61	556	0	38	22
RTOR Reduction (vph)	0	12	0	0	103	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	16	0	0	47	0	0	100	556	0	0	60
Heavy Vehicles (%)	31%	0%	24%	2%	0%	10%	0%	3%	4%	33%	0%	15%
Parking (#/hr)												
Turn Type	Perm			Perm			Perm	pm+pt			Perm	pm+pt
Protected Phases		4			8			5	2			1
Permitted Phases	4			8			2	2			6	6
Actuated Green, G (s)		11.0			11.0			32.0	20.0			32.0
Effective Green, g (s)		12.0			12.0			34.0	21.0			34.0
Actuated g/C Ratio		0.14			0.14			0.40	0.25			0.40
Clearance Time (s)		5.0			5.0			5.0	5.0			5.0
Lane Grp Cap (vph)		147			188			318	755			348
v/s Ratio Prot								c0.05	0.18			0.03
v/s Ratio Perm		0.02			c0.04			0.08				0.04
v/c Ratio		0.11			0.25			0.31	0.74			0.17
Uniform Delay, d1		31.3			32.0			16.7	29.0			15.9
Progression Factor		1.00			1.00			1.00	1.00			1.00
Incremental Delay, d2		1.5			3.2			2.6	6.3			1.1
Delay (s)		32.8			35.2			19.3	35.3			17.0
Level of Service		C			D			B	D			B
Approach Delay (s)		32.8			35.2				32.8			
Approach LOS		C			D				C			

Intersection Summary			
HCM Average Control Delay	36.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	84.0	Sum of lost time (s)	38.0
Intersection Capacity Utilization	42.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SWT	SWR
Lane Configurations		
Ideal Flow (vphpl)	1900	1900
Lane Width	12	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	2981	1045
Flt Permitted	1.00	1.00
Satd. Flow (perm)	2981	1045
Volume (vph)	600	70
Peak-hour factor, PHF	0.92	0.92
Adj. Flow (vph)	652	76
RTOR Reduction (vph)	0	57
Lane Group Flow (vph)	652	19
Heavy Vehicles (%)	9%	21%
Parking (#/hr)		0
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	20.0	20.0
Effective Green, g (s)	21.0	21.0
Actuated g/C Ratio	0.25	0.25
Clearance Time (s)	5.0	5.0
Lane Grp Cap (vph)	745	261
v/s Ratio Prot	c0.22	
v/s Ratio Perm		0.02
v/c Ratio	0.88	0.07
Uniform Delay, d1	30.2	24.1
Progression Factor	1.00	1.00
Incremental Delay, d2	13.6	0.5
Delay (s)	43.9	24.6
Level of Service	D	C
Approach Delay (s)	40.0	
Approach LOS	D	

Intersection Summary

Evening (PM)

Movement	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	12	11	12	12	12	12	10	12	10	12	12	12
Total Lost time (s)		4.0					4.0	4.0				
Lane Util. Factor		0.95					1.00	1.00				
Frpb, ped/bikes		0.93					1.00	0.82				
Flpb, ped/bikes		0.93					0.44	1.00				
Frt		0.98					1.00	0.91				
Flt Protected		0.99					0.95	1.00				
Satd. Flow (prot)		2561					635	1213				
Flt Permitted		0.99					0.95	1.00				
Satd. Flow (perm)		2561					635	1213				
Volume (vph)	95	725	125	0	0	0	230	200	295	0	0	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.92	0.92	0.92	0.94	0.94	0.94	0.92	0.92	0.92
Adj. Flow (vph)	106	806	139	0	0	0	245	213	314	0	0	0
RTOR Reduction (vph)	0	12	0	0	0	0	0	45	0	0	0	0
Lane Group Flow (vph)	0	1039	0	0	0	0	245	482	0	0	0	0
Confl. Peds. (#/hr)	609		254				234		150			
Heavy Vehicles (%)	2%	3%	1%	2%	2%	2%	6%	2%	7%	2%	2%	2%
Parking (#/hr)	0		0									
Turn Type	Perm						Perm					
Protected Phases		2						4				
Permitted Phases	2						4					
Actuated Green, G (s)		62.0					30.0	30.0				
Effective Green, g (s)		62.0					30.0	30.0				
Actuated g/C Ratio		0.62					0.30	0.30				
Clearance Time (s)		4.0					4.0	4.0				
Vehicle Extension (s)		3.0					3.0	3.0				
Lane Grp Cap (vph)		1588					191	364				
v/s Ratio Prot								c0.40				
v/s Ratio Perm		0.41					0.39					
v/c Ratio		0.65					1.28	1.32				
Uniform Delay, d1		12.1					35.0	35.0				
Progression Factor		1.00					1.00	1.00				
Incremental Delay, d2		2.1					161.0	164.1				
Delay (s)		14.3					196.0	199.1				
Level of Service		B					F	F				
Approach Delay (s)		14.3			0.0			198.1			0.0	
Approach LOS		B			A			F			A	

Intersection Summary			
HCM Average Control Delay	92.1	HCM Level of Service	F
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑			↰↰	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	12	12	12
Total Lost time (s)		4.0			4.0	
Lane Util. Factor		0.91			0.97	
Frt		1.00			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		4115			2964	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		4115			2964	
Volume (vph)	0	850	0	0	400	0
Peak-hour factor, PHF	0.88	0.88	0.92	0.92	0.84	0.84
Adj. Flow (vph)	0	966	0	0	476	0
RTOR Reduction (vph)	0	0	0	0	264	0
Lane Group Flow (vph)	0	966	0	0	212	0
Heavy Vehicles (%)	0%	6%	2%	2%	1%	0%
Parking (#/hr)		0			0	
Turn Type						
Protected Phases		2			7	
Permitted Phases						
Actuated Green, G (s)		80.0			12.0	
Effective Green, g (s)		80.0			12.0	
Actuated g/C Ratio		0.80			0.12	
Clearance Time (s)		4.0			4.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		3292			356	
v/s Ratio Prot		c0.23			c0.07	
v/s Ratio Perm						
v/c Ratio		0.29			0.60	
Uniform Delay, d1		2.6			41.7	
Progression Factor		1.74			1.00	
Incremental Delay, d2		0.1			2.7	
Delay (s)		4.7			44.4	
Level of Service		A			D	
Approach Delay (s)		4.7	0.0		44.4	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	17.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	37.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	11
Total Lost time (s)	4.0					4.0
Lane Util. Factor	0.95					1.00
Frt	0.95					0.86
Flt Protected	1.00					1.00
Satd. Flow (prot)	2916					1416
Flt Permitted	1.00					1.00
Satd. Flow (perm)	2916					1416
Volume (vph)	785	380	0	0	0	270
Peak-hour factor, PHF	0.96	0.96	0.92	0.92	0.85	0.85
Adj. Flow (vph)	818	396	0	0	0	318
RTOR Reduction (vph)	32	0	0	0	0	107
Lane Group Flow (vph)	1182	0	0	0	0	211
Heavy Vehicles (%)	1%	0%	2%	2%	0%	1%
Parking (#/hr)	0	0				
Turn Type						custom
Protected Phases	2					8
Permitted Phases						
Actuated Green, G (s)	73.6					18.4
Effective Green, g (s)	73.6					18.4
Actuated g/C Ratio	0.74					0.18
Clearance Time (s)	4.0					4.0
Vehicle Extension (s)	3.0					3.0
Lane Grp Cap (vph)	2146					261
v/s Ratio Prot	c0.41					c0.15
v/s Ratio Perm						
v/c Ratio	0.55					0.81
Uniform Delay, d1	5.9					39.1
Progression Factor	1.37					1.00
Incremental Delay, d2	1.0					16.6
Delay (s)	9.0					55.7
Level of Service	A					E
Approach Delay (s)	9.0			0.0	55.7	
Approach LOS	A			A	E	

Intersection Summary			
HCM Average Control Delay	18.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	62.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	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	
Lane Util. Factor		0.91									0.95	
Frpb, ped/bikes		0.93									1.00	
Flpb, ped/bikes		1.00									0.89	
Frt		0.98									1.00	
Flt Protected		1.00									0.98	
Satd. Flow (prot)		3889									2662	
Flt Permitted		1.00									0.98	
Satd. Flow (perm)		3889									2662	
Volume (vph)	0	905	165	0	0	0	0	0	0	190	345	0
Peak-hour factor, PHF	0.94	0.94	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.89	0.89	0.89
Adj. Flow (vph)	0	963	176	0	0	0	0	0	0	213	388	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	86	0
Lane Group Flow (vph)	0	1139	0	0	0	0	0	0	0	0	515	0
Confl. Peds. (#/hr)			680							240		
Heavy Vehicles (%)	0%	6%	4%	0%	0%	0%	0%	0%	0%	1%	1%	0%
Parking (#/hr)		0	0							0	0	
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		68.6									23.4	
Effective Green, g (s)		68.6									23.4	
Actuated g/C Ratio		0.69									0.23	
Clearance Time (s)		4.0									4.0	
Vehicle Extension (s)		3.0									3.0	
Lane Grp Cap (vph)		2668									623	
v/s Ratio Prot		c0.29										
v/s Ratio Perm											0.19	
v/c Ratio		0.43									0.83	
Uniform Delay, d1		7.0									36.4	
Progression Factor		1.18									1.00	
Incremental Delay, d2		0.4									8.8	
Delay (s)		8.6									45.2	
Level of Service		A									D	
Approach Delay (s)		8.6			0.0			0.0			45.2	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM Average Control Delay	21.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	48.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBL	NBR2	SBL	SBT	SBR	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	12	16	12	12	12	12	10	12
Total Lost time (s)	4.0	4.0		4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		0.95		0.76			1.00	0.91
Frpb, ped/bikes	1.00	1.00		0.89		1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00		0.86		1.00			1.00	1.00
Frt	1.00	0.85		0.93		0.85			1.00	1.00
Flt Protected	0.95	1.00		0.98		1.00			0.95	1.00
Satd. Flow (prot)	1516	1357		2498		3251			1478	4363
Flt Permitted	0.21	1.00		0.98		1.00			0.95	1.00
Satd. Flow (perm)	331	1357		2498		3251			1478	4363
Volume (vph)	55	170	310	25	285	805	20	60	55	525
Peak-hour factor, PHF	0.82	0.82	0.92	0.92	0.92	0.92	0.92	0.88	0.88	0.88
Adj. Flow (vph)	67	207	337	27	310	875	22	68	62	597
RTOR Reduction (vph)	0	148	0	0	0	2	0	0	44	0
Lane Group Flow (vph)	67	59	0	674	0	895	0	0	86	597
Confl. Peds. (#/hr)	90	115	115		90					
Heavy Vehicles (%)	0%	0%	2%	0%	3%	2%	0%	5%	0%	7%
Parking (#/hr)			0		0					
Turn Type	D.Pm	custom	Perm			custom		custom	custom	
Protected Phases		4		4		3		1 2	1 2!	2 3
Permitted Phases	4		4			2!		1 2 3 4	1 2	
Actuated Green, G (s)	28.5	28.5		28.5		46.2			27.4	50.2
Effective Green, g (s)	28.5	28.5		28.5		46.2			27.4	50.2
Actuated g/C Ratio	0.28	0.28		0.28		0.46			0.27	0.50
Clearance Time (s)	4.0	4.0		4.0		4.0				
Vehicle Extension (s)	3.0	3.0		3.0		3.0				
Lane Grp Cap (vph)	94	387		712		1632			405	2190
v/s Ratio Prot		0.04				c0.18			c0.06	0.14
v/s Ratio Perm	0.20			0.27		0.10				
v/c Ratio	0.71	0.15		0.95		0.55			0.21	0.27
Uniform Delay, d1	32.1	26.7		35.0		19.4			28.0	14.4
Progression Factor	1.00	1.00		0.97		1.00			1.00	1.00
Incremental Delay, d2	22.4	0.2		18.4		0.4			0.3	0.1
Delay (s)	54.5	26.9		52.5		19.8			28.3	14.4
Level of Service	D	C		D		B			C	B
Approach Delay (s)				52.5						16.9
Approach LOS				D						B

Intersection Summary			
HCM Average Control Delay	29.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	83.4%	ICU Level of Service	E
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	12	12	11	11	12	12	12
Total Lost time (s)		4.0			4.0			4.0	4.0			4.0
Lane Util. Factor		1.00			1.00			1.00	0.95			1.00
Frt		0.93			0.88			1.00	1.00			1.00
Flt Protected		0.98			0.99			0.95	1.00			0.95
Satd. Flow (prot)		1165			1479			1540	3073			1537
Flt Permitted		0.55			0.95			0.19	1.00			0.18
Satd. Flow (perm)		656			1420			309	3073			291
Volume (vph)	10	0	10	30	0	225	35	65	725	5	55	15
Peak-hour factor, PHF	0.59	0.59	0.59	0.72	0.72	0.72	0.97	0.97	0.97	0.97	0.92	0.92
Adj. Flow (vph)	17	0	17	42	0	312	36	67	747	5	60	16
RTOR Reduction (vph)	0	15	0	0	270	0	0	0	1	0	0	0
Lane Group Flow (vph)	0	19	0	0	84	0	0	103	751	0	0	76
Heavy Vehicles (%)	42%	0%	25%	3%	0%	1%	0%	3%	2%	17%	0%	27%
Parking (#/hr)												
Turn Type	Perm			Perm			Perm	pm+pt			Perm	pm+pt
Protected Phases		4			8			5	2			1
Permitted Phases	4			8			2	2			6	6
Actuated Green, G (s)		11.0			11.0			38.0	26.0			38.0
Effective Green, g (s)		12.0			12.0			40.0	27.0			40.0
Actuated g/C Ratio		0.13			0.13			0.44	0.30			0.44
Clearance Time (s)		5.0			5.0			5.0	5.0			5.0
Lane Grp Cap (vph)		87			189			315	922			309
v/s Ratio Prot								c0.05	c0.24			0.04
v/s Ratio Perm		0.03			c0.06			0.10				0.07
v/c Ratio		0.22			0.44			0.33	0.81			0.25
Uniform Delay, d1		34.8			35.9			16.1	29.2			15.8
Progression Factor		1.00			1.00			1.00	1.00			1.00
Incremental Delay, d2		5.8			7.3			2.8	7.9			1.9
Delay (s)		40.6			43.3			18.8	37.0			17.7
Level of Service		D			D			B	D			B
Approach Delay (s)		40.6			43.3				34.8			
Approach LOS		D			D				C			

Intersection Summary			
HCM Average Control Delay	35.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	38.0
Intersection Capacity Utilization	54.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SWT	SWR
Lane Configurations		
Ideal Flow (vphpl)	1900	1900
Lane Width	12	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	3124	1171
Flt Permitted	1.00	1.00
Satd. Flow (perm)	3124	1171
Volume (vph)	675	140
Peak-hour factor, PHF	0.92	0.92
Adj. Flow (vph)	734	152
RTOR Reduction (vph)	0	106
Lane Group Flow (vph)	734	46
Heavy Vehicles (%)	4%	8%
Parking (#/hr)		0
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	26.0	26.0
Effective Green, g (s)	27.0	27.0
Actuated g/C Ratio	0.30	0.30
Clearance Time (s)	5.0	5.0
Lane Grp Cap (vph)	937	351
v/s Ratio Prot	0.23	
v/s Ratio Perm		0.04
v/c Ratio	0.78	0.13
Uniform Delay, d1	28.8	22.9
Progression Factor	1.00	1.00
Incremental Delay, d2	6.5	0.8
Delay (s)	35.3	23.7
Level of Service	D	C
Approach Delay (s)	32.1	
Approach LOS	C	

Intersection Summary

Saturday

Movement	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	12	11	12	12	12	12	10	10	12	12	12	12
Total Lost time (s)		4.0					4.0	4.0				
Lane Util. Factor		0.95					1.00	1.00				
Frpb, ped/bikes		0.95					1.00	0.83				
Flpb, ped/bikes		0.94					0.46	1.00				
Frt		0.99					1.00	0.91				
Flt Protected		1.00					0.95	1.00				
Satd. Flow (prot)		2730					677	1171				
Flt Permitted		1.00					0.95	1.00				
Satd. Flow (perm)		2730					677	1171				
Volume (vph)	55	660	55	0	0	0	165	145	215	0	0	0
Peak-hour factor, PHF	0.95	0.95	0.95	0.92	0.92	0.92	0.93	0.93	0.93	0.92	0.92	0.92
Adj. Flow (vph)	58	695	58	0	0	0	177	156	231	0	0	0
RTOR Reduction (vph)	0	6	0	0	0	0	0	13	0	0	0	0
Lane Group Flow (vph)	0	805	0	0	0	0	177	374	0	0	0	0
Confl. Peds. (#/hr)	776		460				234		150			
Heavy Vehicles (%)	2%	2%	4%	2%	2%	2%	3%	0%	6%	0%	0%	0%
Parking (#/hr)	0		0									
Turn Type	Perm						Perm					
Protected Phases		2						4				
Permitted Phases	2						4					
Actuated Green, G (s)		50.3					29.7	29.7				
Effective Green, g (s)		51.3					30.7	30.7				
Actuated g/C Ratio		0.57					0.34	0.34				
Clearance Time (s)		5.0					5.0	5.0				
Vehicle Extension (s)		3.0					3.0	3.0				
Lane Grp Cap (vph)		1556					231	399				
v/s Ratio Prot								c0.32				
v/s Ratio Perm		0.29					0.26					
v/c Ratio		0.52					0.77	0.94				
Uniform Delay, d1		11.8					26.4	28.7				
Progression Factor		1.00					1.00	1.00				
Incremental Delay, d2		1.2					14.1	29.3				
Delay (s)		13.0					40.5	58.0				
Level of Service		B					D	E				
Approach Delay (s)		13.0			0.0			52.5			0.0	
Approach LOS		B			A			D			A	

Intersection Summary			
HCM Average Control Delay	29.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	12	12	12
Total Lost time (s)		4.0			4.0	
Lane Util. Factor		0.91			0.97	
Frt		1.00			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		4235			2964	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		4235			2964	
Volume (vph)	0	910	0	0	365	0
Peak-hour factor, PHF	0.95	0.95	0.92	0.92	0.81	0.81
Adj. Flow (vph)	0	958	0	0	451	0
RTOR Reduction (vph)	0	0	0	0	214	0
Lane Group Flow (vph)	0	958	0	0	237	0
Heavy Vehicles (%)	0%	3%	2%	2%	1%	0%
Parking (#/hr)		0			0	
Turn Type						
Protected Phases		2			4	
Permitted Phases						
Actuated Green, G (s)		69.9			12.1	
Effective Green, g (s)		69.9			12.1	
Actuated g/C Ratio		0.78			0.13	
Clearance Time (s)		4.0			4.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		3289			398	
v/s Ratio Prot		c0.23			c0.08	
v/s Ratio Perm						
v/c Ratio		0.29			0.60	
Uniform Delay, d1		2.9			36.7	
Progression Factor		0.70			1.00	
Incremental Delay, d2		0.2			2.4	
Delay (s)		2.2			39.0	
Level of Service		A			D	
Approach Delay (s)		2.2	0.0		39.0	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	14.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	37.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	11
Total Lost time (s)	4.0					4.0
Lane Util. Factor	0.95					1.00
Frt	0.96					0.86
Flt Protected	1.00					1.00
Satd. Flow (prot)	2953					1430
Flt Permitted	1.00					1.00
Satd. Flow (perm)	2953					1430
Volume (vph)	810	330	0	0	0	415
Peak-hour factor, PHF	0.97	0.97	0.92	0.92	0.83	0.83
Adj. Flow (vph)	835	340	0	0	0	500
RTOR Reduction (vph)	49	0	0	0	0	167
Lane Group Flow (vph)	1126	0	0	0	0	333
Heavy Vehicles (%)	0%	0%	2%	2%	0%	0%
Parking (#/hr)	0	0				
Turn Type						custom
Protected Phases	2					8
Permitted Phases						
Actuated Green, G (s)	61.0					21.0
Effective Green, g (s)	61.0					21.0
Actuated g/C Ratio	0.68					0.23
Clearance Time (s)	4.0					4.0
Vehicle Extension (s)	3.0					3.0
Lane Grp Cap (vph)	2001					334
v/s Ratio Prot	c0.38					c0.23
v/s Ratio Perm						
v/c Ratio	0.56					1.00
Uniform Delay, d1	7.6					34.5
Progression Factor	1.60					1.00
Incremental Delay, d2	1.1					48.0
Delay (s)	13.2					82.5
Level of Service	B					F
Approach Delay (s)	13.2			0.0	82.5	
Approach LOS	B			A	F	

Intersection Summary			
HCM Average Control Delay	33.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	71.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	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	
Lane Util. Factor		0.91									0.95	
Frpb, ped/bikes		0.94									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.98									1.00	
Flt Protected		1.00									0.98	
Satd. Flow (prot)		4058									3009	
Flt Permitted		1.00									0.98	
Satd. Flow (perm)		4058									3009	
Volume (vph)	0	1125	140	0	0	0	0	0	0	190	255	0
Peak-hour factor, PHF	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.90	0.90	0.90
Adj. Flow (vph)	0	1210	151	0	0	0	0	0	0	211	283	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	47	0
Lane Group Flow (vph)	0	1361	0	0	0	0	0	0	0	0	447	0
Confl. Peds. (#/hr)			1700			929						
Heavy Vehicles (%)	0%	3%	1%	2%	2%	2%	2%	2%	2%	1%	0%	0%
Parking (#/hr)		0	0							0	0	
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		64.3									17.7	
Effective Green, g (s)		64.3									17.7	
Actuated g/C Ratio		0.71									0.20	
Clearance Time (s)		4.0									4.0	
Vehicle Extension (s)		3.0									3.0	
Lane Grp Cap (vph)		2899									592	
v/s Ratio Prot		c0.34										
v/s Ratio Perm											0.15	
v/c Ratio		0.47									0.75	
Uniform Delay, d1		5.5									34.1	
Progression Factor		0.72									1.00	
Incremental Delay, d2		0.4									5.4	
Delay (s)		4.4									39.5	
Level of Service		A									D	
Approach Delay (s)		4.4			0.0			0.0			39.5	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM Average Control Delay	13.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	49.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBL	NBR2	SBL	SBT	SBR	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	12	16	12	12	12	12	10	12
Total Lost time (s)	4.0	4.0		4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		0.95		0.76			1.00	0.91
Frpb, ped/bikes	1.00	1.00		0.85		1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00		0.84		1.00			1.00	1.00
Frt	1.00	0.85		0.93		0.85			1.00	1.00
Flt Protected	0.95	1.00		0.98		1.00			0.95	1.00
Satd. Flow (prot)	1516	1357		2382		3250			1505	4489
Flt Permitted	0.19	1.00		0.98		1.00			0.95	1.00
Satd. Flow (perm)	304	1357		2382		3250			1505	4489
Volume (vph)	35	160	315	35	295	890	20	200	45	690
Peak-hour factor, PHF	0.79	0.79	0.96	0.96	0.96	0.90	0.90	0.97	0.97	0.97
Adj. Flow (vph)	44	203	328	36	307	989	22	206	46	711
RTOR Reduction (vph)	0	156	0	0	0	2	0	0	18	0
Lane Group Flow (vph)	44	47	0	671	0	1009	0	0	234	711
Confl. Peds. (#/hr)	175	178	178		175					
Heavy Vehicles (%)	0%	0%	1%	0%	1%	2%	0%	0%	4%	4%
Parking (#/hr)			0		0					
Turn Type	D.Pm	custom	Perm			custom		custom	custom	
Protected Phases		4		4		3		1 2	1 2	2 3
Permitted Phases	4		4					1 2 3 4	1 2	
Actuated Green, G (s)	21.0	21.0		21.0		26.4			30.6	42.0
Effective Green, g (s)	21.0	21.0		21.0		26.4			30.6	42.0
Actuated g/C Ratio	0.23	0.23		0.23		0.29			0.34	0.47
Clearance Time (s)	4.0	4.0		4.0		4.0				
Vehicle Extension (s)	3.0	3.0		3.0		3.0				
Lane Grp Cap (vph)	71	317		556		953			512	2095
v/s Ratio Prot		0.03				c0.31			c0.16	0.16
v/s Ratio Perm	0.14			0.28						
v/c Ratio	0.62	0.15		1.21		1.06			0.46	0.34
Uniform Delay, d1	30.9	27.4		34.5		31.8			23.2	15.2
Progression Factor	1.00	1.00		0.85		1.00			1.00	1.00
Incremental Delay, d2	15.0	0.2		108.0		46.0			0.6	0.1
Delay (s)	46.0	27.6		137.3		77.8			23.8	15.3
Level of Service	D	C		F		E			C	B
Approach Delay (s)				137.3						17.5
Approach LOS				F						B

Intersection Summary			
HCM Average Control Delay	67.5	HCM Level of Service	E
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	95.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	12	12	11	11	12	12	12
Total Lost time (s)		4.0			4.0			4.0	4.0			4.0
Lane Util. Factor		1.00			1.00			1.00	0.95			1.00
Frt		0.92			0.90			1.00	1.00			1.00
Flt Protected		0.98			0.99			0.95	1.00			0.95
Satd. Flow (prot)		1417			1515			1570	3040			1611
Flt Permitted		0.67			0.90			0.19	1.00			0.19
Satd. Flow (perm)		974			1388			315	3040			323
Volume (vph)	10	0	15	65	10	190	40	75	695	10	55	15
Peak-hour factor, PHF	0.61	0.61	0.61	0.88	0.88	0.88	0.86	0.86	0.86	0.86	0.98	0.98
Adj. Flow (vph)	16	0	25	74	11	216	47	87	808	12	56	15
RTOR Reduction (vph)	0	21	0	0	109	0	0	0	2	0	0	0
Lane Group Flow (vph)	0	20	0	0	192	0	0	134	819	0	0	71
Heavy Vehicles (%)	5%	0%	11%	0%	0%	1%	0%	0%	3%	8%	0%	4%
Parking (#/hr)												
Turn Type	Perm			Perm			Perm	pm+pt			Perm	pm+pt
Protected Phases		4			8			5	2			1
Permitted Phases	4			8			2	2			6	6
Actuated Green, G (s)		11.0			11.0			32.0	20.0			32.0
Effective Green, g (s)		12.0			12.0			34.0	21.0			34.0
Actuated g/C Ratio		0.14			0.14			0.40	0.25			0.40
Clearance Time (s)		5.0			5.0			5.0	5.0			5.0
Lane Grp Cap (vph)		139			198			322	760			330
v/s Ratio Prot								c0.06	c0.27			0.03
v/s Ratio Perm		0.02			c0.14			0.10				0.05
v/c Ratio		0.14			0.97			0.42	1.08			0.22
Uniform Delay, d1		31.5			35.8			17.3	31.5			17.2
Progression Factor		1.00			1.00			1.00	1.00			1.00
Incremental Delay, d2		2.1			56.7			3.9	55.4			1.5
Delay (s)		33.6			92.5			21.2	86.9			18.6
Level of Service		C			F			C	F			B
Approach Delay (s)		33.6			92.5				77.6			
Approach LOS		C			F				E			

Intersection Summary			
HCM Average Control Delay	62.7	HCM Level of Service	E
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	84.0	Sum of lost time (s)	38.0
Intersection Capacity Utilization	57.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SWT	SWR
Lane Configurations		
Ideal Flow (vphpl)	1900	1900
Lane Width	12	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	3154	1228
Flt Permitted	1.00	1.00
Satd. Flow (perm)	3154	1228
Volume (vph)	675	140
Peak-hour factor, PHF	0.98	0.98
Adj. Flow (vph)	689	143
RTOR Reduction (vph)	0	107
Lane Group Flow (vph)	689	36
Heavy Vehicles (%)	3%	3%
Parking (#/hr)		0
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	20.0	20.0
Effective Green, g (s)	21.0	21.0
Actuated g/C Ratio	0.25	0.25
Clearance Time (s)	5.0	5.0
Lane Grp Cap (vph)	789	307
v/s Ratio Prot	0.22	
v/s Ratio Perm		0.03
v/c Ratio	0.87	0.12
Uniform Delay, d1	30.2	24.3
Progression Factor	1.00	1.00
Incremental Delay, d2	12.8	0.8
Delay (s)	43.1	25.1
Level of Service	D	C
Approach Delay (s)	38.3	
Approach LOS	D	

Intersection Summary

2011 Build Conditions (Exeter Residences Only)

Morning (AM)

Movement	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	12	11	12	12	12	12	10	12	10	12	12	12
Total Lost time (s)		4.0					4.0	4.0				
Lane Util. Factor		0.95					1.00	1.00				
Frpb, ped/bikes		0.91					1.00	0.84				
Flpb, ped/bikes		0.93					0.64	1.00				
Frt		0.97					1.00	0.91				
Flt Protected		0.99					0.95	1.00				
Satd. Flow (prot)		2360					879	1142				
Flt Permitted		0.99					0.95	1.00				
Satd. Flow (perm)		2360					879	1142				
Volume (vph)	70	390	95	0	0	0	180	125	195	0	0	0
Peak-hour factor, PHF	0.92	0.94	0.94	0.92	0.92	0.92	0.94	0.92	0.94	0.92	0.92	0.92
Adj. Flow (vph)	76	415	101	0	0	0	191	136	207	0	0	0
RTOR Reduction (vph)	0	14	0	0	0	0	0	61	0	0	0	0
Lane Group Flow (vph)	0	578	0	0	0	0	191	282	0	0	0	0
Confl. Peds. (#/hr)	138		150				107		126			
Heavy Vehicles (%)	6%	11%	3%	2%	2%	2%	11%	4%	22%	2%	2%	2%
Parking (#/hr)	0		0									
Turn Type	Perm						Perm					
Protected Phases		2						4				
Permitted Phases	2						4					
Actuated Green, G (s)		64.2					27.8	27.8				
Effective Green, g (s)		64.2					27.8	27.8				
Actuated g/C Ratio		0.64					0.28	0.28				
Clearance Time (s)		4.0					4.0	4.0				
Vehicle Extension (s)		3.0					3.0	3.0				
Lane Grp Cap (vph)		1515					244	317				
v/s Ratio Prot								c0.25				
v/s Ratio Perm		0.24					0.22					
v/c Ratio		0.38					0.78	0.89				
Uniform Delay, d1		8.5					33.3	34.6				
Progression Factor		1.00					1.00	1.00				
Incremental Delay, d2		0.7					15.0	25.2				
Delay (s)		9.2					48.3	59.9				
Level of Service		A					D	E				
Approach Delay (s)		9.2			0.0			55.7			0.0	
Approach LOS		A			A			E			A	

Intersection Summary			
HCM Average Control Delay	31.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	50.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑			↰↰	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	12	12	12
Total Lost time (s)		4.0			4.0	
Lane Util. Factor		0.91			0.97	
Frt		1.00			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		3793			2722	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		3793			2722	
Volume (vph)	0	545	0	0	260	0
Peak-hour factor, PHF	0.92	0.87	0.92	0.92	0.87	0.92
Adj. Flow (vph)	0	626	0	0	299	0
RTOR Reduction (vph)	0	0	0	0	274	0
Lane Group Flow (vph)	0	626	0	0	25	0
Heavy Vehicles (%)	2%	15%	2%	2%	10%	2%
Parking (#/hr)	0	0			0	
Turn Type						
Protected Phases		2			4	
Permitted Phases						
Actuated Green, G (s)		83.6			8.4	
Effective Green, g (s)		83.6			8.4	
Actuated g/C Ratio		0.84			0.08	
Clearance Time (s)		4.0			4.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		3171			229	
v/s Ratio Prot		c0.17			c0.01	
v/s Ratio Perm						
v/c Ratio		0.20			0.11	
Uniform Delay, d1		1.6			42.3	
Progression Factor		0.95			1.00	
Incremental Delay, d2		0.1			0.2	
Delay (s)		1.7			42.6	
Level of Service		A			D	
Approach Delay (s)		1.7	0.0		42.6	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	14.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.19		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	26.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	11
Total Lost time (s)	4.0					4.0
Lane Util. Factor	0.95					1.00
Frt	0.94					0.86
Flt Protected	1.00					1.00
Satd. Flow (prot)	2728					1375
Flt Permitted	1.00					1.00
Satd. Flow (perm)	2728					1375
Volume (vph)	490	305	0	0	0	135
Peak-hour factor, PHF	0.86	0.86	0.92	0.92	0.92	0.74
Adj. Flow (vph)	570	355	0	0	0	182
RTOR Reduction (vph)	60	0	0	0	0	164
Lane Group Flow (vph)	865	0	0	0	0	18
Heavy Vehicles (%)	7%	6%	2%	2%	2%	4%
Parking (#/hr)	0	0				
Turn Type						custom
Protected Phases	2					4
Permitted Phases						
Actuated Green, G (s)	81.9					10.1
Effective Green, g (s)	81.9					10.1
Actuated g/C Ratio	0.82					0.10
Clearance Time (s)	4.0					4.0
Vehicle Extension (s)	3.0					3.0
Lane Grp Cap (vph)	2234					139
v/s Ratio Prot	c0.32					c0.01
v/s Ratio Perm						
v/c Ratio	0.39					0.13
Uniform Delay, d1	2.4					41.0
Progression Factor	0.38					1.00
Incremental Delay, d2	0.5					0.4
Delay (s)	1.4					41.4
Level of Service	A					D
Approach Delay (s)	1.4			0.0	41.4	
Approach LOS	A			A	D	

Intersection Summary			
HCM Average Control Delay	8.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	41.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	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	
Lane Util. Factor		0.91									0.95	
Frpb, ped/bikes		0.94									1.00	
Flpb, ped/bikes		1.00									0.89	
Frt		0.97									1.00	
Flt Protected		1.00									0.98	
Satd. Flow (prot)		3599									2582	
Flt Permitted		1.00									0.98	
Satd. Flow (perm)		3599									2582	
Volume (vph)	0	510	120	0	0	0	0	0	0	105	210	0
Peak-hour factor, PHF	0.91	0.91	0.91	0.92	0.92	0.92	0.92	0.92	0.92	0.86	0.86	0.86
Adj. Flow (vph)	0	560	132	0	0	0	0	0	0	122	244	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	79	0
Lane Group Flow (vph)	0	692	0	0	0	0	0	0	0	0	287	0
Confl. Peds. (#/hr)			310							267		
Heavy Vehicles (%)	2%	15%	10%	2%	2%	2%	2%	2%	2%	8%	3%	2%
Parking (#/hr)		0	0							0	0	
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		76.1									15.9	
Effective Green, g (s)		76.1									15.9	
Actuated g/C Ratio		0.76									0.16	
Clearance Time (s)		4.0									4.0	
Vehicle Extension (s)		3.0									3.0	
Lane Grp Cap (vph)		2739									411	
v/s Ratio Prot		c0.19										
v/s Ratio Perm											0.11	
v/c Ratio		0.25									0.70	
Uniform Delay, d1		3.5									39.8	
Progression Factor		0.56									1.00	
Incremental Delay, d2		0.2									5.1	
Delay (s)		2.2									44.9	
Level of Service		A									D	
Approach Delay (s)		2.2			0.0			0.0			44.9	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM Average Control Delay	17.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	34.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBL	NBR2	SBL	SBT	SBR	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	12	16	12	12	12	12	10	12
Total Lost time (s)	4.0	4.0		4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		0.95		0.76			1.00	0.91
Frpb, ped/bikes	1.00	1.00		0.96		1.00			1.00	1.00
Flpb, ped/bikes	0.96	1.00		0.95		1.00			1.00	1.00
Frt	1.00	0.85		0.94		0.85			1.00	1.00
Flt Protected	0.95	1.00		0.98		1.00			0.95	1.00
Satd. Flow (prot)	1455	1357		2881		3135			1418	4095
Flt Permitted	0.35	1.00		0.98		1.00			0.95	1.00
Satd. Flow (perm)	534	1357		2881		3135			1418	4095
Volume (vph)	30	80	170	35	155	560	15	60	105	550
Peak-hour factor, PHF	0.78	0.78	0.98	0.98	0.98	0.91	0.91	0.94	0.94	0.94
Adj. Flow (vph)	38	103	173	36	158	615	16	64	112	585
RTOR Reduction (vph)	0	85	0	0	0	2	0	0	21	0
Lane Group Flow (vph)	38	18	0	367	0	629	0	0	155	585
Confl. Peds. (#/hr)	36	41	41		36					
Heavy Vehicles (%)	0%	0%	8%	0%	6%	5%	33%	19%	0%	14%
Parking (#/hr)			0		0					
Turn Type	D.Pm	custom	Perm			custom		custom	custom	
Protected Phases		4		4		3		1 2	1 2	2 3
Permitted Phases	4		4					1 2 3 4	1 2	
Actuated Green, G (s)	17.2	17.2		17.2		31.8			39.0	54.3
Effective Green, g (s)	17.2	17.2		17.2		31.8			39.0	54.3
Actuated g/C Ratio	0.17	0.17		0.17		0.32			0.39	0.54
Clearance Time (s)	4.0	4.0		4.0		4.0				
Vehicle Extension (s)	3.0	3.0		3.0		3.0				
Lane Grp Cap (vph)	92	233		496		997			553	2224
v/s Ratio Prot		0.01				c0.20			c0.11	0.14
v/s Ratio Perm	0.07			0.13						
v/c Ratio	0.41	0.08		0.74		0.63			0.28	0.26
Uniform Delay, d1	36.9	34.7		39.3		29.1			20.9	12.2
Progression Factor	1.00	1.00		0.74		1.00			1.00	1.00
Incremental Delay, d2	3.0	0.1		4.8		3.0			0.3	0.3
Delay (s)	39.9	34.9		33.7		32.1			21.2	12.5
Level of Service	D	C		C		C			C	B
Approach Delay (s)				33.7						14.5
Approach LOS				C						B

Intersection Summary			
HCM Average Control Delay	25.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	61.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	12	12	11	11	12	12	12
Total Lost time (s)		4.0			4.0			4.0	4.0			4.0
Lane Util. Factor		1.00			1.00			1.00	0.95			1.00
Frt		0.93			0.89			1.00	1.00			1.00
Flt Protected		0.98			0.99			0.95	1.00			0.95
Satd. Flow (prot)		1220			1393			1542	3020			1540
Flt Permitted		0.82			0.93			0.19	1.00			0.27
Satd. Flow (perm)		1026			1313			309	3020			437
Volume (vph)	10	0	10	25	0	100	35	55	500	0	35	20
Peak-hour factor, PHF	0.70	0.70	0.70	0.83	0.83	0.83	0.90	0.90	0.90	0.90	0.92	0.92
Adj. Flow (vph)	14	0	14	30	0	120	39	61	556	0	38	22
RTOR Reduction (vph)	0	12	0	0	103	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	16	0	0	47	0	0	100	556	0	0	60
Heavy Vehicles (%)	31%	0%	24%	2%	0%	10%	0%	3%	4%	33%	0%	15%
Parking (#/hr)												
Turn Type	Perm			Perm			Perm	pm+pt			Perm	pm+pt
Protected Phases		4			8			5	2			1
Permitted Phases	4			8			2	2			6	6
Actuated Green, G (s)		11.0			11.0			32.0	20.0			32.0
Effective Green, g (s)		12.0			12.0			34.0	21.0			34.0
Actuated g/C Ratio		0.14			0.14			0.40	0.25			0.40
Clearance Time (s)		5.0			5.0			5.0	5.0			5.0
Lane Grp Cap (vph)		147			188			316	755			348
v/s Ratio Prot								c0.05	0.18			0.03
v/s Ratio Perm		0.02			c0.04			0.08				0.04
v/c Ratio		0.11			0.25			0.32	0.74			0.17
Uniform Delay, d1		31.3			32.0			16.8	29.0			15.9
Progression Factor		1.00			1.00			1.00	1.00			1.00
Incremental Delay, d2		1.5			3.2			2.6	6.3			1.1
Delay (s)		32.8			35.2			19.4	35.3			17.0
Level of Service		C			D			B	D			B
Approach Delay (s)		32.8			35.2				32.9			
Approach LOS		C			D				C			

Intersection Summary			
HCM Average Control Delay	37.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	84.0	Sum of lost time (s)	38.0
Intersection Capacity Utilization	43.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SWT	SWR
Lane Configurations		
Ideal Flow (vphpl)	1900	1900
Lane Width	12	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	2981	1045
Flt Permitted	1.00	1.00
Satd. Flow (perm)	2981	1045
Volume (vph)	610	70
Peak-hour factor, PHF	0.92	0.92
Adj. Flow (vph)	663	76
RTOR Reduction (vph)	0	57
Lane Group Flow (vph)	663	19
Heavy Vehicles (%)	9%	21%
Parking (#/hr)		0
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	20.0	20.0
Effective Green, g (s)	21.0	21.0
Actuated g/C Ratio	0.25	0.25
Clearance Time (s)	5.0	5.0
Lane Grp Cap (vph)	745	261
v/s Ratio Prot	c0.22	
v/s Ratio Perm		0.02
v/c Ratio	0.89	0.07
Uniform Delay, d1	30.4	24.1
Progression Factor	1.00	1.00
Incremental Delay, d2	15.0	0.5
Delay (s)	45.4	24.6
Level of Service	D	C
Approach Delay (s)	41.3	
Approach LOS	D	

Intersection Summary

Evening (PM)

Movement	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	12	11	12	12	12	12	10	12	10	12	12	12
Total Lost time (s)		4.0					4.0	4.0				
Lane Util. Factor		0.95					1.00	1.00				
Frpb, ped/bikes		0.93					1.00	0.82				
Flpb, ped/bikes		0.93					0.44	1.00				
Frt		0.98					1.00	0.91				
Flt Protected		1.00					0.95	1.00				
Satd. Flow (prot)		2566					635	1210				
Flt Permitted		1.00					0.95	1.00				
Satd. Flow (perm)		2566					635	1210				
Volume (vph)	95	735	125	0	0	0	230	200	300	0	0	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.92	0.92	0.92	0.94	0.94	0.94	0.92	0.92	0.92
Adj. Flow (vph)	106	817	139	0	0	0	245	213	319	0	0	0
RTOR Reduction (vph)	0	12	0	0	0	0	0	44	0	0	0	0
Lane Group Flow (vph)	0	1050	0	0	0	0	245	488	0	0	0	0
Confl. Peds. (#/hr)	609		254				234		150			
Heavy Vehicles (%)	2%	3%	1%	2%	2%	2%	6%	2%	7%	2%	2%	2%
Parking (#/hr)	0		0									
Turn Type	Perm						Perm					
Protected Phases		2						4				
Permitted Phases	2						4					
Actuated Green, G (s)		62.0					30.0	30.0				
Effective Green, g (s)		62.0					30.0	30.0				
Actuated g/C Ratio		0.62					0.30	0.30				
Clearance Time (s)		4.0					4.0	4.0				
Vehicle Extension (s)		3.0					3.0	3.0				
Lane Grp Cap (vph)		1591					191	363				
v/s Ratio Prot								c0.40				
v/s Ratio Perm		0.41					0.39					
v/c Ratio		0.66					1.28	1.34				
Uniform Delay, d1		12.2					35.0	35.0				
Progression Factor		1.00					1.00	1.00				
Incremental Delay, d2		2.2					161.0	172.2				
Delay (s)		14.4					196.0	207.2				
Level of Service		B					F	F				
Approach Delay (s)		14.4			0.0			203.7			0.0	
Approach LOS		B			A			F			A	

Intersection Summary			
HCM Average Control Delay	94.4	HCM Level of Service	F
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	12	12	12
Total Lost time (s)		4.0			4.0	
Lane Util. Factor		0.91			0.97	
Frt		1.00			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		4115			2964	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		4115			2964	
Volume (vph)	0	860	0	0	400	0
Peak-hour factor, PHF	0.88	0.88	0.92	0.92	0.84	0.84
Adj. Flow (vph)	0	977	0	0	476	0
RTOR Reduction (vph)	0	0	0	0	258	0
Lane Group Flow (vph)	0	977	0	0	218	0
Heavy Vehicles (%)	0%	6%	2%	2%	1%	0%
Parking (#/hr)		0			0	
Turn Type						
Protected Phases		2			7	
Permitted Phases						
Actuated Green, G (s)		79.9			12.1	
Effective Green, g (s)		79.9			12.1	
Actuated g/C Ratio		0.80			0.12	
Clearance Time (s)		4.0			4.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		3288			359	
v/s Ratio Prot		c0.24			c0.07	
v/s Ratio Perm						
v/c Ratio		0.30			0.61	
Uniform Delay, d1		2.6			41.7	
Progression Factor		1.73			1.00	
Incremental Delay, d2		0.1			2.9	
Delay (s)		4.7			44.6	
Level of Service		A			D	
Approach Delay (s)		4.7	0.0		44.6	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	17.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	37.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	11
Total Lost time (s)	4.0					4.0
Lane Util. Factor	0.95					1.00
Frt	0.95					0.86
Flt Protected	1.00					1.00
Satd. Flow (prot)	2917					1416
Flt Permitted	1.00					1.00
Satd. Flow (perm)	2917					1416
Volume (vph)	795	380	0	0	0	270
Peak-hour factor, PHF	0.96	0.96	0.92	0.92	0.85	0.85
Adj. Flow (vph)	828	396	0	0	0	318
RTOR Reduction (vph)	31	0	0	0	0	104
Lane Group Flow (vph)	1193	0	0	0	0	214
Heavy Vehicles (%)	1%	0%	2%	2%	0%	1%
Parking (#/hr)	0	0				
Turn Type						custom
Protected Phases	2					8
Permitted Phases						
Actuated Green, G (s)	73.5					18.5
Effective Green, g (s)	73.5					18.5
Actuated g/C Ratio	0.74					0.18
Clearance Time (s)	4.0					4.0
Vehicle Extension (s)	3.0					3.0
Lane Grp Cap (vph)	2144					262
v/s Ratio Prot	c0.41					c0.15
v/s Ratio Perm						
v/c Ratio	0.56					0.82
Uniform Delay, d1	5.9					39.1
Progression Factor	1.37					1.00
Incremental Delay, d2	1.0					17.5
Delay (s)	9.1					56.6
Level of Service	A					E
Approach Delay (s)	9.1			0.0	56.6	
Approach LOS	A			A	E	

Intersection Summary			
HCM Average Control Delay	18.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	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	
Lane Util. Factor		0.91									0.95	
Frpb, ped/bikes		0.93									1.00	
Flpb, ped/bikes		1.00									0.89	
Frt		0.98									1.00	
Flt Protected		1.00									0.98	
Satd. Flow (prot)		3871									2665	
Flt Permitted		1.00									0.98	
Satd. Flow (perm)		3871									2665	
Volume (vph)	0	905	175	0	0	0	0	0	0	190	350	0
Peak-hour factor, PHF	0.94	0.94	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.89	0.89	0.89
Adj. Flow (vph)	0	963	186	0	0	0	0	0	0	213	393	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	85	0
Lane Group Flow (vph)	0	1149	0	0	0	0	0	0	0	0	521	0
Confl. Peds. (#/hr)			680							240		
Heavy Vehicles (%)	0%	6%	4%	0%	0%	0%	0%	0%	0%	1%	1%	0%
Parking (#/hr)		0	0							0	0	
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		68.2									23.8	
Effective Green, g (s)		68.2									23.8	
Actuated g/C Ratio		0.68									0.24	
Clearance Time (s)		4.0									4.0	
Vehicle Extension (s)		3.0									3.0	
Lane Grp Cap (vph)		2640									634	
v/s Ratio Prot		c0.30										
v/s Ratio Perm											0.20	
v/c Ratio		0.44									0.82	
Uniform Delay, d1		7.2									36.1	
Progression Factor		1.18									1.00	
Incremental Delay, d2		0.4									8.4	
Delay (s)		8.9									44.5	
Level of Service		A									D	
Approach Delay (s)		8.9			0.0			0.0			44.5	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM Average Control Delay	21.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	49.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBL	NBR2	SBL	SBT	SBR	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	12	16	12	12	12	12	10	12
Total Lost time (s)	4.0	4.0		4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		0.95		0.76			1.00	0.91
Frpb, ped/bikes	1.00	1.00		0.89		1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00		0.86		1.00			1.00	1.00
Frt	1.00	0.85		0.93		0.85			1.00	1.00
Flt Protected	0.95	1.00		0.98		1.00			0.95	1.00
Satd. Flow (prot)	1516	1357		2497		3251			1478	4363
Flt Permitted	0.20	1.00		0.98		1.00			0.95	1.00
Satd. Flow (perm)	324	1357		2497		3251			1478	4363
Volume (vph)	55	170	315	25	290	805	20	60	55	525
Peak-hour factor, PHF	0.82	0.82	0.92	0.92	0.92	0.92	0.92	0.88	0.88	0.88
Adj. Flow (vph)	67	207	342	27	315	875	22	68	62	597
RTOR Reduction (vph)	0	148	0	0	0	2	0	0	44	0
Lane Group Flow (vph)	67	59	0	684	0	895	0	0	87	597
Confl. Peds. (#/hr)	90	115	115		90					
Heavy Vehicles (%)	0%	0%	2%	0%	3%	2%	0%	5%	0%	7%
Parking (#/hr)			0		0					
Turn Type	D.Pm	custom	Perm			custom		custom	custom	
Protected Phases		4		4		3		1 2	1 2!	2 3
Permitted Phases	4		4			2!		1 2 3 4	1 2	
Actuated Green, G (s)	28.7	28.7		28.7		46.0			27.5	50.0
Effective Green, g (s)	28.7	28.7		28.7		46.0			27.5	50.0
Actuated g/C Ratio	0.29	0.29		0.29		0.46			0.28	0.50
Clearance Time (s)	4.0	4.0		4.0		4.0				
Vehicle Extension (s)	3.0	3.0		3.0		3.0				
Lane Grp Cap (vph)	93	389		717		1626			406	2182
v/s Ratio Prot		0.04				c0.18			c0.06	0.14
v/s Ratio Perm	0.21			0.27		0.10				
v/c Ratio	0.72	0.15		0.95		0.55			0.21	0.27
Uniform Delay, d1	32.0	26.6		35.0		19.5			27.9	14.5
Progression Factor	1.00	1.00		0.97		1.00			1.00	1.00
Incremental Delay, d2	23.8	0.2		19.7		0.4			0.3	0.1
Delay (s)	55.9	26.8		53.6		19.9			28.2	14.5
Level of Service	E	C		D		B			C	B
Approach Delay (s)				53.6						17.0
Approach LOS				D						B

Intersection Summary			
HCM Average Control Delay	29.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	83.8%	ICU Level of Service	E
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	12	12	11	11	12	12	12
Total Lost time (s)		4.0			4.0			4.0	4.0			4.0
Lane Util. Factor		1.00			1.00			1.00	0.95			1.00
Frt		0.93			0.88			1.00	1.00			1.00
Flt Protected		0.98			0.99			0.95	1.00			0.95
Satd. Flow (prot)		1165			1479			1540	3073			1537
Flt Permitted		0.55			0.95			0.19	1.00			0.18
Satd. Flow (perm)		656			1420			304	3073			291
Volume (vph)	10	0	10	30	0	225	35	65	725	5	55	15
Peak-hour factor, PHF	0.59	0.59	0.59	0.72	0.72	0.72	0.97	0.97	0.97	0.97	0.92	0.92
Adj. Flow (vph)	17	0	17	42	0	312	36	67	747	5	60	16
RTOR Reduction (vph)	0	15	0	0	270	0	0	0	1	0	0	0
Lane Group Flow (vph)	0	19	0	0	84	0	0	103	751	0	0	76
Heavy Vehicles (%)	42%	0%	25%	3%	0%	1%	0%	3%	2%	17%	0%	27%
Parking (#/hr)												
Turn Type	Perm			Perm			Perm	pm+pt			Perm	pm+pt
Protected Phases		4			8			5	2			1
Permitted Phases	4			8			2	2			6	6
Actuated Green, G (s)		11.0			11.0			38.0	26.0			38.0
Effective Green, g (s)		12.0			12.0			40.0	27.0			40.0
Actuated g/C Ratio		0.13			0.13			0.44	0.30			0.44
Clearance Time (s)		5.0			5.0			5.0	5.0			5.0
Lane Grp Cap (vph)		87			189			314	922			309
v/s Ratio Prot								c0.05	c0.24			0.04
v/s Ratio Perm		0.03			c0.06			0.10				0.07
v/c Ratio		0.22			0.44			0.33	0.81			0.25
Uniform Delay, d1		34.8			35.9			16.1	29.2			15.8
Progression Factor		1.00			1.00			1.00	1.00			1.00
Incremental Delay, d2		5.8			7.3			2.8	7.9			1.9
Delay (s)		40.6			43.3			18.9	37.0			17.7
Level of Service		D			D			B	D			B
Approach Delay (s)		40.6			43.3				34.8			
Approach LOS		D			D				C			

Intersection Summary			
HCM Average Control Delay	35.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	38.0
Intersection Capacity Utilization	54.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SWT	SWR
Lane Configurations		
Ideal Flow (vphpl)	1900	1900
Lane Width	12	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	3124	1171
Flt Permitted	1.00	1.00
Satd. Flow (perm)	3124	1171
Volume (vph)	680	140
Peak-hour factor, PHF	0.92	0.92
Adj. Flow (vph)	739	152
RTOR Reduction (vph)	0	106
Lane Group Flow (vph)	739	46
Heavy Vehicles (%)	4%	8%
Parking (#/hr)		0
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	26.0	26.0
Effective Green, g (s)	27.0	27.0
Actuated g/C Ratio	0.30	0.30
Clearance Time (s)	5.0	5.0
Lane Grp Cap (vph)	937	351
v/s Ratio Prot	0.24	
v/s Ratio Perm		0.04
v/c Ratio	0.79	0.13
Uniform Delay, d1	28.9	22.9
Progression Factor	1.00	1.00
Incremental Delay, d2	6.7	0.8
Delay (s)	35.6	23.7
Level of Service	D	C
Approach Delay (s)	32.3	
Approach LOS	C	

Intersection Summary

Saturday

Movement	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	12	11	12	12	12	12	10	10	12	12	12	12
Total Lost time (s)		4.0					4.0	4.0				
Lane Util. Factor		0.95					1.00	1.00				
Frpb, ped/bikes		0.95					1.00	0.83				
Flpb, ped/bikes		0.94					0.46	1.00				
Frt		0.99					1.00	0.91				
Flt Protected		1.00					0.95	1.00				
Satd. Flow (prot)		2734					677	1167				
Flt Permitted		1.00					0.95	1.00				
Satd. Flow (perm)		2734					677	1167				
Volume (vph)	55	670	55	0	0	0	165	145	220	0	0	0
Peak-hour factor, PHF	0.95	0.95	0.95	0.92	0.92	0.92	0.93	0.93	0.93	0.92	0.92	0.92
Adj. Flow (vph)	58	705	58	0	0	0	177	156	237	0	0	0
RTOR Reduction (vph)	0	6	0	0	0	0	0	12	0	0	0	0
Lane Group Flow (vph)	0	815	0	0	0	0	177	381	0	0	0	0
Confl. Peds. (#/hr)	776		460				234		150			
Heavy Vehicles (%)	2%	2%	4%	2%	2%	2%	3%	0%	6%	0%	0%	0%
Parking (#/hr)	0		0									
Turn Type	Perm						Perm					
Protected Phases		2						4				
Permitted Phases	2						4					
Actuated Green, G (s)		50.0					30.0	30.0				
Effective Green, g (s)		51.0					31.0	31.0				
Actuated g/C Ratio		0.57					0.34	0.34				
Clearance Time (s)		5.0					5.0	5.0				
Vehicle Extension (s)		3.0					3.0	3.0				
Lane Grp Cap (vph)		1549					233	402				
v/s Ratio Prot								c0.33				
v/s Ratio Perm		0.30					0.26					
v/c Ratio		0.53					0.76	0.95				
Uniform Delay, d1		12.0					26.2	28.7				
Progression Factor		1.00					1.00	1.00				
Incremental Delay, d2		1.3					13.3	31.2				
Delay (s)		13.3					39.5	59.9				
Level of Service		B					D	E				
Approach Delay (s)		13.3			0.0			53.6			0.0	
Approach LOS		B			A			D			A	

Intersection Summary			
HCM Average Control Delay	29.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	59.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑			↰↰	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	12	12	12
Total Lost time (s)		4.0			4.0	
Lane Util. Factor		0.91			0.97	
Frt		1.00			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		4235			2964	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		4235			2964	
Volume (vph)	0	920	0	0	365	0
Peak-hour factor, PHF	0.95	0.95	0.92	0.92	0.81	0.81
Adj. Flow (vph)	0	968	0	0	451	0
RTOR Reduction (vph)	0	0	0	0	208	0
Lane Group Flow (vph)	0	968	0	0	243	0
Heavy Vehicles (%)	0%	3%	2%	2%	1%	0%
Parking (#/hr)		0			0	
Turn Type						
Protected Phases		2			4	
Permitted Phases						
Actuated Green, G (s)		69.8			12.2	
Effective Green, g (s)		69.8			12.2	
Actuated g/C Ratio		0.78			0.14	
Clearance Time (s)		4.0			4.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		3284			402	
v/s Ratio Prot		c0.23			c0.08	
v/s Ratio Perm						
v/c Ratio		0.29			0.60	
Uniform Delay, d1		2.9			36.6	
Progression Factor		0.71			1.00	
Incremental Delay, d2		0.2			2.6	
Delay (s)		2.3			39.2	
Level of Service		A			D	
Approach Delay (s)		2.3	0.0		39.2	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	14.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	38.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	11
Total Lost time (s)	4.0					4.0
Lane Util. Factor	0.95					1.00
Frt	0.96					0.86
Flt Protected	1.00					1.00
Satd. Flow (prot)	2954					1430
Flt Permitted	1.00					1.00
Satd. Flow (perm)	2954					1430
Volume (vph)	820	330	0	0	0	415
Peak-hour factor, PHF	0.97	0.97	0.92	0.92	0.83	0.83
Adj. Flow (vph)	845	340	0	0	0	500
RTOR Reduction (vph)	48	0	0	0	0	164
Lane Group Flow (vph)	1137	0	0	0	0	336
Heavy Vehicles (%)	0%	0%	2%	2%	0%	0%
Parking (#/hr)	0	0				
Turn Type						custom
Protected Phases	2					8
Permitted Phases						
Actuated Green, G (s)	61.0					21.0
Effective Green, g (s)	61.0					21.0
Actuated g/C Ratio	0.68					0.23
Clearance Time (s)	4.0					4.0
Vehicle Extension (s)	3.0					3.0
Lane Grp Cap (vph)	2002					334
v/s Ratio Prot	c0.38					c0.23
v/s Ratio Perm						
v/c Ratio	0.57					1.01
Uniform Delay, d1	7.6					34.5
Progression Factor	1.62					1.00
Incremental Delay, d2	1.1					50.7
Delay (s)	13.4					85.2
Level of Service	B					F
Approach Delay (s)	13.4			0.0	85.2	
Approach LOS	B			A	F	

Intersection Summary			
HCM Average Control Delay	34.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	72.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	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	
Lane Util. Factor		0.91									0.95	
Frpb, ped/bikes		0.94									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.98									1.00	
Flt Protected		1.00									0.98	
Satd. Flow (prot)		4040									3010	
Flt Permitted		1.00									0.98	
Satd. Flow (perm)		4040									3010	
Volume (vph)	0	1125	150	0	0	0	0	0	0	190	260	0
Peak-hour factor, PHF	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.90	0.90	0.90
Adj. Flow (vph)	0	1210	161	0	0	0	0	0	0	211	289	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	47	0
Lane Group Flow (vph)	0	1371	0	0	0	0	0	0	0	0	453	0
Confl. Peds. (#/hr)			1700			929						
Heavy Vehicles (%)	0%	3%	1%	2%	2%	2%	2%	2%	2%	1%	0%	0%
Parking (#/hr)		0	0							0	0	
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		64.2									17.8	
Effective Green, g (s)		64.2									17.8	
Actuated g/C Ratio		0.71									0.20	
Clearance Time (s)		4.0									4.0	
Vehicle Extension (s)		3.0									3.0	
Lane Grp Cap (vph)		2882									595	
v/s Ratio Prot		c0.34										
v/s Ratio Perm											0.15	
v/c Ratio		0.48									0.76	
Uniform Delay, d1		5.6									34.1	
Progression Factor		0.72									1.00	
Incremental Delay, d2		0.4									5.7	
Delay (s)		4.4									39.8	
Level of Service		A									D	
Approach Delay (s)		4.4			0.0			0.0			39.8	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM Average Control Delay	13.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	50.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBL	NBR2	SBL	SBT	SBR	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	12	16	12	12	12	12	10	12
Total Lost time (s)	4.0	4.0		4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		0.95		0.76			1.00	0.91
Frpb, ped/bikes	1.00	1.00		0.85		1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00		0.84		1.00			1.00	1.00
Frt	1.00	0.85		0.93		0.85			1.00	1.00
Flt Protected	0.95	1.00		0.98		1.00			0.95	1.00
Satd. Flow (prot)	1516	1357		2382		3250			1505	4489
Flt Permitted	0.19	1.00		0.98		1.00			0.95	1.00
Satd. Flow (perm)	304	1357		2382		3250			1505	4489
Volume (vph)	35	160	325	35	300	890	20	200	45	690
Peak-hour factor, PHF	0.79	0.79	0.96	0.96	0.96	0.90	0.90	0.97	0.97	0.97
Adj. Flow (vph)	44	203	339	36	312	989	22	206	46	711
RTOR Reduction (vph)	0	156	0	0	0	2	0	0	17	0
Lane Group Flow (vph)	44	47	0	687	0	1009	0	0	235	711
Confl. Peds. (#/hr)	175	178	178		175					
Heavy Vehicles (%)	0%	0%	1%	0%	1%	2%	0%	0%	4%	4%
Parking (#/hr)			0		0					
Turn Type	D.Pm	custom	Perm			custom		custom	custom	
Protected Phases		4		4		3		1 2	1 2	2 3
Permitted Phases	4		4					1 2 3 4	1 2	
Actuated Green, G (s)	21.0	21.0		21.0		26.4			30.6	42.0
Effective Green, g (s)	21.0	21.0		21.0		26.4			30.6	42.0
Actuated g/C Ratio	0.23	0.23		0.23		0.29			0.34	0.47
Clearance Time (s)	4.0	4.0		4.0		4.0				
Vehicle Extension (s)	3.0	3.0		3.0		3.0				
Lane Grp Cap (vph)	71	317		556		953			512	2095
v/s Ratio Prot		0.03				c0.31			c0.16	0.16
v/s Ratio Perm	0.14			0.29						
v/c Ratio	0.62	0.15		1.24		1.06			0.46	0.34
Uniform Delay, d1	30.9	27.4		34.5		31.8			23.2	15.2
Progression Factor	1.00	1.00		0.85		1.00			1.00	1.00
Incremental Delay, d2	15.0	0.2		119.8		46.0			0.7	0.1
Delay (s)	46.0	27.6		149.1		77.8			23.9	15.3
Level of Service	D	C		F		E			C	B
Approach Delay (s)				149.1						17.5
Approach LOS				F						B

Intersection Summary			
HCM Average Control Delay	70.7	HCM Level of Service	E
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	96.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	12	12	11	11	12	12	12
Total Lost time (s)		4.0			4.0			4.0	4.0			4.0
Lane Util. Factor		1.00			1.00			1.00	0.95			1.00
Frt		0.92			0.90			1.00	1.00			1.00
Flt Protected		0.98			0.99			0.95	1.00			0.95
Satd. Flow (prot)		1417			1515			1570	3040			1611
Flt Permitted		0.67			0.90			0.19	1.00			0.19
Satd. Flow (perm)		974			1388			315	3040			323
Volume (vph)	10	0	15	65	10	190	40	75	695	10	55	15
Peak-hour factor, PHF	0.61	0.61	0.61	0.88	0.88	0.88	0.86	0.86	0.86	0.86	0.98	0.98
Adj. Flow (vph)	16	0	25	74	11	216	47	87	808	12	56	15
RTOR Reduction (vph)	0	21	0	0	109	0	0	0	2	0	0	0
Lane Group Flow (vph)	0	20	0	0	192	0	0	134	819	0	0	71
Heavy Vehicles (%)	5%	0%	11%	0%	0%	1%	0%	0%	3%	8%	0%	4%
Parking (#/hr)												
Turn Type	Perm			Perm			Perm	pm+pt			Perm	pm+pt
Protected Phases		4			8			5	2			1
Permitted Phases	4			8			2	2			6	6
Actuated Green, G (s)		11.0			11.0			32.0	20.0			32.0
Effective Green, g (s)		12.0			12.0			34.0	21.0			34.0
Actuated g/C Ratio		0.14			0.14			0.40	0.25			0.40
Clearance Time (s)		5.0			5.0			5.0	5.0			5.0
Lane Grp Cap (vph)		139			198			322	760			330
v/s Ratio Prot								c0.06	c0.27			0.03
v/s Ratio Perm		0.02			c0.14			0.10				0.05
v/c Ratio		0.14			0.97			0.42	1.08			0.22
Uniform Delay, d1		31.5			35.8			17.3	31.5			17.2
Progression Factor		1.00			1.00			1.00	1.00			1.00
Incremental Delay, d2		2.1			56.7			3.9	55.4			1.5
Delay (s)		33.6			92.5			21.2	86.9			18.6
Level of Service		C			F			C	F			B
Approach Delay (s)		33.6			92.5				77.7			
Approach LOS		C			F				E			

Intersection Summary			
HCM Average Control Delay	62.8	HCM Level of Service	E
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	84.0	Sum of lost time (s)	38.0
Intersection Capacity Utilization	57.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SWT	SWR
Lane Configurations		
Ideal Flow (vphpl)	1900	1900
Lane Width	12	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	3154	1228
Flt Permitted	1.00	1.00
Satd. Flow (perm)	3154	1228
Volume (vph)	680	140
Peak-hour factor, PHF	0.98	0.98
Adj. Flow (vph)	694	143
RTOR Reduction (vph)	0	107
Lane Group Flow (vph)	694	36
Heavy Vehicles (%)	3%	3%
Parking (#/hr)		0
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	20.0	20.0
Effective Green, g (s)	21.0	21.0
Actuated g/C Ratio	0.25	0.25
Clearance Time (s)	5.0	5.0
Lane Grp Cap (vph)	789	307
v/s Ratio Prot	0.22	
v/s Ratio Perm		0.03
v/c Ratio	0.88	0.12
Uniform Delay, d1	30.3	24.3
Progression Factor	1.00	1.00
Incremental Delay, d2	13.4	0.8
Delay (s)	43.7	25.1
Level of Service	D	C
Approach Delay (s)	38.8	
Approach LOS	D	

Intersection Summary

2011 Build Conditions (888 Boylston only)

Morning (AM)

Movement	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	12	11	12	12	12	12	10	12	10	12	12	12
Total Lost time (s)		4.0					4.0	4.0				
Lane Util. Factor		0.95					1.00	1.00				
Frpb, ped/bikes		0.91					1.00	0.84				
Flpb, ped/bikes		0.94					0.64	1.00				
Frt		0.98					1.00	0.91				
Flt Protected		0.99					0.95	1.00				
Satd. Flow (prot)		2382					879	1134				
Flt Permitted		0.99					0.95	1.00				
Satd. Flow (perm)		2382					879	1134				
Volume (vph)	70	420	95	0	0	0	180	125	205	0	0	0
Peak-hour factor, PHF	0.92	0.94	0.94	0.92	0.92	0.92	0.94	0.92	0.94	0.92	0.92	0.92
Adj. Flow (vph)	76	447	101	0	0	0	191	136	218	0	0	0
RTOR Reduction (vph)	0	13	0	0	0	0	0	64	0	0	0	0
Lane Group Flow (vph)	0	611	0	0	0	0	191	290	0	0	0	0
Confl. Peds. (#/hr)	138		150				107		126			
Heavy Vehicles (%)	6%	11%	3%	2%	2%	2%	11%	4%	22%	2%	2%	2%
Parking (#/hr)	0		0									
Turn Type	Perm						Perm					
Protected Phases		2						4				
Permitted Phases	2						4					
Actuated Green, G (s)		63.6					28.4	28.4				
Effective Green, g (s)		63.6					28.4	28.4				
Actuated g/C Ratio		0.64					0.28	0.28				
Clearance Time (s)		4.0					4.0	4.0				
Vehicle Extension (s)		3.0					3.0	3.0				
Lane Grp Cap (vph)		1515					250	322				
v/s Ratio Prot								c0.26				
v/s Ratio Perm		0.26					0.22					
v/c Ratio		0.40					0.76	0.90				
Uniform Delay, d1		8.9					32.7	34.5				
Progression Factor		1.00					1.00	1.00				
Incremental Delay, d2		0.8					13.0	26.8				
Delay (s)		9.7					45.7	61.2				
Level of Service		A					D	E				
Approach Delay (s)		9.7			0.0			55.8			0.0	
Approach LOS		A			A			E			A	

Intersection Summary			
HCM Average Control Delay	31.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	51.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	12	12	12
Total Lost time (s)		4.0			4.0	
Lane Util. Factor		0.91			0.97	
Frt		1.00			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		3793			2722	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		3793			2722	
Volume (vph)	0	580	0	0	275	0
Peak-hour factor, PHF	0.92	0.87	0.92	0.92	0.87	0.92
Adj. Flow (vph)	0	667	0	0	316	0
RTOR Reduction (vph)	0	0	0	0	289	0
Lane Group Flow (vph)	0	667	0	0	27	0
Heavy Vehicles (%)	2%	15%	2%	2%	10%	2%
Parking (#/hr)	0	0			0	
Turn Type						
Protected Phases		2			4	
Permitted Phases						
Actuated Green, G (s)		83.6			8.4	
Effective Green, g (s)		83.6			8.4	
Actuated g/C Ratio		0.84			0.08	
Clearance Time (s)		4.0			4.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		3171			229	
v/s Ratio Prot		c0.18			c0.01	
v/s Ratio Perm						
v/c Ratio		0.21			0.12	
Uniform Delay, d1		1.6			42.4	
Progression Factor		0.91			1.00	
Incremental Delay, d2		0.1			0.2	
Delay (s)		1.6			42.6	
Level of Service		A			D	
Approach Delay (s)		1.6	0.0		42.6	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	14.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.20		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	27.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	11
Total Lost time (s)	4.0					4.0
Lane Util. Factor	0.95					1.00
Frt	0.94					0.86
Flt Protected	1.00					1.00
Satd. Flow (prot)	2711					1375
Flt Permitted	1.00					1.00
Satd. Flow (perm)	2711					1375
Volume (vph)	485	360	0	0	0	140
Peak-hour factor, PHF	0.86	0.86	0.92	0.92	0.92	0.74
Adj. Flow (vph)	564	419	0	0	0	189
RTOR Reduction (vph)	76	0	0	0	0	170
Lane Group Flow (vph)	907	0	0	0	0	19
Heavy Vehicles (%)	7%	6%	2%	2%	2%	4%
Parking (#/hr)	0	0				
Turn Type						custom
Protected Phases	2					4
Permitted Phases						
Actuated Green, G (s)	81.9					10.1
Effective Green, g (s)	81.9					10.1
Actuated g/C Ratio	0.82					0.10
Clearance Time (s)	4.0					4.0
Vehicle Extension (s)	3.0					3.0
Lane Grp Cap (vph)	2220					139
v/s Ratio Prot	c0.33					c0.01
v/s Ratio Perm						
v/c Ratio	0.41					0.14
Uniform Delay, d1	2.5					41.0
Progression Factor	0.47					1.00
Incremental Delay, d2	0.6					0.5
Delay (s)	1.7					41.4
Level of Service	A					D
Approach Delay (s)	1.7			0.0	41.4	
Approach LOS	A			A	D	

Intersection Summary			
HCM Average Control Delay	8.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	44.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	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	
Lane Util. Factor		0.91									0.95	
Frpb, ped/bikes		0.94									1.00	
Flpb, ped/bikes		1.00									0.89	
Frt		0.97									1.00	
Flt Protected		1.00									0.98	
Satd. Flow (prot)		3613									2582	
Flt Permitted		1.00									0.98	
Satd. Flow (perm)		3613									2582	
Volume (vph)	0	515	115	0	0	0	0	0	0	105	210	0
Peak-hour factor, PHF	0.91	0.91	0.91	0.92	0.92	0.92	0.92	0.92	0.92	0.86	0.86	0.86
Adj. Flow (vph)	0	566	126	0	0	0	0	0	0	122	244	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	79	0
Lane Group Flow (vph)	0	692	0	0	0	0	0	0	0	0	287	0
Confl. Peds. (#/hr)			310							267		
Heavy Vehicles (%)	2%	15%	10%	2%	2%	2%	2%	2%	2%	8%	3%	2%
Parking (#/hr)		0	0							0	0	
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		76.1									15.9	
Effective Green, g (s)		76.1									15.9	
Actuated g/C Ratio		0.76									0.16	
Clearance Time (s)		4.0									4.0	
Vehicle Extension (s)		3.0									3.0	
Lane Grp Cap (vph)		2749									411	
v/s Ratio Prot		c0.19										
v/s Ratio Perm											0.11	
v/c Ratio		0.25									0.70	
Uniform Delay, d1		3.5									39.8	
Progression Factor		0.55									1.00	
Incremental Delay, d2		0.2									5.1	
Delay (s)		2.1									44.9	
Level of Service		A									D	
Approach Delay (s)		2.1			0.0			0.0			44.9	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM Average Control Delay	16.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	34.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBL	NBR2	SBL	SBT	SBR	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	12	16	12	12	12	12	10	12
Total Lost time (s)	4.0	4.0		4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		0.95		0.76			1.00	0.91
Frpb, ped/bikes	1.00	1.00		0.96		1.00			1.00	1.00
Flpb, ped/bikes	0.96	1.00		0.95		1.00			1.00	1.00
Frt	1.00	0.85		0.94		0.85			1.00	1.00
Flt Protected	0.95	1.00		0.98		1.00			0.95	1.00
Satd. Flow (prot)	1451	1357		2886		3135			1418	4095
Flt Permitted	0.37	1.00		0.98		1.00			0.95	1.00
Satd. Flow (perm)	566	1357		2886		3135			1418	4095
Volume (vph)	30	80	160	35	145	560	15	60	105	550
Peak-hour factor, PHF	0.78	0.78	0.98	0.98	0.98	0.91	0.91	0.94	0.94	0.94
Adj. Flow (vph)	38	103	163	36	148	615	16	64	112	585
RTOR Reduction (vph)	0	86	0	0	0	2	0	0	21	0
Lane Group Flow (vph)	38	17	0	347	0	629	0	0	155	585
Confl. Peds. (#/hr)	36	41	41		36					
Heavy Vehicles (%)	0%	0%	8%	0%	6%	5%	33%	19%	0%	14%
Parking (#/hr)			0		0					
Turn Type	D.Pm	custom	Perm			custom		custom	custom	
Protected Phases		4		4		3		1 2	1 2	2 3
Permitted Phases	4		4					1 2 3 4	1 2	
Actuated Green, G (s)	16.9	16.9		16.9		32.1			39.0	54.6
Effective Green, g (s)	16.9	16.9		16.9		32.1			39.0	54.6
Actuated g/C Ratio	0.17	0.17		0.17		0.32			0.39	0.55
Clearance Time (s)	4.0	4.0		4.0		4.0				
Vehicle Extension (s)	3.0	3.0		3.0		3.0				
Lane Grp Cap (vph)	96	229		488		1006			553	2236
v/s Ratio Prot		0.01				c0.20			c0.11	0.14
v/s Ratio Perm	0.07			0.12						
v/c Ratio	0.40	0.08		0.71		0.63			0.28	0.26
Uniform Delay, d1	37.0	35.0		39.2		28.8			20.9	12.0
Progression Factor	1.00	1.00		0.72		1.00			1.00	1.00
Incremental Delay, d2	2.7	0.1		4.0		2.9			0.3	0.3
Delay (s)	39.7	35.1		32.3		31.8			21.2	12.3
Level of Service	D	D		C		C			C	B
Approach Delay (s)				32.3						14.4
Approach LOS				C						B

Intersection Summary			
HCM Average Control Delay	25.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	60.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	12	12	11	11	12	12	12
Total Lost time (s)		4.0			4.0			4.0	4.0			4.0
Lane Util. Factor		1.00			1.00			1.00	0.95			1.00
Frt		0.93			0.89			1.00	1.00			1.00
Flt Protected		0.98			0.99			0.95	1.00			0.95
Satd. Flow (prot)		1220			1393			1542	3020			1540
Flt Permitted		0.82			0.93			0.20	1.00			0.27
Satd. Flow (perm)		1026			1313			317	3020			437
Volume (vph)	10	0	10	25	0	100	35	55	500	0	35	20
Peak-hour factor, PHF	0.70	0.70	0.70	0.83	0.83	0.83	0.90	0.90	0.90	0.90	0.92	0.92
Adj. Flow (vph)	14	0	14	30	0	120	39	61	556	0	38	22
RTOR Reduction (vph)	0	12	0	0	103	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	16	0	0	47	0	0	100	556	0	0	60
Heavy Vehicles (%)	31%	0%	24%	2%	0%	10%	0%	3%	4%	33%	0%	15%
Parking (#/hr)												
Turn Type	Perm			Perm			Perm	pm+pt			Perm	pm+pt
Protected Phases		4			8			5	2			1
Permitted Phases	4			8			2	2			6	6
Actuated Green, G (s)		11.0			11.0			32.0	20.0			32.0
Effective Green, g (s)		12.0			12.0			34.0	21.0			34.0
Actuated g/C Ratio		0.14			0.14			0.40	0.25			0.40
Clearance Time (s)		5.0			5.0			5.0	5.0			5.0
Lane Grp Cap (vph)		147			188			318	755			348
v/s Ratio Prot								c0.05	0.18			0.03
v/s Ratio Perm		0.02			c0.04			0.08				0.04
v/c Ratio		0.11			0.25			0.31	0.74			0.17
Uniform Delay, d1		31.3			32.0			16.7	29.0			15.9
Progression Factor		1.00			1.00			1.00	1.00			1.00
Incremental Delay, d2		1.5			3.2			2.6	6.3			1.1
Delay (s)		32.8			35.2			19.3	35.3			17.0
Level of Service		C			D			B	D			B
Approach Delay (s)		32.8			35.2				32.8			
Approach LOS		C			D				C			

Intersection Summary			
HCM Average Control Delay	36.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	84.0	Sum of lost time (s)	38.0
Intersection Capacity Utilization	42.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SWT	SWR
Lane Configurations		
Ideal Flow (vphpl)	1900	1900
Lane Width	12	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	2981	1045
Flt Permitted	1.00	1.00
Satd. Flow (perm)	2981	1045
Volume (vph)	600	70
Peak-hour factor, PHF	0.92	0.92
Adj. Flow (vph)	652	76
RTOR Reduction (vph)	0	57
Lane Group Flow (vph)	652	19
Heavy Vehicles (%)	9%	21%
Parking (#/hr)		0
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	20.0	20.0
Effective Green, g (s)	21.0	21.0
Actuated g/C Ratio	0.25	0.25
Clearance Time (s)	5.0	5.0
Lane Grp Cap (vph)	745	261
v/s Ratio Prot	c0.22	
v/s Ratio Perm		0.02
v/c Ratio	0.88	0.07
Uniform Delay, d1	30.2	24.1
Progression Factor	1.00	1.00
Incremental Delay, d2	13.6	0.5
Delay (s)	43.9	24.6
Level of Service	D	C
Approach Delay (s)	40.0	
Approach LOS	D	

Intersection Summary

Evening (PM)

Movement	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	12	11	12	12	12	12	10	12	10	12	12	12
Total Lost time (s)		4.0					4.0	4.0				
Lane Util. Factor		0.95					1.00	1.00				
Frpb, ped/bikes		0.93					1.00	0.82				
Flpb, ped/bikes		0.93					0.44	1.00				
Frt		0.98					1.00	0.91				
Flt Protected		1.00					0.95	1.00				
Satd. Flow (prot)		2563					635	1213				
Flt Permitted		1.00					0.95	1.00				
Satd. Flow (perm)		2563					635	1213				
Volume (vph)	95	730	125	0	0	0	230	200	295	0	0	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.92	0.92	0.92	0.94	0.94	0.94	0.92	0.92	0.92
Adj. Flow (vph)	106	811	139	0	0	0	245	213	314	0	0	0
RTOR Reduction (vph)	0	12	0	0	0	0	0	45	0	0	0	0
Lane Group Flow (vph)	0	1044	0	0	0	0	245	482	0	0	0	0
Confl. Peds. (#/hr)	609		254				234		150			
Heavy Vehicles (%)	2%	3%	1%	2%	2%	2%	6%	2%	7%	2%	2%	2%
Parking (#/hr)	0		0									
Turn Type	Perm						Perm					
Protected Phases		2						4				
Permitted Phases	2						4					
Actuated Green, G (s)		62.0					30.0	30.0				
Effective Green, g (s)		62.0					30.0	30.0				
Actuated g/C Ratio		0.62					0.30	0.30				
Clearance Time (s)		4.0					4.0	4.0				
Vehicle Extension (s)		3.0					3.0	3.0				
Lane Grp Cap (vph)		1589					191	364				
v/s Ratio Prot								c0.40				
v/s Ratio Perm		0.41					0.39					
v/c Ratio		0.66					1.28	1.32				
Uniform Delay, d1		12.2					35.0	35.0				
Progression Factor		1.00					1.00	1.00				
Incremental Delay, d2		2.1					161.0	164.1				
Delay (s)		14.3					196.0	199.1				
Level of Service		B					F	F				
Approach Delay (s)		14.3			0.0			198.1			0.0	
Approach LOS		B			A			F			A	

Intersection Summary			
HCM Average Control Delay	91.9	HCM Level of Service	F
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	12	12	12
Total Lost time (s)		4.0			4.0	
Lane Util. Factor		0.91			0.97	
Frt		1.00			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		4115			2964	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		4115			2964	
Volume (vph)	0	860	0	0	405	0
Peak-hour factor, PHF	0.88	0.88	0.92	0.92	0.84	0.84
Adj. Flow (vph)	0	977	0	0	482	0
RTOR Reduction (vph)	0	0	0	0	257	0
Lane Group Flow (vph)	0	977	0	0	225	0
Heavy Vehicles (%)	0%	6%	2%	2%	1%	0%
Parking (#/hr)		0			0	
Turn Type						
Protected Phases		2			7	
Permitted Phases						
Actuated Green, G (s)		79.7			12.3	
Effective Green, g (s)		79.7			12.3	
Actuated g/C Ratio		0.80			0.12	
Clearance Time (s)		4.0			4.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		3280			365	
v/s Ratio Prot		c0.24			c0.08	
v/s Ratio Perm						
v/c Ratio		0.30			0.62	
Uniform Delay, d1		2.7			41.6	
Progression Factor		1.74			1.00	
Incremental Delay, d2		0.1			3.1	
Delay (s)		4.8			44.7	
Level of Service		A			D	
Approach Delay (s)		4.8	0.0		44.7	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	18.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	38.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	11
Total Lost time (s)	4.0					4.0
Lane Util. Factor	0.95					1.00
Frt	0.95					0.86
Flt Protected	1.00					1.00
Satd. Flow (prot)	2914					1416
Flt Permitted	1.00					1.00
Satd. Flow (perm)	2914					1416
Volume (vph)	785	390	0	0	0	295
Peak-hour factor, PHF	0.96	0.96	0.92	0.92	0.85	0.85
Adj. Flow (vph)	818	406	0	0	0	347
RTOR Reduction (vph)	38	0	0	0	0	101
Lane Group Flow (vph)	1186	0	0	0	0	246
Heavy Vehicles (%)	1%	0%	2%	2%	0%	1%
Parking (#/hr)	0	0				
Turn Type						custom
Protected Phases	2					8
Permitted Phases						
Actuated Green, G (s)	69.4					22.6
Effective Green, g (s)	69.4					22.6
Actuated g/C Ratio	0.69					0.23
Clearance Time (s)	4.0					4.0
Vehicle Extension (s)	3.0					3.0
Lane Grp Cap (vph)	2022					320
v/s Ratio Prot	c0.41					c0.17
v/s Ratio Perm						
v/c Ratio	0.59					0.77
Uniform Delay, d1	7.9					36.2
Progression Factor	1.31					1.35
Incremental Delay, d2	1.2					10.4
Delay (s)	11.6					59.3
Level of Service	B					E
Approach Delay (s)	11.6			0.0	59.3	
Approach LOS	B			A	E	

Intersection Summary			
HCM Average Control Delay	22.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	64.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	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	
Lane Util. Factor		0.91									0.95	
Frpb, ped/bikes		0.93									1.00	
Flpb, ped/bikes		1.00									0.89	
Frt		0.98									1.00	
Flt Protected		1.00									0.98	
Satd. Flow (prot)		3878									2662	
Flt Permitted		1.00									0.98	
Satd. Flow (perm)		3878									2662	
Volume (vph)	0	925	175	0	0	0	0	0	0	190	345	0
Peak-hour factor, PHF	0.94	0.94	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.89	0.89	0.89
Adj. Flow (vph)	0	984	186	0	0	0	0	0	0	213	388	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	82	0
Lane Group Flow (vph)	0	1170	0	0	0	0	0	0	0	0	519	0
Confl. Peds. (#/hr)			680							240		
Heavy Vehicles (%)	0%	6%	4%	0%	0%	0%	0%	0%	0%	1%	1%	0%
Parking (#/hr)		0	0							0	0	
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		68.4									23.6	
Effective Green, g (s)		68.4									23.6	
Actuated g/C Ratio		0.68									0.24	
Clearance Time (s)		4.0									4.0	
Vehicle Extension (s)		3.0									3.0	
Lane Grp Cap (vph)		2653									628	
v/s Ratio Prot		c0.30										
v/s Ratio Perm											0.20	
v/c Ratio		0.44									0.83	
Uniform Delay, d1		7.1									36.3	
Progression Factor		1.04									1.00	
Incremental Delay, d2		0.4									8.8	
Delay (s)		7.8									45.0	
Level of Service		A									D	
Approach Delay (s)		7.8			0.0			0.0			45.0	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM Average Control Delay	20.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	49.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBL	NBR2	SBL	SBT	SBR	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	12	16	12	12	12	12	10	12
Total Lost time (s)	4.0	4.0		4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		0.95		0.76			1.00	0.91
Frpb, ped/bikes	1.00	1.00		0.89		1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00		0.85		1.00			1.00	1.00
Frt	1.00	0.85		0.93		0.85			1.00	1.00
Flt Protected	0.95	1.00		0.98		1.00			0.95	1.00
Satd. Flow (prot)	1516	1357		2498		3251			1478	4363
Flt Permitted	0.20	1.00		0.98		1.00			0.95	1.00
Satd. Flow (perm)	323	1357		2498		3251			1478	4363
Volume (vph)	55	170	320	25	285	805	20	60	55	525
Peak-hour factor, PHF	0.82	0.82	0.92	0.92	0.92	0.92	0.92	0.88	0.88	0.88
Adj. Flow (vph)	67	207	348	27	310	875	22	68	62	597
RTOR Reduction (vph)	0	148	0	0	0	2	0	0	44	0
Lane Group Flow (vph)	67	59	0	685	0	895	0	0	87	597
Confl. Peds. (#/hr)	90	115	115		90					
Heavy Vehicles (%)	0%	0%	2%	0%	3%	2%	0%	5%	0%	7%
Parking (#/hr)			0		0					
Turn Type	D.Pm	custom	Perm			custom		custom	custom	
Protected Phases		4		4		3		1 2	1 2!	2 3
Permitted Phases	4		4			2!		1 2 3 4	1 2	
Actuated Green, G (s)	28.7	28.7		28.7		46.0			27.5	50.0
Effective Green, g (s)	28.7	28.7		28.7		46.0			27.5	50.0
Actuated g/C Ratio	0.29	0.29		0.29		0.46			0.28	0.50
Clearance Time (s)	4.0	4.0		4.0		4.0				
Vehicle Extension (s)	3.0	3.0		3.0		3.0				
Lane Grp Cap (vph)	93	389		717		1626			406	2182
v/s Ratio Prot		0.04				c0.18			c0.06	0.14
v/s Ratio Perm	0.21			0.27		0.10				
v/c Ratio	0.72	0.15		0.96		0.55			0.21	0.27
Uniform Delay, d1	32.0	26.6		35.0		19.5			27.9	14.5
Progression Factor	1.00	1.00		0.97		0.10			1.00	1.00
Incremental Delay, d2	23.8	0.2		19.9		0.3			0.3	0.1
Delay (s)	55.9	26.8		53.9		2.2			28.2	14.5
Level of Service	E	C		D		A			C	B
Approach Delay (s)				53.9						17.0
Approach LOS				D						B

Intersection Summary			
HCM Average Control Delay	23.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	83.7%	ICU Level of Service	E
Analysis Period (min)	15		
! Phase conflict between lane groups.			
c Critical Lane Group			

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	12	12	11	11	12	12	12
Total Lost time (s)		4.0			4.0			4.0	4.0			4.0
Lane Util. Factor		1.00			1.00			1.00	0.95			1.00
Frt		0.93			0.88			1.00	1.00			1.00
Flt Protected		0.98			0.99			0.95	1.00			0.95
Satd. Flow (prot)		1165			1478			1540	3073			1537
Flt Permitted		0.67			0.96			0.21	1.00			0.20
Satd. Flow (perm)		805			1434			342	3073			325
Volume (vph)	10	0	10	30	0	250	35	65	725	5	55	15
Peak-hour factor, PHF	0.59	0.59	0.59	0.72	0.72	0.72	0.97	0.97	0.97	0.97	0.92	0.92
Adj. Flow (vph)	17	0	17	42	0	347	36	67	747	5	60	16
RTOR Reduction (vph)	0	13	0	0	267	0	0	0	1	0	0	0
Lane Group Flow (vph)	0	21	0	0	122	0	0	103	751	0	0	76
Heavy Vehicles (%)	42%	0%	25%	3%	0%	1%	0%	3%	2%	17%	0%	27%
Parking (#/hr)												
Turn Type	Perm			Perm			Perm	pm+pt			Perm	pm+pt
Protected Phases		4			8			5	2			1
Permitted Phases	4			8			2	2			6	6
Actuated Green, G (s)		22.0			22.0			37.0	32.0			37.0
Effective Green, g (s)		23.0			23.0			39.0	33.0			39.0
Actuated g/C Ratio		0.23			0.23			0.39	0.33			0.39
Clearance Time (s)		5.0			5.0			5.0	5.0			5.0
Lane Grp Cap (vph)		185			330			205	1014			199
v/s Ratio Prot								c0.03	c0.24			0.02
v/s Ratio Perm		0.03			c0.08			0.17				0.13
v/c Ratio		0.11			0.37			0.50	0.74			0.38
Uniform Delay, d1		30.4			32.4			21.2	29.7			20.8
Progression Factor		1.00			1.52			1.00	1.00			0.83
Incremental Delay, d2		1.2			2.6			8.5	4.9			4.8
Delay (s)		31.7			51.7			29.7	34.6			22.0
Level of Service		C			D			C	C			C
Approach Delay (s)		31.7			51.7				34.0			
Approach LOS		C			D				C			

Intersection Summary			
HCM Average Control Delay	32.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	38.0
Intersection Capacity Utilization	56.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SWT	SWR
Lane Configurations	↑↑	↱
Ideal Flow (vphpl)	1900	1900
Lane Width	12	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	3124	1171
Flt Permitted	1.00	1.00
Satd. Flow (perm)	3124	1171
Volume (vph)	675	140
Peak-hour factor, PHF	0.92	0.92
Adj. Flow (vph)	734	152
RTOR Reduction (vph)	0	102
Lane Group Flow (vph)	734	50
Heavy Vehicles (%)	4%	8%
Parking (#/hr)		0
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	32.0	32.0
Effective Green, g (s)	33.0	33.0
Actuated g/C Ratio	0.33	0.33
Clearance Time (s)	5.0	5.0
Lane Grp Cap (vph)	1031	386
v/s Ratio Prot	0.23	
v/s Ratio Perm		0.04
v/c Ratio	0.71	0.13
Uniform Delay, d1	29.3	23.5
Progression Factor	0.75	0.68
Incremental Delay, d2	3.6	0.6
Delay (s)	25.7	16.6
Level of Service	C	B
Approach Delay (s)	24.0	
Approach LOS	C	

Intersection Summary

Saturday

Movement	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	12	11	12	12	12	12	10	10	12	12	12	12
Total Lost time (s)		4.0					4.0	4.0				
Lane Util. Factor		0.95					1.00	1.00				
Frpb, ped/bikes		0.95					1.00	0.83				
Flpb, ped/bikes		0.94					0.46	1.00				
Frt		0.99					1.00	0.91				
Flt Protected		1.00					0.95	1.00				
Satd. Flow (prot)		2732					677	1167				
Flt Permitted		1.00					0.95	1.00				
Satd. Flow (perm)		2732					677	1167				
Volume (vph)	55	665	55	0	0	0	165	145	220	0	0	0
Peak-hour factor, PHF	0.95	0.95	0.95	0.92	0.92	0.92	0.93	0.93	0.93	0.92	0.92	0.92
Adj. Flow (vph)	58	700	58	0	0	0	177	156	237	0	0	0
RTOR Reduction (vph)	0	6	0	0	0	0	0	13	0	0	0	0
Lane Group Flow (vph)	0	810	0	0	0	0	177	380	0	0	0	0
Confl. Peds. (#/hr)	776		460				234		150			
Heavy Vehicles (%)	2%	2%	4%	2%	2%	2%	3%	0%	6%	0%	0%	0%
Parking (#/hr)	0		0									
Turn Type	Perm						Perm					
Protected Phases		2						4				
Permitted Phases	2						4					
Actuated Green, G (s)		50.0					30.0	30.0				
Effective Green, g (s)		51.0					31.0	31.0				
Actuated g/C Ratio		0.57					0.34	0.34				
Clearance Time (s)		5.0					5.0	5.0				
Vehicle Extension (s)		3.0					3.0	3.0				
Lane Grp Cap (vph)		1548					233	402				
v/s Ratio Prot								c0.33				
v/s Ratio Perm		0.30					0.26					
v/c Ratio		0.52					0.76	0.94				
Uniform Delay, d1		12.0					26.2	28.7				
Progression Factor		1.00					1.00	1.00				
Incremental Delay, d2		1.3					13.3	30.9				
Delay (s)		13.3					39.5	59.6				
Level of Service		B					D	E				
Approach Delay (s)		13.3			0.0			53.3			0.0	
Approach LOS		B			A			D			A	

Intersection Summary			
HCM Average Control Delay	29.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	59.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑			↰↰	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	12	12	12
Total Lost time (s)		4.0			4.0	
Lane Util. Factor		0.91			0.97	
Frt		1.00			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		4235			2964	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		4235			2964	
Volume (vph)	0	920	0	0	370	0
Peak-hour factor, PHF	0.95	0.95	0.92	0.92	0.81	0.81
Adj. Flow (vph)	0	968	0	0	457	0
RTOR Reduction (vph)	0	0	0	0	208	0
Lane Group Flow (vph)	0	968	0	0	249	0
Heavy Vehicles (%)	0%	3%	2%	2%	1%	0%
Parking (#/hr)		0			0	
Turn Type						
Protected Phases		2			4	
Permitted Phases						
Actuated Green, G (s)		69.6			12.4	
Effective Green, g (s)		69.6			12.4	
Actuated g/C Ratio		0.77			0.14	
Clearance Time (s)		4.0			4.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		3275			408	
v/s Ratio Prot		c0.23			c0.08	
v/s Ratio Perm						
v/c Ratio		0.30			0.61	
Uniform Delay, d1		3.0			36.5	
Progression Factor		0.71			1.00	
Incremental Delay, d2		0.2			2.7	
Delay (s)		2.3			39.2	
Level of Service		A			D	
Approach Delay (s)		2.3	0.0		39.2	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	14.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	38.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	11
Total Lost time (s)	4.0					4.0
Lane Util. Factor	0.95					1.00
Frt	0.96					0.86
Flt Protected	1.00					1.00
Satd. Flow (prot)	2950					1430
Flt Permitted	1.00					1.00
Satd. Flow (perm)	2950					1430
Volume (vph)	810	340	0	0	0	415
Peak-hour factor, PHF	0.97	0.97	0.92	0.92	0.83	0.83
Adj. Flow (vph)	835	351	0	0	0	500
RTOR Reduction (vph)	52	0	0	0	0	167
Lane Group Flow (vph)	1134	0	0	0	0	333
Heavy Vehicles (%)	0%	0%	2%	2%	0%	0%
Parking (#/hr)	0	0				
Turn Type						custom
Protected Phases	2					8
Permitted Phases						
Actuated Green, G (s)	61.0					21.0
Effective Green, g (s)	61.0					21.0
Actuated g/C Ratio	0.68					0.23
Clearance Time (s)	4.0					4.0
Vehicle Extension (s)	3.0					3.0
Lane Grp Cap (vph)	1999					334
v/s Ratio Prot	c0.38					c0.23
v/s Ratio Perm						
v/c Ratio	0.57					1.00
Uniform Delay, d1	7.6					34.5
Progression Factor	1.64					1.00
Incremental Delay, d2	1.1					47.8
Delay (s)	13.6					82.3
Level of Service	B					F
Approach Delay (s)	13.6			0.0	82.3	
Approach LOS	B			A	F	

Intersection Summary			
HCM Average Control Delay	34.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	72.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	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	
Lane Util. Factor		0.91									0.95	
Frpb, ped/bikes		0.94									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.98									1.00	
Flt Protected		1.00									0.98	
Satd. Flow (prot)		4060									3009	
Flt Permitted		1.00									0.98	
Satd. Flow (perm)		4060									3009	
Volume (vph)	0	1130	140	0	0	0	0	0	0	190	255	0
Peak-hour factor, PHF	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.90	0.90	0.90
Adj. Flow (vph)	0	1215	151	0	0	0	0	0	0	211	283	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	47	0
Lane Group Flow (vph)	0	1366	0	0	0	0	0	0	0	0	447	0
Confl. Peds. (#/hr)			1700			929						
Heavy Vehicles (%)	0%	3%	1%	2%	2%	2%	2%	2%	2%	1%	0%	0%
Parking (#/hr)		0	0							0	0	
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		64.3									17.7	
Effective Green, g (s)		64.3									17.7	
Actuated g/C Ratio		0.71									0.20	
Clearance Time (s)		4.0									4.0	
Vehicle Extension (s)		3.0									3.0	
Lane Grp Cap (vph)		2901									592	
v/s Ratio Prot		c0.34										
v/s Ratio Perm											0.15	
v/c Ratio		0.47									0.76	
Uniform Delay, d1		5.5									34.1	
Progression Factor		0.72									1.00	
Incremental Delay, d2		0.4									5.5	
Delay (s)		4.3									39.6	
Level of Service		A									D	
Approach Delay (s)		4.3			0.0			0.0			39.6	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM Average Control Delay	13.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBL	NBR2	SBL	SBT	SBR	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	12	16	12	12	12	12	10	12
Total Lost time (s)	4.0	4.0		4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		0.95		0.76			1.00	0.91
Frpb, ped/bikes	1.00	1.00		0.85		1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00		0.84		1.00			1.00	1.00
Frt	1.00	0.85		0.93		0.85			1.00	1.00
Flt Protected	0.95	1.00		0.98		1.00			0.95	1.00
Satd. Flow (prot)	1516	1357		2382		3250			1505	4489
Flt Permitted	0.19	1.00		0.98		1.00			0.95	1.00
Satd. Flow (perm)	304	1357		2382		3250			1505	4489
Volume (vph)	35	160	315	35	295	890	20	200	45	690
Peak-hour factor, PHF	0.79	0.79	0.96	0.96	0.96	0.90	0.90	0.97	0.97	0.97
Adj. Flow (vph)	44	203	328	36	307	989	22	206	46	711
RTOR Reduction (vph)	0	156	0	0	0	2	0	0	18	0
Lane Group Flow (vph)	44	47	0	671	0	1009	0	0	234	711
Confl. Peds. (#/hr)	175	178	178		175					
Heavy Vehicles (%)	0%	0%	1%	0%	1%	2%	0%	0%	4%	4%
Parking (#/hr)			0		0					
Turn Type	D.Pm	custom	Perm			custom		custom	custom	
Protected Phases		4		4		3		1 2	1 2	2 3
Permitted Phases	4		4					1 2 3 4	1 2	
Actuated Green, G (s)	21.0	21.0		21.0		26.4			30.6	42.0
Effective Green, g (s)	21.0	21.0		21.0		26.4			30.6	42.0
Actuated g/C Ratio	0.23	0.23		0.23		0.29			0.34	0.47
Clearance Time (s)	4.0	4.0		4.0		4.0				
Vehicle Extension (s)	3.0	3.0		3.0		3.0				
Lane Grp Cap (vph)	71	317		556		953			512	2095
v/s Ratio Prot		0.03				c0.31			c0.16	0.16
v/s Ratio Perm	0.14			0.28						
v/c Ratio	0.62	0.15		1.21		1.06			0.46	0.34
Uniform Delay, d1	30.9	27.4		34.5		31.8			23.2	15.2
Progression Factor	1.00	1.00		0.85		0.23			1.00	1.00
Incremental Delay, d2	15.0	0.2		108.0		39.4			0.6	0.1
Delay (s)	46.0	27.6		137.3		46.6			23.8	15.3
Level of Service	D	C		F		D			C	B
Approach Delay (s)				137.3						17.5
Approach LOS				F						B

Intersection Summary			
HCM Average Control Delay	56.6	HCM Level of Service	E
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	95.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	12	12	11	11	12	12	12
Total Lost time (s)		4.0			4.0			4.0	4.0			4.0
Lane Util. Factor		1.00			1.00			1.00	0.95			1.00
Frt		0.92			0.90			1.00	1.00			1.00
Flt Protected		0.98			0.99			0.95	1.00			0.95
Satd. Flow (prot)		1417			1514			1570	3040			1611
Flt Permitted		0.71			0.91			0.22	1.00			0.15
Satd. Flow (perm)		1029			1388			360	3040			251
Volume (vph)	10	0	15	65	10	195	40	75	695	10	55	15
Peak-hour factor, PHF	0.61	0.61	0.61	0.88	0.88	0.88	0.86	0.86	0.86	0.86	0.98	0.98
Adj. Flow (vph)	16	0	25	74	11	222	47	87	808	12	56	15
RTOR Reduction (vph)	0	21	0	0	104	0	0	0	1	0	0	0
Lane Group Flow (vph)	0	20	0	0	203	0	0	134	819	0	0	71
Heavy Vehicles (%)	5%	0%	11%	0%	0%	1%	0%	0%	3%	8%	0%	4%
Parking (#/hr)												
Turn Type	Perm			Perm			Perm	pm+pt			Perm	pm+pt
Protected Phases		4			8			5	2			1
Permitted Phases	4			8			2	2			6	6
Actuated Green, G (s)		15.0			15.0			34.0	26.0			34.0
Effective Green, g (s)		16.0			16.0			36.0	27.0			36.0
Actuated g/C Ratio		0.18			0.18			0.40	0.30			0.40
Clearance Time (s)		5.0			5.0			5.0	5.0			5.0
Lane Grp Cap (vph)		183			247			265	912			236
v/s Ratio Prot								c0.05	c0.27			0.03
v/s Ratio Perm		0.02			c0.15			0.15				0.09
v/c Ratio		0.11			0.82			0.51	0.90			0.30
Uniform Delay, d1		31.0			35.6			18.7	30.2			18.5
Progression Factor		1.00			0.73			1.00	1.00			1.08
Incremental Delay, d2		1.2			21.6			6.7	13.4			2.6
Delay (s)		32.3			47.4			25.4	43.6			22.7
Level of Service		C			D			C	D			C
Approach Delay (s)		32.3			47.4				41.0			
Approach LOS		C			D				D			

Intersection Summary			
HCM Average Control Delay	34.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	38.0
Intersection Capacity Utilization	58.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SWT	SWR
Lane Configurations		
Ideal Flow (vphpl)	1900	1900
Lane Width	12	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	3154	1228
Flt Permitted	1.00	1.00
Satd. Flow (perm)	3154	1228
Volume (vph)	675	140
Peak-hour factor, PHF	0.98	0.98
Adj. Flow (vph)	689	143
RTOR Reduction (vph)	0	100
Lane Group Flow (vph)	689	43
Heavy Vehicles (%)	3%	3%
Parking (#/hr)		0
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	26.0	26.0
Effective Green, g (s)	27.0	27.0
Actuated g/C Ratio	0.30	0.30
Clearance Time (s)	5.0	5.0
Lane Grp Cap (vph)	946	368
v/s Ratio Prot	0.22	
v/s Ratio Perm		0.03
v/c Ratio	0.73	0.12
Uniform Delay, d1	28.2	22.8
Progression Factor	0.74	0.58
Incremental Delay, d2	4.0	0.5
Delay (s)	25.0	13.7
Level of Service	C	B
Approach Delay (s)	23.0	
Approach LOS	C	

Intersection Summary

2011 Build Conditions (Both projects)

Morning (AM)

Movement	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	12	11	12	12	12	12	10	12	10	12	12	12
Total Lost time (s)		4.0					4.0	4.0				
Lane Util. Factor		0.95					1.00	1.00				
Frpb, ped/bikes		0.91					1.00	0.84				
Flpb, ped/bikes		0.93					0.64	1.00				
Frt		0.97					1.00	0.91				
Flt Protected		0.99					0.95	1.00				
Satd. Flow (prot)		2360					879	1142				
Flt Permitted		0.99					0.95	1.00				
Satd. Flow (perm)		2360					879	1142				
Volume (vph)	70	390	95	0	0	0	180	125	195	0	0	0
Peak-hour factor, PHF	0.92	0.94	0.94	0.92	0.92	0.92	0.94	0.92	0.94	0.92	0.92	0.92
Adj. Flow (vph)	76	415	101	0	0	0	191	136	207	0	0	0
RTOR Reduction (vph)	0	14	0	0	0	0	0	61	0	0	0	0
Lane Group Flow (vph)	0	578	0	0	0	0	191	282	0	0	0	0
Confl. Peds. (#/hr)	138		150				107		126			
Heavy Vehicles (%)	6%	11%	3%	2%	2%	2%	11%	4%	22%	2%	2%	2%
Parking (#/hr)	0		0									
Turn Type	Perm						Perm					
Protected Phases		2						4				
Permitted Phases	2						4					
Actuated Green, G (s)		64.2					27.8	27.8				
Effective Green, g (s)		64.2					27.8	27.8				
Actuated g/C Ratio		0.64					0.28	0.28				
Clearance Time (s)		4.0					4.0	4.0				
Vehicle Extension (s)		3.0					3.0	3.0				
Lane Grp Cap (vph)		1515					244	317				
v/s Ratio Prot								c0.25				
v/s Ratio Perm		0.24					0.22					
v/c Ratio		0.38					0.78	0.89				
Uniform Delay, d1		8.5					33.3	34.6				
Progression Factor		1.00					1.00	1.00				
Incremental Delay, d2		0.7					15.0	25.2				
Delay (s)		9.2					48.3	59.9				
Level of Service		A					D	E				
Approach Delay (s)		9.2			0.0			55.7			0.0	
Approach LOS		A			A			E			A	

Intersection Summary			
HCM Average Control Delay	31.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	50.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	12	12	12
Total Lost time (s)		4.0			4.0	
Lane Util. Factor		0.91			0.97	
Frt		1.00			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		3793			2722	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		3793			2722	
Volume (vph)	0	540	0	0	260	0
Peak-hour factor, PHF	0.92	0.87	0.92	0.92	0.87	0.92
Adj. Flow (vph)	0	621	0	0	299	0
RTOR Reduction (vph)	0	0	0	0	274	0
Lane Group Flow (vph)	0	621	0	0	25	0
Heavy Vehicles (%)	2%	15%	2%	2%	10%	2%
Parking (#/hr)	0	0			0	
Turn Type						
Protected Phases		2			4	
Permitted Phases						
Actuated Green, G (s)		83.6			8.4	
Effective Green, g (s)		83.6			8.4	
Actuated g/C Ratio		0.84			0.08	
Clearance Time (s)		4.0			4.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		3171			229	
v/s Ratio Prot		c0.16			c0.01	
v/s Ratio Perm						
v/c Ratio		0.20			0.11	
Uniform Delay, d1		1.6			42.3	
Progression Factor		0.95			1.00	
Incremental Delay, d2		0.1			0.2	
Delay (s)		1.6			42.6	
Level of Service		A			D	
Approach Delay (s)		1.6	0.0		42.6	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	14.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.19		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	26.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	11
Total Lost time (s)	4.0					4.0
Lane Util. Factor	0.95					1.00
Frt	0.94					0.86
Flt Protected	1.00					1.00
Satd. Flow (prot)	2727					1375
Flt Permitted	1.00					1.00
Satd. Flow (perm)	2727					1375
Volume (vph)	485	305	0	0	0	135
Peak-hour factor, PHF	0.86	0.86	0.92	0.92	0.92	0.74
Adj. Flow (vph)	564	355	0	0	0	182
RTOR Reduction (vph)	62	0	0	0	0	164
Lane Group Flow (vph)	857	0	0	0	0	18
Heavy Vehicles (%)	7%	6%	2%	2%	2%	4%
Parking (#/hr)	0	0				
Turn Type						custom
Protected Phases	2					4
Permitted Phases						
Actuated Green, G (s)	81.9					10.1
Effective Green, g (s)	81.9					10.1
Actuated g/C Ratio	0.82					0.10
Clearance Time (s)	4.0					4.0
Vehicle Extension (s)	3.0					3.0
Lane Grp Cap (vph)	2233					139
v/s Ratio Prot	c0.31					c0.01
v/s Ratio Perm						
v/c Ratio	0.38					0.13
Uniform Delay, d1	2.4					41.0
Progression Factor	0.39					1.00
Incremental Delay, d2	0.5					0.4
Delay (s)	1.4					41.4
Level of Service	A					D
Approach Delay (s)	1.4			0.0	41.4	
Approach LOS	A			A	D	

Intersection Summary			
HCM Average Control Delay	8.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	41.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	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	
Lane Util. Factor		0.91									0.95	
Frpb, ped/bikes		0.94									1.00	
Flpb, ped/bikes		1.00									0.89	
Frt		0.97									1.00	
Flt Protected		1.00									0.98	
Satd. Flow (prot)		3611									2582	
Flt Permitted		1.00									0.98	
Satd. Flow (perm)		3611									2582	
Volume (vph)	0	510	115	0	0	0	0	0	0	105	210	0
Peak-hour factor, PHF	0.91	0.91	0.91	0.92	0.92	0.92	0.92	0.92	0.92	0.86	0.86	0.86
Adj. Flow (vph)	0	560	126	0	0	0	0	0	0	122	244	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	79	0
Lane Group Flow (vph)	0	686	0	0	0	0	0	0	0	0	287	0
Confl. Peds. (#/hr)			310							267		
Heavy Vehicles (%)	2%	15%	10%	2%	2%	2%	2%	2%	2%	8%	3%	2%
Parking (#/hr)		0	0							0	0	
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		76.1									15.9	
Effective Green, g (s)		76.1									15.9	
Actuated g/C Ratio		0.76									0.16	
Clearance Time (s)		4.0									4.0	
Vehicle Extension (s)		3.0									3.0	
Lane Grp Cap (vph)		2748									411	
v/s Ratio Prot		c0.19										
v/s Ratio Perm											0.11	
v/c Ratio		0.25									0.70	
Uniform Delay, d1		3.5									39.8	
Progression Factor		0.57									1.00	
Incremental Delay, d2		0.2									5.1	
Delay (s)		2.2									44.9	
Level of Service		A									D	
Approach Delay (s)		2.2			0.0			0.0			44.9	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM Average Control Delay	17.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	34.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBL	NBR2	SBL	SBT	SBR	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	12	16	12	12	12	12	10	12
Total Lost time (s)	4.0	4.0		4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		0.95		0.76			1.00	0.91
Frpb, ped/bikes	1.00	1.00		0.96		1.00			1.00	1.00
Flpb, ped/bikes	0.96	1.00		0.95		1.00			1.00	1.00
Frt	1.00	0.85		0.94		0.85			1.00	1.00
Flt Protected	0.95	1.00		0.98		1.00			0.95	1.00
Satd. Flow (prot)	1451	1357		2886		3135			1418	4095
Flt Permitted	0.37	1.00		0.98		1.00			0.95	1.00
Satd. Flow (perm)	566	1357		2886		3135			1418	4095
Volume (vph)	30	80	160	35	145	560	15	60	105	550
Peak-hour factor, PHF	0.78	0.78	0.98	0.98	0.98	0.91	0.91	0.94	0.94	0.94
Adj. Flow (vph)	38	103	163	36	148	615	16	64	112	585
RTOR Reduction (vph)	0	86	0	0	0	2	0	0	21	0
Lane Group Flow (vph)	38	17	0	347	0	629	0	0	155	585
Confl. Peds. (#/hr)	36	41	41		36					
Heavy Vehicles (%)	0%	0%	8%	0%	6%	5%	33%	19%	0%	14%
Parking (#/hr)			0		0					
Turn Type	D.Pm	custom	Perm			custom		custom	custom	
Protected Phases		4		4		3		1 2	1 2	2 3
Permitted Phases	4		4					1 2 3 4	1 2	
Actuated Green, G (s)	16.9	16.9		16.9		32.1			39.0	54.6
Effective Green, g (s)	16.9	16.9		16.9		32.1			39.0	54.6
Actuated g/C Ratio	0.17	0.17		0.17		0.32			0.39	0.55
Clearance Time (s)	4.0	4.0		4.0		4.0				
Vehicle Extension (s)	3.0	3.0		3.0		3.0				
Lane Grp Cap (vph)	96	229		488		1006			553	2236
v/s Ratio Prot		0.01				c0.20			c0.11	0.14
v/s Ratio Perm	0.07			0.12						
v/c Ratio	0.40	0.08		0.71		0.63			0.28	0.26
Uniform Delay, d1	37.0	35.0		39.2		28.8			20.9	12.0
Progression Factor	1.00	1.00		0.72		1.00			1.00	1.00
Incremental Delay, d2	2.7	0.1		4.0		2.9			0.3	0.3
Delay (s)	39.7	35.1		32.3		31.8			21.2	12.3
Level of Service	D	D		C		C			C	B
Approach Delay (s)				32.3						14.4
Approach LOS				C						B

Intersection Summary			
HCM Average Control Delay	25.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	60.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	12	12	11	11	12	12	12
Total Lost time (s)		4.0			4.0			4.0	4.0			4.0
Lane Util. Factor		1.00			1.00			1.00	0.95			1.00
Frt		0.93			0.89			1.00	1.00			1.00
Flt Protected		0.98			0.99			0.95	1.00			0.95
Satd. Flow (prot)		1220			1393			1542	3020			1540
Flt Permitted		0.82			0.93			0.20	1.00			0.27
Satd. Flow (perm)		1026			1313			317	3020			437
Volume (vph)	10	0	10	25	0	100	35	55	500	0	35	20
Peak-hour factor, PHF	0.70	0.70	0.70	0.83	0.83	0.83	0.90	0.90	0.90	0.90	0.92	0.92
Adj. Flow (vph)	14	0	14	30	0	120	39	61	556	0	38	22
RTOR Reduction (vph)	0	12	0	0	103	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	16	0	0	47	0	0	100	556	0	0	60
Heavy Vehicles (%)	31%	0%	24%	2%	0%	10%	0%	3%	4%	33%	0%	15%
Parking (#/hr)												
Turn Type	Perm			Perm			Perm	pm+pt			Perm	pm+pt
Protected Phases		4			8			5	2			1
Permitted Phases	4			8			2	2			6	6
Actuated Green, G (s)		11.0			11.0			32.0	20.0			32.0
Effective Green, g (s)		12.0			12.0			34.0	21.0			34.0
Actuated g/C Ratio		0.14			0.14			0.40	0.25			0.40
Clearance Time (s)		5.0			5.0			5.0	5.0			5.0
Lane Grp Cap (vph)		147			188			318	755			348
v/s Ratio Prot								c0.05	0.18			0.03
v/s Ratio Perm		0.02			c0.04			0.08				0.04
v/c Ratio		0.11			0.25			0.31	0.74			0.17
Uniform Delay, d1		31.3			32.0			16.7	29.0			15.9
Progression Factor		1.00			1.00			1.00	1.00			1.00
Incremental Delay, d2		1.5			3.2			2.6	6.3			1.1
Delay (s)		32.8			35.2			19.3	35.3			17.0
Level of Service		C			D			B	D			B
Approach Delay (s)		32.8			35.2				32.8			
Approach LOS		C			D				C			

Intersection Summary			
HCM Average Control Delay	36.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	84.0	Sum of lost time (s)	38.0
Intersection Capacity Utilization	42.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SWT	SWR
Lane Configurations		
Ideal Flow (vphpl)	1900	1900
Lane Width	12	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	2981	1045
Flt Permitted	1.00	1.00
Satd. Flow (perm)	2981	1045
Volume (vph)	600	70
Peak-hour factor, PHF	0.92	0.92
Adj. Flow (vph)	652	76
RTOR Reduction (vph)	0	57
Lane Group Flow (vph)	652	19
Heavy Vehicles (%)	9%	21%
Parking (#/hr)		0
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	20.0	20.0
Effective Green, g (s)	21.0	21.0
Actuated g/C Ratio	0.25	0.25
Clearance Time (s)	5.0	5.0
Lane Grp Cap (vph)	745	261
v/s Ratio Prot	c0.22	
v/s Ratio Perm		0.02
v/c Ratio	0.88	0.07
Uniform Delay, d1	30.2	24.1
Progression Factor	1.00	1.00
Incremental Delay, d2	13.6	0.5
Delay (s)	43.9	24.6
Level of Service	D	C
Approach Delay (s)	40.0	
Approach LOS	D	

Intersection Summary

Evening (PM)

Movement	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	12	11	12	12	12	12	10	12	10	12	12	12
Total Lost time (s)		4.0					4.0	4.0				
Lane Util. Factor		0.95					1.00	1.00				
Frpb, ped/bikes		0.93					1.00	0.82				
Flpb, ped/bikes		0.93					0.44	1.00				
Frt		0.98					1.00	0.91				
Flt Protected		1.00					0.95	1.00				
Satd. Flow (prot)		2568					635	1210				
Flt Permitted		1.00					0.95	1.00				
Satd. Flow (perm)		2568					635	1210				
Volume (vph)	95	740	125	0	0	0	230	200	300	0	0	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.92	0.92	0.92	0.94	0.94	0.94	0.92	0.92	0.92
Adj. Flow (vph)	106	822	139	0	0	0	245	213	319	0	0	0
RTOR Reduction (vph)	0	12	0	0	0	0	0	43	0	0	0	0
Lane Group Flow (vph)	0	1055	0	0	0	0	245	489	0	0	0	0
Confl. Peds. (#/hr)	609		254				234		150			
Heavy Vehicles (%)	2%	3%	1%	2%	2%	2%	6%	2%	7%	2%	2%	2%
Parking (#/hr)	0		0									
Turn Type	Perm						Perm					
Protected Phases		2						4				
Permitted Phases	2						4					
Actuated Green, G (s)		62.0					30.0	30.0				
Effective Green, g (s)		62.0					30.0	30.0				
Actuated g/C Ratio		0.62					0.30	0.30				
Clearance Time (s)		4.0					4.0	4.0				
Vehicle Extension (s)		3.0					3.0	3.0				
Lane Grp Cap (vph)		1592					191	363				
v/s Ratio Prot								c0.40				
v/s Ratio Perm		0.41					0.39					
v/c Ratio		0.66					1.28	1.35				
Uniform Delay, d1		12.3					35.0	35.0				
Progression Factor		1.00					1.00	1.00				
Incremental Delay, d2		2.2					161.0	173.1				
Delay (s)		14.4					196.0	208.1				
Level of Service		B					F	F				
Approach Delay (s)		14.4			0.0			204.3			0.0	
Approach LOS		B			A			F			A	

Intersection Summary			
HCM Average Control Delay	94.4	HCM Level of Service	F
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	74.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑			↰↰	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	12	12	12
Total Lost time (s)		4.0			4.0	
Lane Util. Factor		0.91			0.97	
Frt		1.00			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		4115			2964	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		4115			2964	
Volume (vph)	0	870	0	0	405	0
Peak-hour factor, PHF	0.88	0.88	0.92	0.92	0.84	0.84
Adj. Flow (vph)	0	989	0	0	482	0
RTOR Reduction (vph)	0	0	0	0	250	0
Lane Group Flow (vph)	0	989	0	0	232	0
Heavy Vehicles (%)	0%	6%	2%	2%	1%	0%
Parking (#/hr)		0			0	
Turn Type						
Protected Phases		2			7	
Permitted Phases						
Actuated Green, G (s)		79.5			12.5	
Effective Green, g (s)		79.5			12.5	
Actuated g/C Ratio		0.80			0.12	
Clearance Time (s)		4.0			4.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		3271			371	
v/s Ratio Prot		c0.24			c0.08	
v/s Ratio Perm						
v/c Ratio		0.30			0.62	
Uniform Delay, d1		2.8			41.5	
Progression Factor		1.73			1.00	
Incremental Delay, d2		0.1			3.3	
Delay (s)		4.9			44.8	
Level of Service		A			D	
Approach Delay (s)		4.9	0.0		44.8	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	18.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	38.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	11
Total Lost time (s)	4.0					4.0
Lane Util. Factor	0.95					1.00
Frt	0.95					0.86
Flt Protected	1.00					1.00
Satd. Flow (prot)	2915					1416
Flt Permitted	1.00					1.00
Satd. Flow (perm)	2915					1416
Volume (vph)	795	390	0	0	0	295
Peak-hour factor, PHF	0.96	0.96	0.92	0.92	0.85	0.85
Adj. Flow (vph)	828	406	0	0	0	347
RTOR Reduction (vph)	35	0	0	0	0	102
Lane Group Flow (vph)	1199	0	0	0	0	245
Heavy Vehicles (%)	1%	0%	2%	2%	0%	1%
Parking (#/hr)	0	0				
Turn Type						custom
Protected Phases	2					8
Permitted Phases						
Actuated Green, G (s)	71.3					20.7
Effective Green, g (s)	71.3					20.7
Actuated g/C Ratio	0.71					0.21
Clearance Time (s)	4.0					4.0
Vehicle Extension (s)	3.0					3.0
Lane Grp Cap (vph)	2078					293
v/s Ratio Prot	c0.41					c0.17
v/s Ratio Perm						
v/c Ratio	0.58					0.84
Uniform Delay, d1	7.0					38.0
Progression Factor	1.34					1.00
Incremental Delay, d2	1.1					18.4
Delay (s)	10.5					56.5
Level of Service	B					E
Approach Delay (s)	10.5			0.0	56.5	
Approach LOS	B			A	E	

Intersection Summary			
HCM Average Control Delay	20.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	65.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	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	
Lane Util. Factor		0.91									0.95	
Frpb, ped/bikes		0.93									1.00	
Flpb, ped/bikes		1.00									0.89	
Frt		0.97									1.00	
Flt Protected		1.00									0.98	
Satd. Flow (prot)		3860									2665	
Flt Permitted		1.00									0.98	
Satd. Flow (perm)		3860									2665	
Volume (vph)	0	925	185	0	0	0	0	0	0	190	350	0
Peak-hour factor, PHF	0.94	0.94	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.89	0.89	0.89
Adj. Flow (vph)	0	984	197	0	0	0	0	0	0	213	393	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	81	0
Lane Group Flow (vph)	0	1181	0	0	0	0	0	0	0	0	525	0
Confl. Peds. (#/hr)			680							240		
Heavy Vehicles (%)	0%	6%	4%	0%	0%	0%	0%	0%	0%	1%	1%	0%
Parking (#/hr)		0	0							0	0	
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		68.0									24.0	
Effective Green, g (s)		68.0									24.0	
Actuated g/C Ratio		0.68									0.24	
Clearance Time (s)		4.0									4.0	
Vehicle Extension (s)		3.0									3.0	
Lane Grp Cap (vph)		2625									640	
v/s Ratio Prot		c0.31										
v/s Ratio Perm											0.20	
v/c Ratio		0.45									0.82	
Uniform Delay, d1		7.4									36.0	
Progression Factor		1.14									1.00	
Incremental Delay, d2		0.4									8.1	
Delay (s)		8.8									44.1	
Level of Service		A									D	
Approach Delay (s)		8.8			0.0			0.0			44.1	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM Average Control Delay	20.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	49.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBL	NBR2	SBL	SBT	SBR	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	12	16	12	12	12	12	10	12
Total Lost time (s)	4.0	4.0		4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		0.95		0.76			1.00	0.91
Frpb, ped/bikes	1.00	1.00		0.89		1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00		0.85		1.00			1.00	1.00
Frt	1.00	0.85		0.93		0.85			1.00	1.00
Flt Protected	0.95	1.00		0.98		1.00			0.95	1.00
Satd. Flow (prot)	1516	1357		2498		3251			1478	4363
Flt Permitted	0.20	1.00		0.98		1.00			0.95	1.00
Satd. Flow (perm)	317	1357		2498		3251			1478	4363
Volume (vph)	55	170	325	25	290	805	20	60	55	525
Peak-hour factor, PHF	0.82	0.82	0.92	0.92	0.92	0.92	0.92	0.88	0.88	0.88
Adj. Flow (vph)	67	207	353	27	315	875	22	68	62	597
RTOR Reduction (vph)	0	147	0	0	0	2	0	0	44	0
Lane Group Flow (vph)	67	60	0	695	0	895	0	0	87	597
Confl. Peds. (#/hr)	90	115	115		90					
Heavy Vehicles (%)	0%	0%	2%	0%	3%	2%	0%	5%	0%	7%
Parking (#/hr)			0		0					
Turn Type	D.Pm	custom	Perm			custom		custom	custom	
Protected Phases		4		4		3		1 2	1 2!	2 3
Permitted Phases	4		4			2!		1 2 3 4	1 2	
Actuated Green, G (s)	29.0	29.0		29.0		45.7			27.5	49.7
Effective Green, g (s)	29.0	29.0		29.0		45.7			27.5	49.7
Actuated g/C Ratio	0.29	0.29		0.29		0.46			0.28	0.50
Clearance Time (s)	4.0	4.0		4.0		4.0				
Vehicle Extension (s)	3.0	3.0		3.0		3.0				
Lane Grp Cap (vph)	92	394		724		1616			406	2168
v/s Ratio Prot		0.04				c0.17			c0.06	0.14
v/s Ratio Perm	0.21			0.28		0.10				
v/c Ratio	0.73	0.15		0.96		0.55			0.21	0.28
Uniform Delay, d1	32.0	26.4		34.9		19.7			27.9	14.7
Progression Factor	1.00	1.00		0.96		1.00			1.00	1.00
Incremental Delay, d2	24.8	0.2		20.5		0.4			0.3	0.1
Delay (s)	56.7	26.6		54.1		20.2			28.2	14.7
Level of Service	E	C		D		C			C	B
Approach Delay (s)				54.1						17.1
Approach LOS				D						B

Intersection Summary			
HCM Average Control Delay	29.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	84.1%	ICU Level of Service	E
Analysis Period (min)	15		

! Phase conflict between lane groups.

c Critical Lane Group

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	12	12	11	11	12	12	12
Total Lost time (s)		4.0			4.0			4.0	4.0			4.0
Lane Util. Factor		1.00			1.00			1.00	0.95			1.00
Frt		0.93			0.88			1.00	1.00			1.00
Flt Protected		0.98			0.99			0.95	1.00			0.95
Satd. Flow (prot)		1165			1478			1540	3073			1537
Flt Permitted		0.54			0.96			0.19	1.00			0.18
Satd. Flow (perm)		650			1424			304	3073			291
Volume (vph)	10	0	10	30	0	250	35	65	725	5	55	15
Peak-hour factor, PHF	0.59	0.59	0.59	0.72	0.72	0.72	0.97	0.97	0.97	0.97	0.92	0.92
Adj. Flow (vph)	17	0	17	42	0	347	36	67	747	5	60	16
RTOR Reduction (vph)	0	15	0	0	301	0	0	0	1	0	0	0
Lane Group Flow (vph)	0	19	0	0	88	0	0	103	751	0	0	76
Heavy Vehicles (%)	42%	0%	25%	3%	0%	1%	0%	3%	2%	17%	0%	27%
Parking (#/hr)												
Turn Type	Perm			Perm			Perm	pm+pt			Perm	pm+pt
Protected Phases		4			8			5	2			1
Permitted Phases	4			8			2	2			6	6
Actuated Green, G (s)		11.0			11.0			38.0	26.0			38.0
Effective Green, g (s)		12.0			12.0			40.0	27.0			40.0
Actuated g/C Ratio		0.13			0.13			0.44	0.30			0.44
Clearance Time (s)		5.0			5.0			5.0	5.0			5.0
Lane Grp Cap (vph)		87			190			314	922			309
v/s Ratio Prot								c0.05	c0.24			0.04
v/s Ratio Perm		0.03			c0.06			0.10				0.07
v/c Ratio		0.22			0.46			0.33	0.81			0.25
Uniform Delay, d1		34.8			36.0			16.1	29.2			15.8
Progression Factor		1.00			1.00			1.00	1.00			1.00
Incremental Delay, d2		5.8			8.0			2.8	7.9			1.9
Delay (s)		40.6			44.0			18.9	37.0			17.7
Level of Service		D			D			B	D			B
Approach Delay (s)		40.6			44.0				34.8			
Approach LOS		D			D				C			

Intersection Summary			
HCM Average Control Delay	35.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	38.0
Intersection Capacity Utilization	56.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SWT	SWR
Lane Configurations		
Ideal Flow (vphpl)	1900	1900
Lane Width	12	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	3124	1171
Flt Permitted	1.00	1.00
Satd. Flow (perm)	3124	1171
Volume (vph)	680	140
Peak-hour factor, PHF	0.92	0.92
Adj. Flow (vph)	739	152
RTOR Reduction (vph)	0	106
Lane Group Flow (vph)	739	46
Heavy Vehicles (%)	4%	8%
Parking (#/hr)		0
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	26.0	26.0
Effective Green, g (s)	27.0	27.0
Actuated g/C Ratio	0.30	0.30
Clearance Time (s)	5.0	5.0
Lane Grp Cap (vph)	937	351
v/s Ratio Prot	0.24	
v/s Ratio Perm		0.04
v/c Ratio	0.79	0.13
Uniform Delay, d1	28.9	22.9
Progression Factor	1.00	1.00
Incremental Delay, d2	6.7	0.8
Delay (s)	35.6	23.7
Level of Service	D	C
Approach Delay (s)	32.3	
Approach LOS	C	

Intersection Summary

Movement	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	12	11	12	12	12	12	10	10	12	12	12	12
Total Lost time (s)		4.0					4.0	4.0				
Lane Util. Factor		0.95					1.00	1.00				
Frpb, ped/bikes		0.96					1.00	0.83				
Flpb, ped/bikes		0.94					0.46	1.00				
Frt		0.99					1.00	0.91				
Flt Protected		1.00					0.95	1.00				
Satd. Flow (prot)		2736					677	1167				
Flt Permitted		1.00					0.95	1.00				
Satd. Flow (perm)		2736					677	1167				
Volume (vph)	55	675	55	0	0	0	165	145	220	0	0	0
Peak-hour factor, PHF	0.95	0.95	0.95	0.92	0.92	0.92	0.93	0.93	0.93	0.92	0.92	0.92
Adj. Flow (vph)	58	711	58	0	0	0	177	156	237	0	0	0
RTOR Reduction (vph)	0	6	0	0	0	0	0	12	0	0	0	0
Lane Group Flow (vph)	0	821	0	0	0	0	177	381	0	0	0	0
Confl. Peds. (#/hr)	776		460				234		150			
Heavy Vehicles (%)	2%	2%	4%	2%	2%	2%	3%	0%	6%	0%	0%	0%
Parking (#/hr)	0		0									
Turn Type	Perm						Perm					
Protected Phases		2						4				
Permitted Phases	2						4					
Actuated Green, G (s)		50.0					30.0	30.0				
Effective Green, g (s)		51.0					31.0	31.0				
Actuated g/C Ratio		0.57					0.34	0.34				
Clearance Time (s)		5.0					5.0	5.0				
Vehicle Extension (s)		3.0					3.0	3.0				
Lane Grp Cap (vph)		1550					233	402				
v/s Ratio Prot								c0.33				
v/s Ratio Perm		0.30					0.26					
v/c Ratio		0.53					0.76	0.95				
Uniform Delay, d1		12.1					26.2	28.7				
Progression Factor		1.00					1.00	1.00				
Incremental Delay, d2		1.3					13.3	31.2				
Delay (s)		13.4					39.5	59.9				
Level of Service		B					D	E				
Approach Delay (s)		13.4			0.0			53.6			0.0	
Approach LOS		B			A			D			A	

Intersection Summary			
HCM Average Control Delay	29.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	59.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	12	12	12
Total Lost time (s)		4.0			4.0	
Lane Util. Factor		0.91			0.97	
Frt		1.00			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		4235			2964	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		4235			2964	
Volume (vph)	0	930	0	0	370	0
Peak-hour factor, PHF	0.95	0.95	0.92	0.92	0.81	0.81
Adj. Flow (vph)	0	979	0	0	457	0
RTOR Reduction (vph)	0	0	0	0	203	0
Lane Group Flow (vph)	0	979	0	0	254	0
Heavy Vehicles (%)	0%	3%	2%	2%	1%	0%
Parking (#/hr)		0			0	
Turn Type						
Protected Phases		2			4	
Permitted Phases						
Actuated Green, G (s)		69.5			12.5	
Effective Green, g (s)		69.5			12.5	
Actuated g/C Ratio		0.77			0.14	
Clearance Time (s)		4.0			4.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		3270			412	
v/s Ratio Prot		c0.23			c0.09	
v/s Ratio Perm						
v/c Ratio		0.30			0.62	
Uniform Delay, d1		3.0			36.5	
Progression Factor		0.70			1.00	
Incremental Delay, d2		0.2			2.7	
Delay (s)		2.3			39.2	
Level of Service		A			D	
Approach Delay (s)		2.3	0.0		39.2	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	14.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	38.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	11
Total Lost time (s)	4.0					4.0
Lane Util. Factor	0.95					1.00
Frt	0.96					0.86
Flt Protected	1.00					1.00
Satd. Flow (prot)	2951					1430
Flt Permitted	1.00					1.00
Satd. Flow (perm)	2951					1430
Volume (vph)	820	340	0	0	0	420
Peak-hour factor, PHF	0.97	0.97	0.92	0.92	0.83	0.83
Adj. Flow (vph)	845	351	0	0	0	506
RTOR Reduction (vph)	51	0	0	0	0	164
Lane Group Flow (vph)	1145	0	0	0	0	342
Heavy Vehicles (%)	0%	0%	2%	2%	0%	0%
Parking (#/hr)	0	0				
Turn Type						custom
Protected Phases	2					8
Permitted Phases						
Actuated Green, G (s)	61.0					21.0
Effective Green, g (s)	61.0					21.0
Actuated g/C Ratio	0.68					0.23
Clearance Time (s)	4.0					4.0
Vehicle Extension (s)	3.0					3.0
Lane Grp Cap (vph)	2000					334
v/s Ratio Prot	c0.39					c0.24
v/s Ratio Perm						
v/c Ratio	0.57					1.02
Uniform Delay, d1	7.6					34.5
Progression Factor	1.64					1.00
Incremental Delay, d2	1.2					55.5
Delay (s)	13.7					90.0
Level of Service	B					F
Approach Delay (s)	13.7			0.0	90.0	
Approach LOS	B			A	F	

Intersection Summary			
HCM Average Control Delay	36.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	72.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	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	
Lane Util. Factor		0.91									0.95	
Frpb, ped/bikes		0.94									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.98									1.00	
Flt Protected		1.00									0.98	
Satd. Flow (prot)		4041									3010	
Flt Permitted		1.00									0.98	
Satd. Flow (perm)		4041									3010	
Volume (vph)	0	1130	150	0	0	0	0	0	0	190	260	0
Peak-hour factor, PHF	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.90	0.90	0.90
Adj. Flow (vph)	0	1215	161	0	0	0	0	0	0	211	289	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	46	0
Lane Group Flow (vph)	0	1376	0	0	0	0	0	0	0	0	454	0
Confl. Peds. (#/hr)			1700			929						
Heavy Vehicles (%)	0%	3%	1%	2%	2%	2%	2%	2%	2%	1%	0%	0%
Parking (#/hr)		0	0							0	0	
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		64.1									17.9	
Effective Green, g (s)		64.1									17.9	
Actuated g/C Ratio		0.71									0.20	
Clearance Time (s)		4.0									4.0	
Vehicle Extension (s)		3.0									3.0	
Lane Grp Cap (vph)		2878									599	
v/s Ratio Prot		c0.34										
v/s Ratio Perm											0.15	
v/c Ratio		0.48									0.76	
Uniform Delay, d1		5.7									34.0	
Progression Factor		0.72									1.00	
Incremental Delay, d2		0.4									5.4	
Delay (s)		4.5									39.4	
Level of Service		A									D	
Approach Delay (s)		4.5			0.0			0.0			39.4	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM Average Control Delay	13.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	50.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBL	NBR2	SBL	SBT	SBR	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	12	16	12	12	12	12	10	12
Total Lost time (s)	4.0	4.0		4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		0.95		0.76			1.00	0.91
Frpb, ped/bikes	1.00	1.00		0.85		1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00		0.84		1.00			1.00	1.00
Frt	1.00	0.85		0.93		0.85			1.00	1.00
Flt Protected	0.95	1.00		0.98		1.00			0.95	1.00
Satd. Flow (prot)	1516	1357		2382		3250			1505	4489
Flt Permitted	0.19	1.00		0.98		1.00			0.95	1.00
Satd. Flow (perm)	304	1357		2382		3250			1505	4489
Volume (vph)	35	160	325	35	300	890	20	200	45	690
Peak-hour factor, PHF	0.79	0.79	0.96	0.96	0.96	0.90	0.90	0.97	0.97	0.97
Adj. Flow (vph)	44	203	339	36	312	989	22	206	46	711
RTOR Reduction (vph)	0	156	0	0	0	2	0	0	17	0
Lane Group Flow (vph)	44	47	0	687	0	1009	0	0	235	711
Confl. Peds. (#/hr)	175	178	178		175					
Heavy Vehicles (%)	0%	0%	1%	0%	1%	2%	0%	0%	4%	4%
Parking (#/hr)			0		0					
Turn Type	D.Pm	custom	Perm			custom		custom	custom	
Protected Phases		4		4		3		1 2	1 2	2 3
Permitted Phases	4		4					1 2 3 4	1 2	
Actuated Green, G (s)	21.0	21.0		21.0		26.4			30.6	42.0
Effective Green, g (s)	21.0	21.0		21.0		26.4			30.6	42.0
Actuated g/C Ratio	0.23	0.23		0.23		0.29			0.34	0.47
Clearance Time (s)	4.0	4.0		4.0		4.0				
Vehicle Extension (s)	3.0	3.0		3.0		3.0				
Lane Grp Cap (vph)	71	317		556		953			512	2095
v/s Ratio Prot		0.03				c0.31			c0.16	0.16
v/s Ratio Perm	0.14			0.29						
v/c Ratio	0.62	0.15		1.24		1.06			0.46	0.34
Uniform Delay, d1	30.9	27.4		34.5		31.8			23.2	15.2
Progression Factor	1.00	1.00		0.85		1.00			1.00	1.00
Incremental Delay, d2	15.0	0.2		119.8		46.0			0.7	0.1
Delay (s)	46.0	27.6		149.1		77.8			23.9	15.3
Level of Service	D	C		F		E			C	B
Approach Delay (s)				149.1						17.5
Approach LOS				F						B

Intersection Summary			
HCM Average Control Delay	70.7	HCM Level of Service	E
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	96.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	12	12	11	11	12	12	12
Total Lost time (s)		4.0			4.0			4.0	4.0			4.0
Lane Util. Factor		1.00			1.00			1.00	0.95			1.00
Frt		0.92			0.90			1.00	1.00			1.00
Flt Protected		0.98			0.99			0.95	1.00			0.95
Satd. Flow (prot)		1417			1514			1570	3040			1611
Flt Permitted		0.67			0.91			0.19	1.00			0.19
Satd. Flow (perm)		971			1389			315	3040			323
Volume (vph)	10	0	15	65	10	195	40	75	695	10	55	15
Peak-hour factor, PHF	0.61	0.61	0.61	0.88	0.88	0.88	0.86	0.86	0.86	0.86	0.98	0.98
Adj. Flow (vph)	16	0	25	74	11	222	47	87	808	12	56	15
RTOR Reduction (vph)	0	21	0	0	112	0	0	0	2	0	0	0
Lane Group Flow (vph)	0	20	0	0	195	0	0	134	819	0	0	71
Heavy Vehicles (%)	5%	0%	11%	0%	0%	1%	0%	0%	3%	8%	0%	4%
Parking (#/hr)												
Turn Type	Perm			Perm			Perm	pm+pt			Perm	pm+pt
Protected Phases		4			8			5	2			1
Permitted Phases	4			8			2	2			6	6
Actuated Green, G (s)		11.0			11.0			32.0	20.0			32.0
Effective Green, g (s)		12.0			12.0			34.0	21.0			34.0
Actuated g/C Ratio		0.14			0.14			0.40	0.25			0.40
Clearance Time (s)		5.0			5.0			5.0	5.0			5.0
Lane Grp Cap (vph)		139			198			322	760			330
v/s Ratio Prot								c0.06	c0.27			0.03
v/s Ratio Perm		0.02			c0.14			0.10				0.05
v/c Ratio		0.14			0.98			0.42	1.08			0.22
Uniform Delay, d1		31.5			35.9			17.3	31.5			17.2
Progression Factor		1.00			1.00			1.00	1.00			1.00
Incremental Delay, d2		2.1			59.8			3.9	55.4			1.5
Delay (s)		33.6			95.7			21.2	86.9			18.6
Level of Service		C			F			C	F			B
Approach Delay (s)		33.6			95.7				77.7			
Approach LOS		C			F				E			

Intersection Summary			
HCM Average Control Delay	63.4	HCM Level of Service	E
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	84.0	Sum of lost time (s)	38.0
Intersection Capacity Utilization	58.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SWT	SWR
Lane Configurations		
Ideal Flow (vphpl)	1900	1900
Lane Width	12	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	3154	1228
Flt Permitted	1.00	1.00
Satd. Flow (perm)	3154	1228
Volume (vph)	680	140
Peak-hour factor, PHF	0.98	0.98
Adj. Flow (vph)	694	143
RTOR Reduction (vph)	0	107
Lane Group Flow (vph)	694	36
Heavy Vehicles (%)	3%	3%
Parking (#/hr)		0
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	20.0	20.0
Effective Green, g (s)	21.0	21.0
Actuated g/C Ratio	0.25	0.25
Clearance Time (s)	5.0	5.0
Lane Grp Cap (vph)	789	307
v/s Ratio Prot	0.22	
v/s Ratio Perm		0.03
v/c Ratio	0.88	0.12
Uniform Delay, d1	30.3	24.3
Progression Factor	1.00	1.00
Incremental Delay, d2	13.4	0.8
Delay (s)	43.7	25.1
Level of Service	D	C
Approach Delay (s)	38.8	
Approach LOS	D	

Intersection Summary

2011 Build Conditions – Mitigation (Exeter Residences only)

Morning (AM)

Movement	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	12	11	12	12	12	12	10	12	10	12	12	12
Total Lost time (s)		4.0					4.0	4.0				
Lane Util. Factor		0.95					1.00	1.00				
Frpb, ped/bikes		0.91					1.00	0.84				
Flpb, ped/bikes		0.93					0.64	1.00				
Frt		0.97					1.00	0.91				
Flt Protected		0.99					0.95	1.00				
Satd. Flow (prot)		2360					879	1142				
Flt Permitted		0.99					0.95	1.00				
Satd. Flow (perm)		2360					879	1142				
Volume (vph)	70	390	95	0	0	0	180	125	195	0	0	0
Peak-hour factor, PHF	0.92	0.94	0.94	0.92	0.92	0.92	0.94	0.92	0.94	0.92	0.92	0.92
Adj. Flow (vph)	76	415	101	0	0	0	191	136	207	0	0	0
RTOR Reduction (vph)	0	14	0	0	0	0	0	61	0	0	0	0
Lane Group Flow (vph)	0	578	0	0	0	0	191	282	0	0	0	0
Confl. Peds. (#/hr)	138		150				107		126			
Heavy Vehicles (%)	6%	11%	3%	2%	2%	2%	11%	4%	22%	2%	2%	2%
Parking (#/hr)	0		0									
Turn Type	Perm						Perm					
Protected Phases		2						4				
Permitted Phases	2						4					
Actuated Green, G (s)		64.2					27.8	27.8				
Effective Green, g (s)		64.2					27.8	27.8				
Actuated g/C Ratio		0.64					0.28	0.28				
Clearance Time (s)		4.0					4.0	4.0				
Vehicle Extension (s)		3.0					3.0	3.0				
Lane Grp Cap (vph)		1515					244	317				
v/s Ratio Prot								c0.25				
v/s Ratio Perm		0.24					0.22					
v/c Ratio		0.38					0.78	0.89				
Uniform Delay, d1		8.5					33.3	34.6				
Progression Factor		1.00					1.00	1.00				
Incremental Delay, d2		0.7					15.0	25.2				
Delay (s)		9.2					48.3	59.9				
Level of Service		A					D	E				
Approach Delay (s)		9.2			0.0			55.7			0.0	
Approach LOS		A			A			E			A	

Intersection Summary			
HCM Average Control Delay	31.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	50.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	12	12	12
Total Lost time (s)		4.0			4.0	
Lane Util. Factor		0.91			0.97	
Frt		1.00			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		3793			2722	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		3793			2722	
Volume (vph)	0	545	0	0	260	0
Peak-hour factor, PHF	0.92	0.87	0.92	0.92	0.87	0.92
Adj. Flow (vph)	0	626	0	0	299	0
RTOR Reduction (vph)	0	0	0	0	274	0
Lane Group Flow (vph)	0	626	0	0	25	0
Heavy Vehicles (%)	2%	15%	2%	2%	10%	2%
Parking (#/hr)	0	0			0	
Turn Type						
Protected Phases		2			4	
Permitted Phases						
Actuated Green, G (s)		83.6			8.4	
Effective Green, g (s)		83.6			8.4	
Actuated g/C Ratio		0.84			0.08	
Clearance Time (s)		4.0			4.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		3171			229	
v/s Ratio Prot		c0.17			c0.01	
v/s Ratio Perm						
v/c Ratio		0.20			0.11	
Uniform Delay, d1		1.6			42.3	
Progression Factor		0.95			1.00	
Incremental Delay, d2		0.1			0.2	
Delay (s)		1.7			42.6	
Level of Service		A			D	
Approach Delay (s)		1.7	0.0		42.6	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	14.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.19		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	26.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Boylston St & East Ring Road 6/11/2007

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	11
Total Lost time (s)	4.0					4.0
Lane Util. Factor	0.95					1.00
Frt	0.94					0.86
Flt Protected	1.00					1.00
Satd. Flow (prot)	2728					1375
Flt Permitted	1.00					1.00
Satd. Flow (perm)	2728					1375
Volume (vph)	490	305	0	0	0	135
Peak-hour factor, PHF	0.86	0.86	0.92	0.92	0.92	0.74
Adj. Flow (vph)	570	355	0	0	0	182
RTOR Reduction (vph)	53	0	0	0	0	168
Lane Group Flow (vph)	872	0	0	0	0	14
Heavy Vehicles (%)	7%	6%	2%	2%	2%	4%
Parking (#/hr)	0	0				
Turn Type						custom
Protected Phases	2					4
Permitted Phases						
Actuated Green, G (s)	84.2					7.8
Effective Green, g (s)	84.2					7.8
Actuated g/C Ratio	0.84					0.08
Clearance Time (s)	4.0					4.0
Vehicle Extension (s)	3.0					3.0
Lane Grp Cap (vph)	2297					107
v/s Ratio Prot	c0.32					c0.01
v/s Ratio Perm						
v/c Ratio	0.38					0.13
Uniform Delay, d1	1.8					42.9
Progression Factor	0.51					1.00
Incremental Delay, d2	0.5					0.6
Delay (s)	1.4					43.5
Level of Service	A					D
Approach Delay (s)	1.4			0.0	43.5	
Approach LOS	A			A	D	

Intersection Summary			
HCM Average Control Delay	8.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	41.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	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	
Lane Util. Factor		0.91									0.95	
Frpb, ped/bikes		0.94									1.00	
Flpb, ped/bikes		1.00									0.89	
Frt		0.97									1.00	
Flt Protected		1.00									0.98	
Satd. Flow (prot)		3599									2582	
Flt Permitted		1.00									0.98	
Satd. Flow (perm)		3599									2582	
Volume (vph)	0	510	120	0	0	0	0	0	0	105	210	0
Peak-hour factor, PHF	0.91	0.91	0.91	0.92	0.92	0.92	0.92	0.92	0.92	0.86	0.86	0.86
Adj. Flow (vph)	0	560	132	0	0	0	0	0	0	122	244	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	79	0
Lane Group Flow (vph)	0	692	0	0	0	0	0	0	0	0	287	0
Confl. Peds. (#/hr)			310							267		
Heavy Vehicles (%)	2%	15%	10%	2%	2%	2%	2%	2%	2%	8%	3%	2%
Parking (#/hr)		0	0							0	0	
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		76.1									15.9	
Effective Green, g (s)		76.1									15.9	
Actuated g/C Ratio		0.76									0.16	
Clearance Time (s)		4.0									4.0	
Vehicle Extension (s)		3.0									3.0	
Lane Grp Cap (vph)		2739									411	
v/s Ratio Prot		c0.19										
v/s Ratio Perm											0.11	
v/c Ratio		0.25									0.70	
Uniform Delay, d1		3.5									39.8	
Progression Factor		0.53									1.00	
Incremental Delay, d2		0.2									5.1	
Delay (s)		2.1									44.9	
Level of Service		A									D	
Approach Delay (s)		2.1			0.0			0.0			44.9	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM Average Control Delay	16.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	34.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBL	NBR2	SBL	SBT	SBR	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	12	16	12	12	12	12	10	12
Total Lost time (s)	4.0	4.0		4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		0.95		0.76			1.00	0.91
Frpb, ped/bikes	1.00	1.00		0.96		1.00			1.00	1.00
Flpb, ped/bikes	0.96	1.00		0.95		1.00			1.00	1.00
Frt	1.00	0.85		0.94		0.85			1.00	1.00
Flt Protected	0.95	1.00		0.98		1.00			0.95	1.00
Satd. Flow (prot)	1454	1357		2881		3135			1418	4095
Flt Permitted	0.36	1.00		0.98		1.00			0.95	1.00
Satd. Flow (perm)	549	1357		2881		3135			1418	4095
Volume (vph)	30	80	170	35	155	560	15	60	105	550
Peak-hour factor, PHF	0.78	0.78	0.98	0.98	0.98	0.91	0.91	0.94	0.94	0.94
Adj. Flow (vph)	38	103	173	36	158	615	16	64	112	585
RTOR Reduction (vph)	0	85	0	0	0	2	0	0	21	0
Lane Group Flow (vph)	38	18	0	367	0	629	0	0	155	585
Confl. Peds. (#/hr)	36	41	41		36					
Heavy Vehicles (%)	0%	0%	8%	0%	6%	5%	33%	19%	0%	14%
Parking (#/hr)			0		0					
Turn Type	D.Pm	custom	Perm			custom		custom	custom	
Protected Phases		4		4		3		1 2	1 2	2 3
Permitted Phases	4		4					1 2 3 4	1 2	
Actuated Green, G (s)	17.9	17.9		17.9		31.1			39.0	53.6
Effective Green, g (s)	17.9	17.9		17.9		31.1			39.0	53.6
Actuated g/C Ratio	0.18	0.18		0.18		0.31			0.39	0.54
Clearance Time (s)	4.0	4.0		4.0		4.0				
Vehicle Extension (s)	3.0	3.0		3.0		3.0				
Lane Grp Cap (vph)	98	243		516		975			553	2195
v/s Ratio Prot		0.01				c0.20			c0.11	0.14
v/s Ratio Perm	0.07			0.13						
v/c Ratio	0.39	0.08		0.71		0.65			0.28	0.27
Uniform Delay, d1	36.2	34.2		38.6		29.7			20.9	12.6
Progression Factor	1.00	1.00		0.72		0.70			1.00	1.00
Incremental Delay, d2	2.5	0.1		3.8		3.2			0.3	0.3
Delay (s)	38.8	34.3		31.7		24.1			21.2	12.9
Level of Service	D	C		C		C			C	B
Approach Delay (s)				31.7						14.8
Approach LOS				C						B

Intersection Summary			
HCM Average Control Delay	22.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	61.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	12	12	11	11	12	12	12
Total Lost time (s)		4.0			4.0			4.0	4.0			4.0
Lane Util. Factor		1.00			1.00			1.00	0.95			1.00
Frt		0.93			0.89			1.00	1.00			1.00
Flt Protected		0.98			0.99			0.95	1.00			0.95
Satd. Flow (prot)		1220			1393			1542	3020			1540
Flt Permitted		0.65			0.93			0.36	1.00			0.42
Satd. Flow (perm)		815			1303			589	3020			686
Volume (vph)	10	0	10	25	0	100	35	55	500	0	35	20
Peak-hour factor, PHF	0.70	0.70	0.70	0.83	0.83	0.83	0.90	0.90	0.90	0.90	0.92	0.92
Adj. Flow (vph)	14	0	14	30	0	120	39	61	556	0	38	22
RTOR Reduction (vph)	0	13	0	0	107	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	15	0	0	43	0	0	100	556	0	0	60
Heavy Vehicles (%)	31%	0%	24%	2%	0%	10%	0%	3%	4%	33%	0%	15%
Parking (#/hr)												
Turn Type	Perm			Perm			Perm	pm+pt			Perm	pm+pt
Protected Phases		4			8			5	2			1
Permitted Phases	4			8			2	2			6	6
Actuated Green, G (s)		9.5			9.5			66.8	61.0			65.8
Effective Green, g (s)		10.5			10.5			68.8	62.0			67.8
Actuated g/C Ratio		0.10			0.10			0.69	0.62			0.68
Clearance Time (s)		5.0			5.0			5.0	5.0			5.0
Vehicle Extension (s)		3.0			3.0			3.0	3.0			3.0
Lane Grp Cap (vph)		86			137			470	1872			519
v/s Ratio Prot								c0.01	0.18			0.01
v/s Ratio Perm		0.02			c0.03			0.13				0.07
v/c Ratio		0.18			0.31			0.21	0.30			0.12
Uniform Delay, d1		40.8			41.4			5.4	8.8			5.4
Progression Factor		1.00			1.36			1.00	1.00			0.56
Incremental Delay, d2		1.0			1.2			0.2	0.4			0.1
Delay (s)		41.8			57.4			5.6	9.3			3.1
Level of Service		D			E			A	A			A
Approach Delay (s)		41.8			57.4				8.7			
Approach LOS		D			E				A			

Intersection Summary			
HCM Average Control Delay	12.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.2
Intersection Capacity Utilization	43.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SWT	SWR
Lane Configurations		
Ideal Flow (vphpl)	1900	1900
Lane Width	12	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	2981	1045
Flt Permitted	1.00	1.00
Satd. Flow (perm)	2981	1045
Volume (vph)	610	70
Peak-hour factor, PHF	0.92	0.92
Adj. Flow (vph)	663	76
RTOR Reduction (vph)	0	29
Lane Group Flow (vph)	663	47
Heavy Vehicles (%)	9%	21%
Parking (#/hr)		0
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	60.5	60.5
Effective Green, g (s)	61.5	61.5
Actuated g/C Ratio	0.62	0.62
Clearance Time (s)	5.0	5.0
Vehicle Extension (s)	3.0	3.0
Lane Grp Cap (vph)	1833	643
v/s Ratio Prot	c0.22	
v/s Ratio Perm		0.04
v/c Ratio	0.36	0.07
Uniform Delay, d1	9.5	7.8
Progression Factor	0.59	0.46
Incremental Delay, d2	0.5	0.2
Delay (s)	6.1	3.8
Level of Service	A	A
Approach Delay (s)	5.7	
Approach LOS	A	

Intersection Summary

Evening (PM)

Movement	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	12	11	12	12	12	12	10	12	10	12	12	12
Total Lost time (s)		4.0					4.0	4.0				
Lane Util. Factor		0.95					1.00	1.00				
Frpb, ped/bikes		0.93					1.00	0.82				
Flpb, ped/bikes		0.93					0.44	1.00				
Frt		0.98					1.00	0.91				
Flt Protected		1.00					0.95	1.00				
Satd. Flow (prot)		2566					635	1210				
Flt Permitted		1.00					0.95	1.00				
Satd. Flow (perm)		2566					635	1210				
Volume (vph)	95	735	125	0	0	0	230	200	300	0	0	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.92	0.92	0.92	0.94	0.94	0.94	0.92	0.92	0.92
Adj. Flow (vph)	106	817	139	0	0	0	245	213	319	0	0	0
RTOR Reduction (vph)	0	12	0	0	0	0	0	44	0	0	0	0
Lane Group Flow (vph)	0	1050	0	0	0	0	245	488	0	0	0	0
Confl. Peds. (#/hr)	609		254				234		150			
Heavy Vehicles (%)	2%	3%	1%	2%	2%	2%	6%	2%	7%	2%	2%	2%
Parking (#/hr)	0		0									
Turn Type	Perm						Perm					
Protected Phases		2						4				
Permitted Phases	2						4					
Actuated Green, G (s)		62.0					30.0	30.0				
Effective Green, g (s)		62.0					30.0	30.0				
Actuated g/C Ratio		0.62					0.30	0.30				
Clearance Time (s)		4.0					4.0	4.0				
Vehicle Extension (s)		3.0					3.0	3.0				
Lane Grp Cap (vph)		1591					191	363				
v/s Ratio Prot								c0.40				
v/s Ratio Perm		0.41					0.39					
v/c Ratio		0.66					1.28	1.34				
Uniform Delay, d1		12.2					35.0	35.0				
Progression Factor		1.00					1.00	1.00				
Incremental Delay, d2		2.2					161.0	172.2				
Delay (s)		14.4					196.0	207.2				
Level of Service		B					F	F				
Approach Delay (s)		14.4			0.0			203.7			0.0	
Approach LOS		B			A			F			A	

Intersection Summary			
HCM Average Control Delay	94.4	HCM Level of Service	F
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑			↰↰	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	12	12	12
Total Lost time (s)		4.0			4.0	
Lane Util. Factor		0.91			0.97	
Frt		1.00			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		4115			2964	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		4115			2964	
Volume (vph)	0	860	0	0	400	0
Peak-hour factor, PHF	0.88	0.88	0.92	0.92	0.84	0.84
Adj. Flow (vph)	0	977	0	0	476	0
RTOR Reduction (vph)	0	0	0	0	258	0
Lane Group Flow (vph)	0	977	0	0	218	0
Heavy Vehicles (%)	0%	6%	2%	2%	1%	0%
Parking (#/hr)		0			0	
Turn Type						
Protected Phases		2			7	
Permitted Phases						
Actuated Green, G (s)		79.9			12.1	
Effective Green, g (s)		79.9			12.1	
Actuated g/C Ratio		0.80			0.12	
Clearance Time (s)		4.0			4.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		3288			359	
v/s Ratio Prot		c0.24			c0.07	
v/s Ratio Perm						
v/c Ratio		0.30			0.61	
Uniform Delay, d1		2.6			41.7	
Progression Factor		1.73			1.00	
Incremental Delay, d2		0.1			2.9	
Delay (s)		4.7			44.6	
Level of Service		A			D	
Approach Delay (s)		4.7	0.0		44.6	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	17.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	37.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	11
Total Lost time (s)	4.0					4.0
Lane Util. Factor	0.95					1.00
Frt	0.95					0.86
Flt Protected	1.00					1.00
Satd. Flow (prot)	2917					1416
Flt Permitted	1.00					1.00
Satd. Flow (perm)	2917					1416
Volume (vph)	795	380	0	0	0	270
Peak-hour factor, PHF	0.96	0.96	0.92	0.92	0.85	0.85
Adj. Flow (vph)	828	396	0	0	0	318
RTOR Reduction (vph)	33	0	0	0	0	103
Lane Group Flow (vph)	1191	0	0	0	0	215
Heavy Vehicles (%)	1%	0%	2%	2%	0%	1%
Parking (#/hr)	0	0				
Turn Type						custom
Protected Phases	2					8
Permitted Phases						
Actuated Green, G (s)	72.2					19.8
Effective Green, g (s)	72.2					19.8
Actuated g/C Ratio	0.72					0.20
Clearance Time (s)	4.0					4.0
Vehicle Extension (s)	3.0					3.0
Lane Grp Cap (vph)	2106					280
v/s Ratio Prot	c0.41					c0.15
v/s Ratio Perm						
v/c Ratio	0.57					0.77
Uniform Delay, d1	6.5					37.9
Progression Factor	1.30					0.93
Incremental Delay, d2	1.1					11.9
Delay (s)	9.6					47.2
Level of Service	A					D
Approach Delay (s)	9.6			0.0	47.2	
Approach LOS	A			A	D	

Intersection Summary			
HCM Average Control Delay	17.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	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	
Lane Util. Factor		0.91									0.95	
Frpb, ped/bikes		0.93									1.00	
Flpb, ped/bikes		1.00									0.89	
Frt		0.98									1.00	
Flt Protected		1.00									0.98	
Satd. Flow (prot)		3871									2665	
Flt Permitted		1.00									0.98	
Satd. Flow (perm)		3871									2665	
Volume (vph)	0	905	175	0	0	0	0	0	0	190	350	0
Peak-hour factor, PHF	0.94	0.94	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.89	0.89	0.89
Adj. Flow (vph)	0	963	186	0	0	0	0	0	0	213	393	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	85	0
Lane Group Flow (vph)	0	1149	0	0	0	0	0	0	0	0	521	0
Confl. Peds. (#/hr)			680							240		
Heavy Vehicles (%)	0%	6%	4%	0%	0%	0%	0%	0%	0%	1%	1%	0%
Parking (#/hr)		0	0							0	0	
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		68.2									23.8	
Effective Green, g (s)		68.2									23.8	
Actuated g/C Ratio		0.68									0.24	
Clearance Time (s)		4.0									4.0	
Vehicle Extension (s)		3.0									3.0	
Lane Grp Cap (vph)		2640									634	
v/s Ratio Prot		c0.30										
v/s Ratio Perm											0.20	
v/c Ratio		0.44									0.82	
Uniform Delay, d1		7.2									36.1	
Progression Factor		1.05									1.00	
Incremental Delay, d2		0.4									8.4	
Delay (s)		7.9									44.5	
Level of Service		A									D	
Approach Delay (s)		7.9			0.0			0.0			44.5	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM Average Control Delay	20.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	49.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBL	NBR2	SBL	SBT	SBR	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	12	16	12	12	12	12	10	12
Total Lost time (s)	4.0	4.0		4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		0.95		0.76			1.00	0.91
Frpb, ped/bikes	1.00	1.00		0.89		1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00		0.86		1.00			1.00	1.00
Frt	1.00	0.85		0.93		0.85			1.00	1.00
Flt Protected	0.95	1.00		0.98		1.00			0.95	1.00
Satd. Flow (prot)	1516	1357		2497		3251			1478	4363
Flt Permitted	0.20	1.00		0.98		1.00			0.95	1.00
Satd. Flow (perm)	324	1357		2497		3251			1478	4363
Volume (vph)	55	170	315	25	290	805	20	60	55	525
Peak-hour factor, PHF	0.82	0.82	0.92	0.92	0.92	0.92	0.92	0.88	0.88	0.88
Adj. Flow (vph)	67	207	342	27	315	875	22	68	62	597
RTOR Reduction (vph)	0	148	0	0	0	2	0	0	44	0
Lane Group Flow (vph)	67	59	0	684	0	895	0	0	87	597
Confl. Peds. (#/hr)	90	115	115		90					
Heavy Vehicles (%)	0%	0%	2%	0%	3%	2%	0%	5%	0%	7%
Parking (#/hr)			0		0					
Turn Type	D.Pm	custom	Perm			custom		custom	custom	
Protected Phases		4		4		3		1 2	1 2!	2 3
Permitted Phases	4		4			2!		1 2 3 4	1 2	
Actuated Green, G (s)	28.7	28.7		28.7		46.0			27.5	50.0
Effective Green, g (s)	28.7	28.7		28.7		46.0			27.5	50.0
Actuated g/C Ratio	0.29	0.29		0.29		0.46			0.28	0.50
Clearance Time (s)	4.0	4.0		4.0		4.0				
Vehicle Extension (s)	3.0	3.0		3.0		3.0				
Lane Grp Cap (vph)	93	389		717		1626			406	2182
v/s Ratio Prot		0.04				c0.18			c0.06	0.14
v/s Ratio Perm	0.21			0.27		0.10				
v/c Ratio	0.72	0.15		0.95		0.55			0.21	0.27
Uniform Delay, d1	32.0	26.6		35.0		19.5			27.9	14.5
Progression Factor	1.00	1.00		0.86		0.48			1.00	1.00
Incremental Delay, d2	23.8	0.2		19.7		0.4			0.3	0.1
Delay (s)	55.9	26.8		49.7		9.8			28.2	14.5
Level of Service	E	C		D		A			C	B
Approach Delay (s)				49.7						17.0
Approach LOS				D						B

Intersection Summary			
HCM Average Control Delay	25.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	83.8%	ICU Level of Service	E
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	12	12	11	11	12	12	12
Total Lost time (s)		4.0			4.0			4.0	4.0			4.0
Lane Util. Factor		1.00			1.00			1.00	0.95			1.00
Frt		0.93			0.88			1.00	1.00			1.00
Flt Protected		0.98			0.99			0.95	1.00			0.95
Satd. Flow (prot)		1165			1479			1540	3073			1537
Flt Permitted		0.56			0.96			0.31	1.00			0.32
Satd. Flow (perm)		671			1424			507	3073			521
Volume (vph)	10	0	10	30	0	225	35	65	725	5	55	15
Peak-hour factor, PHF	0.59	0.59	0.59	0.72	0.72	0.72	0.97	0.97	0.97	0.97	0.92	0.92
Adj. Flow (vph)	17	0	17	42	0	312	36	67	747	5	60	16
RTOR Reduction (vph)	0	14	0	0	263	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	20	0	0	91	0	0	103	752	0	0	76
Heavy Vehicles (%)	42%	0%	25%	3%	0%	1%	0%	3%	2%	17%	0%	27%
Parking (#/hr)												
Turn Type	Perm			Perm			Perm	pm+pt			Perm	pm+pt
Protected Phases		4			8			5	2			1
Permitted Phases	4			8			2	2			6	6
Actuated Green, G (s)		14.6			14.6			62.3	56.7			60.1
Effective Green, g (s)		15.6			15.6			64.3	57.7			62.1
Actuated g/C Ratio		0.16			0.16			0.64	0.58			0.62
Clearance Time (s)		5.0			5.0			5.0	5.0			5.0
Vehicle Extension (s)		3.0			3.0			3.0	3.0			3.0
Lane Grp Cap (vph)		105			222			394	1773			379
v/s Ratio Prot								c0.02	c0.24			0.01
v/s Ratio Perm		0.03			c0.06			0.15				0.11
v/c Ratio		0.19			0.41			0.26	0.42			0.20
Uniform Delay, d1		36.7			38.0			7.3	11.8			7.8
Progression Factor		1.00			0.68			1.00	1.00			0.75
Incremental Delay, d2		0.9			1.0			0.4	0.7			0.2
Delay (s)		37.6			26.8			7.7	12.6			6.1
Level of Service		D			C			A	B			A
Approach Delay (s)		37.6			26.8				12.0			
Approach LOS		D			C				B			

Intersection Summary			
HCM Average Control Delay	13.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	17.2
Intersection Capacity Utilization	54.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SWT	SWR
Lane Configurations		
Ideal Flow (vphpl)	1900	1900
Lane Width	12	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	3124	1171
Flt Permitted	1.00	1.00
Satd. Flow (perm)	3124	1171
Volume (vph)	680	140
Peak-hour factor, PHF	0.92	0.92
Adj. Flow (vph)	739	152
RTOR Reduction (vph)	0	66
Lane Group Flow (vph)	739	86
Heavy Vehicles (%)	4%	8%
Parking (#/hr)		0
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	55.6	55.6
Effective Green, g (s)	56.6	56.6
Actuated g/C Ratio	0.57	0.57
Clearance Time (s)	5.0	5.0
Vehicle Extension (s)	3.0	3.0
Lane Grp Cap (vph)	1768	663
v/s Ratio Prot	0.24	
v/s Ratio Perm		0.07
v/c Ratio	0.42	0.13
Uniform Delay, d1	12.3	10.2
Progression Factor	0.74	0.58
Incremental Delay, d2	0.6	0.3
Delay (s)	9.8	6.2
Level of Service	A	A
Approach Delay (s)	8.9	
Approach LOS	A	

Intersection Summary

Saturday

Movement	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	12	11	12	12	12	12	10	10	12	12	12	12
Total Lost time (s)		4.0					4.0	4.0				
Lane Util. Factor		0.95					1.00	1.00				
Frpb, ped/bikes		0.95					1.00	0.83				
Flpb, ped/bikes		0.94					0.46	1.00				
Frt		0.99					1.00	0.91				
Flt Protected		1.00					0.95	1.00				
Satd. Flow (prot)		2734					677	1167				
Flt Permitted		1.00					0.95	1.00				
Satd. Flow (perm)		2734					677	1167				
Volume (vph)	55	670	55	0	0	0	165	145	220	0	0	0
Peak-hour factor, PHF	0.95	0.95	0.95	0.92	0.92	0.92	0.93	0.93	0.93	0.92	0.92	0.92
Adj. Flow (vph)	58	705	58	0	0	0	177	156	237	0	0	0
RTOR Reduction (vph)	0	5	0	0	0	0	0	2	0	0	0	0
Lane Group Flow (vph)	0	816	0	0	0	0	177	391	0	0	0	0
Confl. Peds. (#/hr)	776		460				234		150			
Heavy Vehicles (%)	2%	2%	4%	2%	2%	2%	3%	0%	6%	0%	0%	0%
Parking (#/hr)	0		0									
Turn Type	Perm						Perm					
Protected Phases		2						4				
Permitted Phases	2						4					
Actuated Green, G (s)		46.9					33.1	33.1				
Effective Green, g (s)		47.9					34.1	34.1				
Actuated g/C Ratio		0.53					0.38	0.38				
Clearance Time (s)		5.0					5.0	5.0				
Vehicle Extension (s)		3.0					3.0	3.0				
Lane Grp Cap (vph)		1455					257	442				
v/s Ratio Prot								c0.33				
v/s Ratio Perm		0.30					0.26					
v/c Ratio		0.56					0.69	0.88				
Uniform Delay, d1		14.0					23.5	26.1				
Progression Factor		1.00					1.00	1.00				
Incremental Delay, d2		1.6					7.5	18.5				
Delay (s)		15.6					31.0	44.6				
Level of Service		B					C	D				
Approach Delay (s)		15.6			0.0			40.3			0.0	
Approach LOS		B			A			D			A	

Intersection Summary			
HCM Average Control Delay	25.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	59.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	12	12	12
Total Lost time (s)		4.0			4.0	
Lane Util. Factor		0.91			0.97	
Frt		1.00			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		4235			2964	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		4235			2964	
Volume (vph)	0	920	0	0	365	0
Peak-hour factor, PHF	0.95	0.95	0.92	0.92	0.81	0.81
Adj. Flow (vph)	0	968	0	0	451	0
RTOR Reduction (vph)	0	0	0	0	237	0
Lane Group Flow (vph)	0	968	0	0	214	0
Heavy Vehicles (%)	0%	3%	2%	2%	1%	0%
Parking (#/hr)		0			0	
Turn Type						
Protected Phases		2			4	
Permitted Phases						
Actuated Green, G (s)		70.4			11.6	
Effective Green, g (s)		70.4			11.6	
Actuated g/C Ratio		0.78			0.13	
Clearance Time (s)		4.0			4.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		3313			382	
v/s Ratio Prot		c0.23			c0.07	
v/s Ratio Perm						
v/c Ratio		0.29			0.56	
Uniform Delay, d1		2.8			36.8	
Progression Factor		0.76			1.00	
Incremental Delay, d2		0.2			1.9	
Delay (s)		2.3			38.7	
Level of Service		A			D	
Approach Delay (s)		2.3	0.0		38.7	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	13.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	38.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	11
Total Lost time (s)	4.0					4.0
Lane Util. Factor	0.95					1.00
Frt	0.96					0.86
Flt Protected	1.00					1.00
Satd. Flow (prot)	2954					1430
Flt Permitted	1.00					1.00
Satd. Flow (perm)	2954					1430
Volume (vph)	820	330	0	0	0	415
Peak-hour factor, PHF	0.97	0.97	0.92	0.92	0.83	0.83
Adj. Flow (vph)	845	340	0	0	0	500
RTOR Reduction (vph)	39	0	0	0	0	69
Lane Group Flow (vph)	1146	0	0	0	0	431
Heavy Vehicles (%)	0%	0%	2%	2%	0%	0%
Parking (#/hr)	0	0				
Turn Type						custom
Protected Phases	2					8
Permitted Phases						
Actuated Green, G (s)	51.5					30.5
Effective Green, g (s)	51.5					30.5
Actuated g/C Ratio	0.57					0.34
Clearance Time (s)	4.0					4.0
Vehicle Extension (s)	3.0					3.0
Lane Grp Cap (vph)	1690					485
v/s Ratio Prot	c0.39					c0.30
v/s Ratio Perm						
v/c Ratio	0.68					0.89
Uniform Delay, d1	13.5					28.1
Progression Factor	0.58					0.97
Incremental Delay, d2	2.1					17.5
Delay (s)	10.0					44.8
Level of Service	A					D
Approach Delay (s)	10.0			0.0	44.8	
Approach LOS	A			A	D	

Intersection Summary			
HCM Average Control Delay	20.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	72.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	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	
Lane Util. Factor		0.91									0.95	
Frpb, ped/bikes		0.94									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.98									1.00	
Flt Protected		1.00									0.98	
Satd. Flow (prot)		4040									3010	
Flt Permitted		1.00									0.98	
Satd. Flow (perm)		4040									3010	
Volume (vph)	0	1125	150	0	0	0	0	0	0	190	260	0
Peak-hour factor, PHF	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.90	0.90	0.90
Adj. Flow (vph)	0	1210	161	0	0	0	0	0	0	211	289	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	47	0
Lane Group Flow (vph)	0	1371	0	0	0	0	0	0	0	0	453	0
Confl. Peds. (#/hr)			1700			929						
Heavy Vehicles (%)	0%	3%	1%	2%	2%	2%	2%	2%	2%	1%	0%	0%
Parking (#/hr)		0	0							0	0	
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		64.2									17.8	
Effective Green, g (s)		64.2									17.8	
Actuated g/C Ratio		0.71									0.20	
Clearance Time (s)		4.0									4.0	
Vehicle Extension (s)		3.0									3.0	
Lane Grp Cap (vph)		2882									595	
v/s Ratio Prot		c0.34										
v/s Ratio Perm											0.15	
v/c Ratio		0.48									0.76	
Uniform Delay, d1		5.6									34.1	
Progression Factor		0.91									1.00	
Incremental Delay, d2		0.4									5.7	
Delay (s)		5.5									39.8	
Level of Service		A									D	
Approach Delay (s)		5.5			0.0			0.0			39.8	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM Average Control Delay	14.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	50.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBL	NBR2	SBL	SBT	SBR	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	12	16	12	12	12	12	10	12
Total Lost time (s)	4.0	4.0		4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		0.95		0.76			1.00	0.91
Frpb, ped/bikes	1.00	1.00		0.85		1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00		0.84		1.00			1.00	1.00
Frt	1.00	0.85		0.93		0.85			1.00	1.00
Flt Protected	0.95	1.00		0.98		1.00			0.95	1.00
Satd. Flow (prot)	1516	1357		2382		3250			1505	4489
Flt Permitted	0.17	1.00		0.98		1.00			0.95	1.00
Satd. Flow (perm)	278	1357		2382		3250			1505	4489
Volume (vph)	35	160	325	35	300	890	20	200	45	690
Peak-hour factor, PHF	0.79	0.79	0.96	0.96	0.96	0.90	0.90	0.97	0.97	0.97
Adj. Flow (vph)	44	203	339	36	312	989	22	206	46	711
RTOR Reduction (vph)	0	151	0	0	0	2	0	0	24	0
Lane Group Flow (vph)	44	52	0	687	0	1009	0	0	228	711
Confl. Peds. (#/hr)	175	178	178		175					
Heavy Vehicles (%)	0%	0%	1%	0%	1%	2%	0%	0%	4%	4%
Parking (#/hr)			0		0					
Turn Type	D.Pm	custom	Perm			custom		custom	custom	
Protected Phases		4		4		3		1 2	1 2	2 3
Permitted Phases	4		4					1 2 3 4	1 2	
Actuated Green, G (s)	23.0	23.0		23.0		26.7			28.3	41.5
Effective Green, g (s)	23.0	23.0		23.0		26.7			28.3	41.5
Actuated g/C Ratio	0.26	0.26		0.26		0.30			0.31	0.46
Clearance Time (s)	4.0	4.0		4.0		4.0				
Vehicle Extension (s)	3.0	3.0		3.0		3.0				
Lane Grp Cap (vph)	71	347		609		964			473	2070
v/s Ratio Prot		0.04				c0.31			c0.15	0.16
v/s Ratio Perm	0.16			0.29						
v/c Ratio	0.62	0.15		1.13		1.05			0.48	0.34
Uniform Delay, d1	29.6	25.9		33.5		31.6			24.9	15.5
Progression Factor	1.00	1.00		0.83		0.58			1.00	1.00
Incremental Delay, d2	15.0	0.2		75.8		40.3			0.8	0.1
Delay (s)	44.7	26.1		103.5		58.8			25.7	15.6
Level of Service	D	C		F		E			C	B
Approach Delay (s)				103.5						18.3
Approach LOS				F						B

Intersection Summary			
HCM Average Control Delay	53.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	96.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	12	12	11	11	12	12	12
Total Lost time (s)		4.0			4.0			4.0	4.0			4.0
Lane Util. Factor		1.00			1.00			1.00	0.95			1.00
Frt		0.92			0.90			1.00	1.00			1.00
Flt Protected		0.98			0.99			0.95	1.00			0.95
Satd. Flow (prot)		1417			1515			1570	3040			1611
Flt Permitted		0.83			0.91			0.28	1.00			0.26
Satd. Flow (perm)		1203			1396			465	3040			448
Volume (vph)	10	0	15	65	10	190	40	75	695	10	55	15
Peak-hour factor, PHF	0.61	0.61	0.61	0.88	0.88	0.88	0.86	0.86	0.86	0.86	0.98	0.98
Adj. Flow (vph)	16	0	25	74	11	216	47	87	808	12	56	15
RTOR Reduction (vph)	0	19	0	0	95	0	0	0	1	0	0	0
Lane Group Flow (vph)	0	22	0	0	206	0	0	134	819	0	0	71
Heavy Vehicles (%)	5%	0%	11%	0%	0%	1%	0%	0%	3%	8%	0%	4%
Parking (#/hr)												
Turn Type	Perm			Perm			Perm	pm+pt			Perm	pm+pt
Protected Phases		4			8			5	2			1
Permitted Phases	4			8			2	2			6	6
Actuated Green, G (s)		19.8			19.8			48.4	40.4			43.6
Effective Green, g (s)		20.8			20.8			50.4	41.4			45.6
Actuated g/C Ratio		0.23			0.23			0.56	0.46			0.51
Clearance Time (s)		5.0			5.0			5.0	5.0			5.0
Vehicle Extension (s)		3.0			3.0			3.0	3.0			3.0
Lane Grp Cap (vph)		278			323			371	1398			312
v/s Ratio Prot								c0.04	c0.27			0.02
v/s Ratio Perm		0.02			c0.15			0.17				0.10
v/c Ratio		0.08			0.64			0.36	0.59			0.23
Uniform Delay, d1		27.1			31.2			10.4	18.0			12.0
Progression Factor		1.00			0.80			1.00	1.00			1.11
Incremental Delay, d2		0.1			3.0			0.6	1.8			0.3
Delay (s)		27.2			27.8			11.0	19.8			13.6
Level of Service		C			C			B	B			B
Approach Delay (s)		27.2			27.8				18.5			
Approach LOS		C			C				B			

Intersection Summary			
HCM Average Control Delay	17.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	21.2
Intersection Capacity Utilization	57.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	SWT	SWR
Lane Configurations		
Ideal Flow (vphpl)	1900	1900
Lane Width	12	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	3154	1228
Flt Permitted	1.00	1.00
Satd. Flow (perm)	3154	1228
Volume (vph)	680	140
Peak-hour factor, PHF	0.98	0.98
Adj. Flow (vph)	694	143
RTOR Reduction (vph)	0	81
Lane Group Flow (vph)	694	62
Heavy Vehicles (%)	3%	3%
Parking (#/hr)		0
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	38.0	38.0
Effective Green, g (s)	39.0	39.0
Actuated g/C Ratio	0.43	0.43
Clearance Time (s)	5.0	5.0
Vehicle Extension (s)	3.0	3.0
Lane Grp Cap (vph)	1367	532
v/s Ratio Prot	0.22	
v/s Ratio Perm		0.05
v/c Ratio	0.51	0.12
Uniform Delay, d1	18.5	15.2
Progression Factor	0.71	0.52
Incremental Delay, d2	1.1	0.4
Delay (s)	14.3	8.3
Level of Service	B	A
Approach Delay (s)	13.3	
Approach LOS	B	

Intersection Summary

2011 Build Conditions – Mitigation (888 Boylston only)

Morning (AM)

Movement	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	12	11	12	12	12	12	10	12	10	12	12	12
Total Lost time (s)		4.0					4.0	4.0				
Lane Util. Factor		0.95					1.00	1.00				
Frpb, ped/bikes		0.91					1.00	0.84				
Flpb, ped/bikes		0.94					0.64	1.00				
Frt		0.98					1.00	0.91				
Flt Protected		0.99					0.95	1.00				
Satd. Flow (prot)		2382					879	1134				
Flt Permitted		0.99					0.95	1.00				
Satd. Flow (perm)		2382					879	1134				
Volume (vph)	70	420	95	0	0	0	180	125	205	0	0	0
Peak-hour factor, PHF	0.92	0.94	0.94	0.92	0.92	0.92	0.94	0.92	0.94	0.92	0.92	0.92
Adj. Flow (vph)	76	447	101	0	0	0	191	136	218	0	0	0
RTOR Reduction (vph)	0	13	0	0	0	0	0	64	0	0	0	0
Lane Group Flow (vph)	0	611	0	0	0	0	191	290	0	0	0	0
Confl. Peds. (#/hr)	138		150				107		126			
Heavy Vehicles (%)	6%	11%	3%	2%	2%	2%	11%	4%	22%	2%	2%	2%
Parking (#/hr)	0		0									
Turn Type	Perm						Perm					
Protected Phases		2						4				
Permitted Phases	2						4					
Actuated Green, G (s)		63.6					28.4	28.4				
Effective Green, g (s)		63.6					28.4	28.4				
Actuated g/C Ratio		0.64					0.28	0.28				
Clearance Time (s)		4.0					4.0	4.0				
Vehicle Extension (s)		3.0					3.0	3.0				
Lane Grp Cap (vph)		1515					250	322				
v/s Ratio Prot								c0.26				
v/s Ratio Perm		0.26					0.22					
v/c Ratio		0.40					0.76	0.90				
Uniform Delay, d1		8.9					32.7	34.5				
Progression Factor		1.00					1.00	1.00				
Incremental Delay, d2		0.8					13.0	26.8				
Delay (s)		9.7					45.7	61.2				
Level of Service		A					D	E				
Approach Delay (s)		9.7			0.0			55.8			0.0	
Approach LOS		A			A			E			A	

Intersection Summary			
HCM Average Control Delay	31.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	51.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑			↰↰	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	12	12	12
Total Lost time (s)		4.0			4.0	
Lane Util. Factor		0.91			0.97	
Frt		1.00			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		3793			2722	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		3793			2722	
Volume (vph)	0	580	0	0	275	0
Peak-hour factor, PHF	0.92	0.87	0.92	0.92	0.87	0.92
Adj. Flow (vph)	0	667	0	0	316	0
RTOR Reduction (vph)	0	0	0	0	289	0
Lane Group Flow (vph)	0	667	0	0	27	0
Heavy Vehicles (%)	2%	15%	2%	2%	10%	2%
Parking (#/hr)	0	0			0	
Turn Type						
Protected Phases		2			4	
Permitted Phases						
Actuated Green, G (s)		83.6			8.4	
Effective Green, g (s)		83.6			8.4	
Actuated g/C Ratio		0.84			0.08	
Clearance Time (s)		4.0			4.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		3171			229	
v/s Ratio Prot		c0.18			c0.01	
v/s Ratio Perm						
v/c Ratio		0.21			0.12	
Uniform Delay, d1		1.6			42.4	
Progression Factor		0.91			1.00	
Incremental Delay, d2		0.1			0.2	
Delay (s)		1.6			42.6	
Level of Service		A			D	
Approach Delay (s)		1.6	0.0		42.6	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	14.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.20		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	27.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	11
Total Lost time (s)	4.0					4.0
Lane Util. Factor	0.95					1.00
Frt	0.94					0.86
Flt Protected	1.00					1.00
Satd. Flow (prot)	2711					1375
Flt Permitted	1.00					1.00
Satd. Flow (perm)	2711					1375
Volume (vph)	485	360	0	0	0	140
Peak-hour factor, PHF	0.86	0.86	0.92	0.92	0.92	0.74
Adj. Flow (vph)	564	419	0	0	0	189
RTOR Reduction (vph)	66	0	0	0	0	174
Lane Group Flow (vph)	917	0	0	0	0	15
Heavy Vehicles (%)	7%	6%	2%	2%	2%	4%
Parking (#/hr)	0	0				
Turn Type						custom
Protected Phases	2					4
Permitted Phases						
Actuated Green, G (s)	84.2					7.8
Effective Green, g (s)	84.2					7.8
Actuated g/C Ratio	0.84					0.08
Clearance Time (s)	4.0					4.0
Vehicle Extension (s)	3.0					3.0
Lane Grp Cap (vph)	2283					107
v/s Ratio Prot	c0.34					c0.01
v/s Ratio Perm						
v/c Ratio	0.40					0.14
Uniform Delay, d1	1.9					43.0
Progression Factor	0.63					1.00
Incremental Delay, d2	0.5					0.6
Delay (s)	1.7					43.6
Level of Service	A					D
Approach Delay (s)	1.7			0.0	43.6	
Approach LOS	A			A	D	

Intersection Summary			
HCM Average Control Delay	8.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	44.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	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	
Lane Util. Factor		0.91									0.95	
Frpb, ped/bikes		0.94									1.00	
Flpb, ped/bikes		1.00									0.89	
Frt		0.97									1.00	
Flt Protected		1.00									0.98	
Satd. Flow (prot)		3613									2582	
Flt Permitted		1.00									0.98	
Satd. Flow (perm)		3613									2582	
Volume (vph)	0	515	115	0	0	0	0	0	0	105	210	0
Peak-hour factor, PHF	0.91	0.91	0.91	0.92	0.92	0.92	0.92	0.92	0.92	0.86	0.86	0.86
Adj. Flow (vph)	0	566	126	0	0	0	0	0	0	122	244	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	79	0
Lane Group Flow (vph)	0	692	0	0	0	0	0	0	0	0	287	0
Confl. Peds. (#/hr)			310							267		
Heavy Vehicles (%)	2%	15%	10%	2%	2%	2%	2%	2%	2%	8%	3%	2%
Parking (#/hr)		0	0							0	0	
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		76.1									15.9	
Effective Green, g (s)		76.1									15.9	
Actuated g/C Ratio		0.76									0.16	
Clearance Time (s)		4.0									4.0	
Vehicle Extension (s)		3.0									3.0	
Lane Grp Cap (vph)		2749									411	
v/s Ratio Prot		c0.19										
v/s Ratio Perm											0.11	
v/c Ratio		0.25									0.70	
Uniform Delay, d1		3.5									39.8	
Progression Factor		0.51									1.00	
Incremental Delay, d2		0.2									5.1	
Delay (s)		2.0									44.9	
Level of Service		A									D	
Approach Delay (s)		2.0			0.0			0.0			44.9	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM Average Control Delay	16.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	34.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBL	NBR2	SBL	SBT	SBR	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	12	16	12	12	12	12	10	12
Total Lost time (s)	4.0	4.0		4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		0.95		0.76			1.00	0.91
Frpb, ped/bikes	1.00	1.00		0.96		1.00			1.00	1.00
Flpb, ped/bikes	0.96	1.00		0.95		1.00			1.00	1.00
Frt	1.00	0.85		0.94		0.85			1.00	1.00
Flt Protected	0.95	1.00		0.98		1.00			0.95	1.00
Satd. Flow (prot)	1449	1357		2886		3135			1418	4095
Flt Permitted	0.42	1.00		0.98		1.00			0.95	1.00
Satd. Flow (perm)	639	1357		2886		3135			1418	4095
Volume (vph)	30	80	160	35	145	560	15	60	105	550
Peak-hour factor, PHF	0.78	0.78	0.98	0.98	0.98	0.91	0.91	0.94	0.94	0.94
Adj. Flow (vph)	38	103	163	36	148	615	16	64	112	585
RTOR Reduction (vph)	0	81	0	0	0	2	0	0	21	0
Lane Group Flow (vph)	38	22	0	347	0	629	0	0	155	585
Confl. Peds. (#/hr)	36	41	41		36					
Heavy Vehicles (%)	0%	0%	8%	0%	6%	5%	33%	19%	0%	14%
Parking (#/hr)			0		0					
Turn Type	D.Pm	custom	Perm			custom		custom	custom	
Protected Phases		4		4		3		1 2	1 2	2 3
Permitted Phases	4		4					1 2 3 4	1 2	
Actuated Green, G (s)	21.3	21.3		21.3		27.7			39.0	50.2
Effective Green, g (s)	21.3	21.3		21.3		27.7			39.0	50.2
Actuated g/C Ratio	0.21	0.21		0.21		0.28			0.39	0.50
Clearance Time (s)	4.0	4.0		4.0		4.0				
Vehicle Extension (s)	3.0	3.0		3.0		3.0				
Lane Grp Cap (vph)	136	289		615		868			553	2056
v/s Ratio Prot		0.02				c0.20			c0.11	0.14
v/s Ratio Perm	0.06			0.12						
v/c Ratio	0.28	0.08		0.56		0.72			0.28	0.28
Uniform Delay, d1	32.9	31.5		35.2		32.7			20.9	14.5
Progression Factor	1.00	1.00		0.64		0.73			1.00	1.00
Incremental Delay, d2	1.1	0.1		1.0		5.1			0.3	0.3
Delay (s)	34.1	31.6		23.6		29.1			21.2	14.8
Level of Service	C	C		C		C			C	B
Approach Delay (s)				23.6						16.3
Approach LOS				C						B

Intersection Summary			
HCM Average Control Delay	23.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	60.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	12	12	11	11	12	12	12
Total Lost time (s)		4.0			4.0			4.0	4.0			4.0
Lane Util. Factor		1.00			1.00			1.00	0.95			1.00
Frt		0.93			0.89			1.00	1.00			1.00
Flt Protected		0.98			0.99			0.95	1.00			0.95
Satd. Flow (prot)		1220			1393			1542	3020			1540
Flt Permitted		0.65			0.93			0.37	1.00			0.42
Satd. Flow (perm)		815			1303			597	3020			686
Volume (vph)	10	0	10	25	0	100	35	55	500	0	35	20
Peak-hour factor, PHF	0.70	0.70	0.70	0.83	0.83	0.83	0.90	0.90	0.90	0.90	0.92	0.92
Adj. Flow (vph)	14	0	14	30	0	120	39	61	556	0	38	22
RTOR Reduction (vph)	0	13	0	0	107	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	15	0	0	43	0	0	100	556	0	0	60
Heavy Vehicles (%)	31%	0%	24%	2%	0%	10%	0%	3%	4%	33%	0%	15%
Parking (#/hr)												
Turn Type	Perm			Perm			Perm	pm+pt			Perm	pm+pt
Protected Phases		4			8			5	2			1
Permitted Phases	4			8			2	2			6	6
Actuated Green, G (s)		9.5			9.5			66.8	61.0			65.8
Effective Green, g (s)		10.5			10.5			68.8	62.0			67.8
Actuated g/C Ratio		0.10			0.10			0.69	0.62			0.68
Clearance Time (s)		5.0			5.0			5.0	5.0			5.0
Vehicle Extension (s)		3.0			3.0			3.0	3.0			3.0
Lane Grp Cap (vph)		86			137			475	1872			519
v/s Ratio Prot								c0.01	0.18			0.01
v/s Ratio Perm		0.02			c0.03			0.13				0.07
v/c Ratio		0.18			0.31			0.21	0.30			0.12
Uniform Delay, d1		40.8			41.4			5.4	8.8			5.4
Progression Factor		1.00			1.17			1.00	1.00			0.57
Incremental Delay, d2		1.0			1.2			0.2	0.4			0.1
Delay (s)		41.8			49.6			5.6	9.3			3.2
Level of Service		D			D			A	A			A
Approach Delay (s)		41.8			49.6				8.7			
Approach LOS		D			D				A			

Intersection Summary			
HCM Average Control Delay	11.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.2
Intersection Capacity Utilization	42.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SWT	SWR
Lane Configurations		
Ideal Flow (vphpl)	1900	1900
Lane Width	12	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	2981	1045
Flt Permitted	1.00	1.00
Satd. Flow (perm)	2981	1045
Volume (vph)	600	70
Peak-hour factor, PHF	0.92	0.92
Adj. Flow (vph)	652	76
RTOR Reduction (vph)	0	29
Lane Group Flow (vph)	652	47
Heavy Vehicles (%)	9%	21%
Parking (#/hr)		0
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	60.5	60.5
Effective Green, g (s)	61.5	61.5
Actuated g/C Ratio	0.62	0.62
Clearance Time (s)	5.0	5.0
Vehicle Extension (s)	3.0	3.0
Lane Grp Cap (vph)	1833	643
v/s Ratio Prot	c0.22	
v/s Ratio Perm		0.04
v/c Ratio	0.36	0.07
Uniform Delay, d1	9.5	7.8
Progression Factor	0.59	0.50
Incremental Delay, d2	0.5	0.2
Delay (s)	6.1	4.1
Level of Service	A	A
Approach Delay (s)	5.7	
Approach LOS	A	

Intersection Summary

Evening (PM)

Movement	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	12	11	12	12	12	12	10	12	10	12	12	12
Total Lost time (s)		4.0					4.0	4.0				
Lane Util. Factor		0.95					1.00	1.00				
Frpb, ped/bikes		0.93					1.00	0.82				
Flpb, ped/bikes		0.93					0.44	1.00				
Frt		0.98					1.00	0.91				
Flt Protected		1.00					0.95	1.00				
Satd. Flow (prot)		2563					635	1213				
Flt Permitted		1.00					0.95	1.00				
Satd. Flow (perm)		2563					635	1213				
Volume (vph)	95	730	125	0	0	0	230	200	295	0	0	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.92	0.92	0.92	0.94	0.94	0.94	0.92	0.92	0.92
Adj. Flow (vph)	106	811	139	0	0	0	245	213	314	0	0	0
RTOR Reduction (vph)	0	12	0	0	0	0	0	45	0	0	0	0
Lane Group Flow (vph)	0	1044	0	0	0	0	245	482	0	0	0	0
Confl. Peds. (#/hr)	609		254				234		150			
Heavy Vehicles (%)	2%	3%	1%	2%	2%	2%	6%	2%	7%	2%	2%	2%
Parking (#/hr)	0		0									
Turn Type	Perm						Perm					
Protected Phases		2						4				
Permitted Phases	2						4					
Actuated Green, G (s)		62.0					30.0	30.0				
Effective Green, g (s)		62.0					30.0	30.0				
Actuated g/C Ratio		0.62					0.30	0.30				
Clearance Time (s)		4.0					4.0	4.0				
Vehicle Extension (s)		3.0					3.0	3.0				
Lane Grp Cap (vph)		1589					191	364				
v/s Ratio Prot								c0.40				
v/s Ratio Perm		0.41					0.39					
v/c Ratio		0.66					1.28	1.32				
Uniform Delay, d1		12.2					35.0	35.0				
Progression Factor		1.00					1.00	1.00				
Incremental Delay, d2		2.1					161.0	164.1				
Delay (s)		14.3					196.0	199.1				
Level of Service		B					F	F				
Approach Delay (s)		14.3			0.0			198.1			0.0	
Approach LOS		B			A			F			A	

Intersection Summary			
HCM Average Control Delay	91.9	HCM Level of Service	F
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑			↰↰	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	12	12	12
Total Lost time (s)		4.0			4.0	
Lane Util. Factor		0.91			0.97	
Frt		1.00			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		4115			2964	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		4115			2964	
Volume (vph)	0	860	0	0	405	0
Peak-hour factor, PHF	0.88	0.88	0.92	0.92	0.84	0.84
Adj. Flow (vph)	0	977	0	0	482	0
RTOR Reduction (vph)	0	0	0	0	257	0
Lane Group Flow (vph)	0	977	0	0	225	0
Heavy Vehicles (%)	0%	6%	2%	2%	1%	0%
Parking (#/hr)		0			0	
Turn Type						
Protected Phases		2			7	
Permitted Phases						
Actuated Green, G (s)		79.7			12.3	
Effective Green, g (s)		79.7			12.3	
Actuated g/C Ratio		0.80			0.12	
Clearance Time (s)		4.0			4.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		3280			365	
v/s Ratio Prot		c0.24			c0.08	
v/s Ratio Perm						
v/c Ratio		0.30			0.62	
Uniform Delay, d1		2.7			41.6	
Progression Factor		1.74			1.00	
Incremental Delay, d2		0.1			3.1	
Delay (s)		4.8			44.7	
Level of Service		A			D	
Approach Delay (s)		4.8	0.0		44.7	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	18.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	38.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	11
Total Lost time (s)	4.0					4.0
Lane Util. Factor	0.95					1.00
Frt	0.95					0.86
Flt Protected	1.00					1.00
Satd. Flow (prot)	2914					1416
Flt Permitted	1.00					1.00
Satd. Flow (perm)	2914					1416
Volume (vph)	785	390	0	0	0	295
Peak-hour factor, PHF	0.96	0.96	0.92	0.92	0.85	0.85
Adj. Flow (vph)	818	406	0	0	0	347
RTOR Reduction (vph)	38	0	0	0	0	102
Lane Group Flow (vph)	1187	0	0	0	0	245
Heavy Vehicles (%)	1%	0%	2%	2%	0%	1%
Parking (#/hr)	0	0				
Turn Type						custom
Protected Phases	2					8
Permitted Phases						
Actuated Green, G (s)	70.0					22.0
Effective Green, g (s)	70.0					22.0
Actuated g/C Ratio	0.70					0.22
Clearance Time (s)	4.0					4.0
Vehicle Extension (s)	3.0					3.0
Lane Grp Cap (vph)	2040					312
v/s Ratio Prot	c0.41					c0.17
v/s Ratio Perm						
v/c Ratio	0.58					0.78
Uniform Delay, d1	7.6					36.8
Progression Factor	1.31					1.16
Incremental Delay, d2	1.2					12.1
Delay (s)	11.1					54.7
Level of Service	B					D
Approach Delay (s)	11.1			0.0	54.7	
Approach LOS	B			A	D	

Intersection Summary			
HCM Average Control Delay	20.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	64.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	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	
Lane Util. Factor		0.91									0.95	
Frpb, ped/bikes		0.93									1.00	
Flpb, ped/bikes		1.00									0.89	
Frt		0.98									1.00	
Flt Protected		1.00									0.98	
Satd. Flow (prot)		3878									2662	
Flt Permitted		1.00									0.98	
Satd. Flow (perm)		3878									2662	
Volume (vph)	0	925	175	0	0	0	0	0	0	190	345	0
Peak-hour factor, PHF	0.94	0.94	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.89	0.89	0.89
Adj. Flow (vph)	0	984	186	0	0	0	0	0	0	213	388	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	82	0
Lane Group Flow (vph)	0	1170	0	0	0	0	0	0	0	0	519	0
Confl. Peds. (#/hr)			680							240		
Heavy Vehicles (%)	0%	6%	4%	0%	0%	0%	0%	0%	0%	1%	1%	0%
Parking (#/hr)		0	0							0	0	
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		68.4									23.6	
Effective Green, g (s)		68.4									23.6	
Actuated g/C Ratio		0.68									0.24	
Clearance Time (s)		4.0									4.0	
Vehicle Extension (s)		3.0									3.0	
Lane Grp Cap (vph)		2653									628	
v/s Ratio Prot		c0.30										
v/s Ratio Perm											0.20	
v/c Ratio		0.44									0.83	
Uniform Delay, d1		7.1									36.3	
Progression Factor		1.06									1.00	
Incremental Delay, d2		0.4									8.8	
Delay (s)		8.0									45.0	
Level of Service		A									D	
Approach Delay (s)		8.0			0.0			0.0			45.0	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM Average Control Delay	20.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	49.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBL	NBR2	SBL	SBT	SBR	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	12	16	12	12	12	12	10	12
Total Lost time (s)	4.0	4.0		4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		0.95		0.76			1.00	0.91
Frpb, ped/bikes	1.00	1.00		0.89		1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00		0.85		1.00			1.00	1.00
Frt	1.00	0.85		0.93		0.85			1.00	1.00
Flt Protected	0.95	1.00		0.98		1.00			0.95	1.00
Satd. Flow (prot)	1516	1357		2498		3251			1478	4363
Flt Permitted	0.20	1.00		0.98		1.00			0.95	1.00
Satd. Flow (perm)	323	1357		2498		3251			1478	4363
Volume (vph)	55	170	320	25	285	805	20	60	55	525
Peak-hour factor, PHF	0.82	0.82	0.92	0.92	0.92	0.92	0.92	0.88	0.88	0.88
Adj. Flow (vph)	67	207	348	27	310	875	22	68	62	597
RTOR Reduction (vph)	0	148	0	0	0	2	0	0	44	0
Lane Group Flow (vph)	67	59	0	685	0	895	0	0	87	597
Confl. Peds. (#/hr)	90	115	115		90					
Heavy Vehicles (%)	0%	0%	2%	0%	3%	2%	0%	5%	0%	7%
Parking (#/hr)			0		0					
Turn Type	D.Pm	custom	Perm			custom		custom	custom	
Protected Phases		4		4		3		1 2	1 2!	2 3
Permitted Phases	4		4			2!		1 2 3 4	1 2	
Actuated Green, G (s)	28.7	28.7		28.7		46.0			27.5	50.0
Effective Green, g (s)	28.7	28.7		28.7		46.0			27.5	50.0
Actuated g/C Ratio	0.29	0.29		0.29		0.46			0.28	0.50
Clearance Time (s)	4.0	4.0		4.0		4.0				
Vehicle Extension (s)	3.0	3.0		3.0		3.0				
Lane Grp Cap (vph)	93	389		717		1626			406	2182
v/s Ratio Prot		0.04				c0.18			c0.06	0.14
v/s Ratio Perm	0.21			0.27		0.10				
v/c Ratio	0.72	0.15		0.96		0.55			0.21	0.27
Uniform Delay, d1	32.0	26.6		35.0		19.5			27.9	14.5
Progression Factor	1.00	1.00		1.11		0.63			1.00	1.00
Incremental Delay, d2	23.8	0.2		19.9		0.4			0.3	0.1
Delay (s)	55.9	26.8		58.9		12.6			28.2	14.5
Level of Service	E	C		E		B			C	B
Approach Delay (s)				58.9						17.0
Approach LOS				E						B

Intersection Summary			
HCM Average Control Delay	28.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	83.7%	ICU Level of Service	E
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	12	12	11	11	12	12	12
Total Lost time (s)		4.0			4.0			4.0	4.0			4.0
Lane Util. Factor		1.00			1.00			1.00	0.95			1.00
Frt		0.93			0.88			1.00	1.00			1.00
Flt Protected		0.98			0.99			0.95	1.00			0.95
Satd. Flow (prot)		1165			1478			1540	3073			1537
Flt Permitted		0.55			0.96			0.32	1.00			0.32
Satd. Flow (perm)		660			1427			519	3073			518
Volume (vph)	10	0	10	30	0	250	35	65	725	5	55	15
Peak-hour factor, PHF	0.59	0.59	0.59	0.72	0.72	0.72	0.97	0.97	0.97	0.97	0.92	0.92
Adj. Flow (vph)	17	0	17	42	0	347	36	67	747	5	60	16
RTOR Reduction (vph)	0	14	0	0	295	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	20	0	0	94	0	0	103	752	0	0	76
Heavy Vehicles (%)	42%	0%	25%	3%	0%	1%	0%	3%	2%	17%	0%	27%
Parking (#/hr)												
Turn Type	Perm			Perm			Perm	pm+pt			Perm	pm+pt
Protected Phases		4			8			5	2			1
Permitted Phases	4			8			2	2			6	6
Actuated Green, G (s)		14.0			14.0			62.4	57.1			61.2
Effective Green, g (s)		15.0			15.0			64.4	58.1			63.2
Actuated g/C Ratio		0.15			0.15			0.64	0.58			0.63
Clearance Time (s)		5.0			5.0			5.0	5.0			5.0
Vehicle Extension (s)		3.0			3.0			3.0	3.0			3.0
Lane Grp Cap (vph)		99			214			399	1785			385
v/s Ratio Prot								c0.02	c0.24			0.01
v/s Ratio Perm		0.03			c0.07			0.15				0.11
v/c Ratio		0.20			0.44			0.26	0.42			0.20
Uniform Delay, d1		37.2			38.7			7.2	11.6			7.4
Progression Factor		1.00			1.41			1.00	1.00			0.85
Incremental Delay, d2		1.0			1.2			0.3	0.7			0.2
Delay (s)		38.2			55.7			7.5	12.4			6.5
Level of Service		D			E			A	B			A
Approach Delay (s)		38.2			55.7				11.8			
Approach LOS		D			E				B			

Intersection Summary			
HCM Average Control Delay	18.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	17.2
Intersection Capacity Utilization	56.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	SWT	SWR
Lane Configurations		
Ideal Flow (vphpl)	1900	1900
Lane Width	12	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	3124	1171
Flt Permitted	1.00	1.00
Satd. Flow (perm)	3124	1171
Volume (vph)	675	140
Peak-hour factor, PHF	0.92	0.92
Adj. Flow (vph)	734	152
RTOR Reduction (vph)	0	65
Lane Group Flow (vph)	734	87
Heavy Vehicles (%)	4%	8%
Parking (#/hr)		0
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	56.5	56.5
Effective Green, g (s)	57.5	57.5
Actuated g/C Ratio	0.58	0.58
Clearance Time (s)	5.0	5.0
Vehicle Extension (s)	3.0	3.0
Lane Grp Cap (vph)	1796	673
v/s Ratio Prot	0.23	
v/s Ratio Perm		0.07
v/c Ratio	0.41	0.13
Uniform Delay, d1	11.8	9.8
Progression Factor	0.67	0.46
Incremental Delay, d2	0.6	0.3
Delay (s)	8.5	4.8
Level of Service	A	A
Approach Delay (s)	7.7	
Approach LOS	A	

Intersection Summary

Saturday

Movement	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	12	11	12	12	12	12	10	10	12	12	12	12
Total Lost time (s)		4.0					4.0	4.0				
Lane Util. Factor		0.95					1.00	1.00				
Frpb, ped/bikes		0.95					1.00	0.83				
Flpb, ped/bikes		0.94					0.46	1.00				
Frt		0.99					1.00	0.91				
Flt Protected		1.00					0.95	1.00				
Satd. Flow (prot)		2732					677	1167				
Flt Permitted		1.00					0.95	1.00				
Satd. Flow (perm)		2732					677	1167				
Volume (vph)	55	665	55	0	0	0	165	145	220	0	0	0
Peak-hour factor, PHF	0.95	0.95	0.95	0.92	0.92	0.92	0.93	0.93	0.93	0.92	0.92	0.92
Adj. Flow (vph)	58	700	58	0	0	0	177	156	237	0	0	0
RTOR Reduction (vph)	0	6	0	0	0	0	0	13	0	0	0	0
Lane Group Flow (vph)	0	810	0	0	0	0	177	380	0	0	0	0
Confl. Peds. (#/hr)	776		460				234		150			
Heavy Vehicles (%)	2%	2%	4%	2%	2%	2%	3%	0%	6%	0%	0%	0%
Parking (#/hr)	0		0									
Turn Type	Perm						Perm					
Protected Phases		2						4				
Permitted Phases	2						4					
Actuated Green, G (s)		50.0					30.0	30.0				
Effective Green, g (s)		51.0					31.0	31.0				
Actuated g/C Ratio		0.57					0.34	0.34				
Clearance Time (s)		5.0					5.0	5.0				
Vehicle Extension (s)		3.0					3.0	3.0				
Lane Grp Cap (vph)		1548					233	402				
v/s Ratio Prot								c0.33				
v/s Ratio Perm		0.30					0.26					
v/c Ratio		0.52					0.76	0.94				
Uniform Delay, d1		12.0					26.2	28.7				
Progression Factor		1.00					1.00	1.00				
Incremental Delay, d2		1.3					13.3	30.9				
Delay (s)		13.3					39.5	59.6				
Level of Service		B					D	E				
Approach Delay (s)		13.3			0.0			53.3			0.0	
Approach LOS		B			A			D			A	

Intersection Summary			
HCM Average Control Delay	29.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	59.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	12	12	12
Total Lost time (s)		4.0			4.0	
Lane Util. Factor		0.91			0.97	
Frt		1.00			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		4235			2964	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		4235			2964	
Volume (vph)	0	920	0	0	370	0
Peak-hour factor, PHF	0.95	0.95	0.92	0.92	0.81	0.81
Adj. Flow (vph)	0	968	0	0	457	0
RTOR Reduction (vph)	0	0	0	0	208	0
Lane Group Flow (vph)	0	968	0	0	249	0
Heavy Vehicles (%)	0%	3%	2%	2%	1%	0%
Parking (#/hr)		0			0	
Turn Type						
Protected Phases		2			4	
Permitted Phases						
Actuated Green, G (s)		69.6			12.4	
Effective Green, g (s)		69.6			12.4	
Actuated g/C Ratio		0.77			0.14	
Clearance Time (s)		4.0			4.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		3275			408	
v/s Ratio Prot		c0.23			c0.08	
v/s Ratio Perm						
v/c Ratio		0.30			0.61	
Uniform Delay, d1		3.0			36.5	
Progression Factor		0.71			1.00	
Incremental Delay, d2		0.2			2.7	
Delay (s)		2.3			39.2	
Level of Service		A			D	
Approach Delay (s)		2.3	0.0		39.2	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	14.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	38.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↱					↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	11
Total Lost time (s)	4.0					4.0
Lane Util. Factor	0.95					1.00
Frt	0.96					0.86
Flt Protected	1.00					1.00
Satd. Flow (prot)	2950					1430
Flt Permitted	1.00					1.00
Satd. Flow (perm)	2950					1430
Volume (vph)	810	340	0	0	0	415
Peak-hour factor, PHF	0.97	0.97	0.92	0.92	0.83	0.83
Adj. Flow (vph)	835	351	0	0	0	500
RTOR Reduction (vph)	52	0	0	0	0	167
Lane Group Flow (vph)	1134	0	0	0	0	333
Heavy Vehicles (%)	0%	0%	2%	2%	0%	0%
Parking (#/hr)	0	0				
Turn Type						custom
Protected Phases	2					8
Permitted Phases						
Actuated Green, G (s)	61.0					21.0
Effective Green, g (s)	61.0					21.0
Actuated g/C Ratio	0.68					0.23
Clearance Time (s)	4.0					4.0
Vehicle Extension (s)	3.0					3.0
Lane Grp Cap (vph)	1999					334
v/s Ratio Prot	c0.38					c0.23
v/s Ratio Perm						
v/c Ratio	0.57					1.00
Uniform Delay, d1	7.6					34.5
Progression Factor	1.64					0.82
Incremental Delay, d2	1.1					47.9
Delay (s)	13.6					76.3
Level of Service	B					E
Approach Delay (s)	13.6			0.0	76.3	
Approach LOS	B			A	E	

Intersection Summary			
HCM Average Control Delay	32.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	72.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	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	
Lane Util. Factor		0.91									0.95	
Frpb, ped/bikes		0.94									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.98									1.00	
Flt Protected		1.00									0.98	
Satd. Flow (prot)		4060									3009	
Flt Permitted		1.00									0.98	
Satd. Flow (perm)		4060									3009	
Volume (vph)	0	1130	140	0	0	0	0	0	0	190	255	0
Peak-hour factor, PHF	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.90	0.90	0.90
Adj. Flow (vph)	0	1215	151	0	0	0	0	0	0	211	283	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	47	0
Lane Group Flow (vph)	0	1366	0	0	0	0	0	0	0	0	447	0
Confl. Peds. (#/hr)			1700			929						
Heavy Vehicles (%)	0%	3%	1%	2%	2%	2%	2%	2%	2%	1%	0%	0%
Parking (#/hr)		0	0							0	0	
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		64.3									17.7	
Effective Green, g (s)		64.3									17.7	
Actuated g/C Ratio		0.71									0.20	
Clearance Time (s)		4.0									4.0	
Vehicle Extension (s)		3.0									3.0	
Lane Grp Cap (vph)		2901									592	
v/s Ratio Prot		c0.34										
v/s Ratio Perm											0.15	
v/c Ratio		0.47									0.76	
Uniform Delay, d1		5.5									34.1	
Progression Factor		0.72									1.00	
Incremental Delay, d2		0.4									5.5	
Delay (s)		4.4									39.6	
Level of Service		A									D	
Approach Delay (s)		4.4			0.0			0.0			39.6	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM Average Control Delay	13.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBL	NBR2	SBL	SBT	SBR	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	12	16	12	12	12	12	10	12
Total Lost time (s)	4.0	4.0		4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		0.95		0.76			1.00	0.91
Frpb, ped/bikes	1.00	1.00		0.85		1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00		0.84		1.00			1.00	1.00
Frt	1.00	0.85		0.93		0.85			1.00	1.00
Flt Protected	0.95	1.00		0.98		1.00			0.95	1.00
Satd. Flow (prot)	1516	1357		2382		3250			1505	4489
Flt Permitted	0.18	1.00		0.98		1.00			0.95	1.00
Satd. Flow (perm)	293	1357		2382		3250			1505	4489
Volume (vph)	35	160	315	35	295	890	20	200	45	690
Peak-hour factor, PHF	0.79	0.79	0.96	0.96	0.96	0.90	0.90	0.97	0.97	0.97
Adj. Flow (vph)	44	203	328	36	307	989	22	206	46	711
RTOR Reduction (vph)	0	151	0	0	0	2	0	0	25	0
Lane Group Flow (vph)	44	52	0	671	0	1009	0	0	227	711
Confl. Peds. (#/hr)	175	178	178		175					
Heavy Vehicles (%)	0%	0%	1%	0%	1%	2%	0%	0%	4%	4%
Parking (#/hr)			0		0					
Turn Type	D.Pm	custom	Perm			custom		custom	custom	
Protected Phases		4		4		3		1 2	1 2	2 3
Permitted Phases	4		4					1 2 3 4	1 2	
Actuated Green, G (s)	23.0	23.0		23.0		26.7			28.3	41.5
Effective Green, g (s)	23.0	23.0		23.0		26.7			28.3	41.5
Actuated g/C Ratio	0.26	0.26		0.26		0.30			0.31	0.46
Clearance Time (s)	4.0	4.0		4.0		4.0				
Vehicle Extension (s)	3.0	3.0		3.0		3.0				
Lane Grp Cap (vph)	75	347		609		964			473	2070
v/s Ratio Prot		0.04				c0.31			c0.15	0.16
v/s Ratio Perm	0.15			0.28						
v/c Ratio	0.59	0.15		1.10		1.05			0.48	0.34
Uniform Delay, d1	29.3	25.9		33.5		31.6			24.9	15.5
Progression Factor	1.00	1.00		0.82		0.63			1.00	1.00
Incremental Delay, d2	11.2	0.2		66.2		40.4			0.8	0.1
Delay (s)	40.5	26.1		93.7		60.2			25.7	15.6
Level of Service	D	C		F		E			C	B
Approach Delay (s)				93.7						18.3
Approach LOS				F						B

Intersection Summary			
HCM Average Control Delay	51.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	95.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	12	12	11	11	12	12	12
Total Lost time (s)		4.0			4.0			4.0	4.0			4.0
Lane Util. Factor		1.00			1.00			1.00	0.95			1.00
Frt		0.92			0.90			1.00	1.00			1.00
Flt Protected		0.98			0.99			0.95	1.00			0.95
Satd. Flow (prot)		1417			1514			1570	3040			1611
Flt Permitted		0.80			0.91			0.29	1.00			0.27
Satd. Flow (perm)		1160			1395			482	3040			458
Volume (vph)	10	0	15	65	10	195	40	75	695	10	55	15
Peak-hour factor, PHF	0.61	0.61	0.61	0.88	0.88	0.88	0.86	0.86	0.86	0.86	0.98	0.98
Adj. Flow (vph)	16	0	25	74	11	222	47	87	808	12	56	15
RTOR Reduction (vph)	0	20	0	0	99	0	0	0	1	0	0	0
Lane Group Flow (vph)	0	21	0	0	208	0	0	134	819	0	0	71
Heavy Vehicles (%)	5%	0%	11%	0%	0%	1%	0%	0%	3%	8%	0%	4%
Parking (#/hr)												
Turn Type	Perm			Perm			Perm	pm+pt			Perm	pm+pt
Protected Phases		4			8			5	2			1
Permitted Phases	4			8			2	2			6	6
Actuated Green, G (s)		18.5			18.5			49.6	41.8			45.0
Effective Green, g (s)		19.5			19.5			51.6	42.8			47.0
Actuated g/C Ratio		0.22			0.22			0.57	0.48			0.52
Clearance Time (s)		5.0			5.0			5.0	5.0			5.0
Vehicle Extension (s)		3.0			3.0			3.0	3.0			3.0
Lane Grp Cap (vph)		251			302			383	1446			322
v/s Ratio Prot								c0.03	c0.27			0.02
v/s Ratio Perm		0.02			c0.15			0.17				0.10
v/c Ratio		0.09			0.69			0.35	0.57			0.22
Uniform Delay, d1		28.1			32.4			9.8	16.9			11.2
Progression Factor		1.00			1.83			1.00	1.00			1.16
Incremental Delay, d2		0.1			5.3			0.6	1.6			0.3
Delay (s)		28.3			64.7			10.3	18.6			13.3
Level of Service		C			E			B	B			B
Approach Delay (s)		28.3			64.7				17.4			
Approach LOS		C			E				B			

Intersection Summary			
HCM Average Control Delay	22.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	21.2
Intersection Capacity Utilization	58.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	SWT	SWR
Lane Configurations		
Ideal Flow (vphpl)	1900	1900
Lane Width	12	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	3154	1228
Flt Permitted	1.00	1.00
Satd. Flow (perm)	3154	1228
Volume (vph)	675	140
Peak-hour factor, PHF	0.98	0.98
Adj. Flow (vph)	689	143
RTOR Reduction (vph)	0	79
Lane Group Flow (vph)	689	64
Heavy Vehicles (%)	3%	3%
Parking (#/hr)		0
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	39.5	39.5
Effective Green, g (s)	40.5	40.5
Actuated g/C Ratio	0.45	0.45
Clearance Time (s)	5.0	5.0
Vehicle Extension (s)	3.0	3.0
Lane Grp Cap (vph)	1419	553
v/s Ratio Prot	0.22	
v/s Ratio Perm		0.05
v/c Ratio	0.49	0.12
Uniform Delay, d1	17.4	14.4
Progression Factor	0.72	0.50
Incremental Delay, d2	1.0	0.4
Delay (s)	13.5	7.6
Level of Service	B	A
Approach Delay (s)	12.6	
Approach LOS	B	

Intersection Summary

2011 Build Conditions – Mitigation (Both projects)

Morning (AM)

Movement	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	12	11	12	12	12	12	10	12	10	12	12	12
Total Lost time (s)		4.0					4.0	4.0				
Lane Util. Factor		0.95					1.00	1.00				
Frpb, ped/bikes		0.91					1.00	0.84				
Flpb, ped/bikes		0.93					0.64	1.00				
Frt		0.97					1.00	0.91				
Flt Protected		0.99					0.95	1.00				
Satd. Flow (prot)		2360					879	1142				
Flt Permitted		0.99					0.95	1.00				
Satd. Flow (perm)		2360					879	1142				
Volume (vph)	70	390	95	0	0	0	180	125	195	0	0	0
Peak-hour factor, PHF	0.92	0.94	0.94	0.92	0.92	0.92	0.94	0.92	0.94	0.92	0.92	0.92
Adj. Flow (vph)	76	415	101	0	0	0	191	136	207	0	0	0
RTOR Reduction (vph)	0	14	0	0	0	0	0	61	0	0	0	0
Lane Group Flow (vph)	0	578	0	0	0	0	191	282	0	0	0	0
Confl. Peds. (#/hr)	138		150				107		126			
Heavy Vehicles (%)	6%	11%	3%	2%	2%	2%	11%	4%	22%	2%	2%	2%
Parking (#/hr)	0		0									
Turn Type	Perm						Perm					
Protected Phases		2						4				
Permitted Phases	2						4					
Actuated Green, G (s)		64.2					27.8	27.8				
Effective Green, g (s)		64.2					27.8	27.8				
Actuated g/C Ratio		0.64					0.28	0.28				
Clearance Time (s)		4.0					4.0	4.0				
Vehicle Extension (s)		3.0					3.0	3.0				
Lane Grp Cap (vph)		1515					244	317				
v/s Ratio Prot								c0.25				
v/s Ratio Perm		0.24					0.22					
v/c Ratio		0.38					0.78	0.89				
Uniform Delay, d1		8.5					33.3	34.6				
Progression Factor		1.00					1.00	1.00				
Incremental Delay, d2		0.7					15.0	25.2				
Delay (s)		9.2					48.3	59.9				
Level of Service		A					D	E				
Approach Delay (s)		9.2			0.0			55.7			0.0	
Approach LOS		A			A			E			A	

Intersection Summary			
HCM Average Control Delay	31.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	50.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	12	12	12
Total Lost time (s)		4.0			4.0	
Lane Util. Factor		0.91			0.97	
Frt		1.00			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		3793			2722	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		3793			2722	
Volume (vph)	0	540	0	0	260	0
Peak-hour factor, PHF	0.92	0.87	0.92	0.92	0.87	0.92
Adj. Flow (vph)	0	621	0	0	299	0
RTOR Reduction (vph)	0	0	0	0	274	0
Lane Group Flow (vph)	0	621	0	0	25	0
Heavy Vehicles (%)	2%	15%	2%	2%	10%	2%
Parking (#/hr)	0	0			0	
Turn Type						
Protected Phases		2			4	
Permitted Phases						
Actuated Green, G (s)		83.6			8.4	
Effective Green, g (s)		83.6			8.4	
Actuated g/C Ratio		0.84			0.08	
Clearance Time (s)		4.0			4.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		3171			229	
v/s Ratio Prot		c0.16			c0.01	
v/s Ratio Perm						
v/c Ratio		0.20			0.11	
Uniform Delay, d1		1.6			42.3	
Progression Factor		0.95			1.00	
Incremental Delay, d2		0.1			0.2	
Delay (s)		1.6			42.6	
Level of Service		A			D	
Approach Delay (s)		1.6	0.0		42.6	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	14.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.19		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	26.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	11
Total Lost time (s)	4.0					4.0
Lane Util. Factor	0.95					1.00
Frt	0.94					0.86
Flt Protected	1.00					1.00
Satd. Flow (prot)	2727					1375
Flt Permitted	1.00					1.00
Satd. Flow (perm)	2727					1375
Volume (vph)	485	305	0	0	0	135
Peak-hour factor, PHF	0.86	0.86	0.92	0.92	0.92	0.74
Adj. Flow (vph)	564	355	0	0	0	182
RTOR Reduction (vph)	54	0	0	0	0	168
Lane Group Flow (vph)	865	0	0	0	0	14
Heavy Vehicles (%)	7%	6%	2%	2%	2%	4%
Parking (#/hr)	0	0				
Turn Type						custom
Protected Phases	2					4
Permitted Phases						
Actuated Green, G (s)	84.2					7.8
Effective Green, g (s)	84.2					7.8
Actuated g/C Ratio	0.84					0.08
Clearance Time (s)	4.0					4.0
Vehicle Extension (s)	3.0					3.0
Lane Grp Cap (vph)	2296					107
v/s Ratio Prot	c0.32					c0.01
v/s Ratio Perm						
v/c Ratio	0.38					0.13
Uniform Delay, d1	1.8					42.9
Progression Factor	0.51					1.00
Incremental Delay, d2	0.5					0.6
Delay (s)	1.4					43.5
Level of Service	A					D
Approach Delay (s)	1.4			0.0	43.5	
Approach LOS	A			A	D	

Intersection Summary			
HCM Average Control Delay	8.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	41.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	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	
Lane Util. Factor		0.91									0.95	
Frpb, ped/bikes		0.94									1.00	
Flpb, ped/bikes		1.00									0.89	
Frt		0.97									1.00	
Flt Protected		1.00									0.98	
Satd. Flow (prot)		3611									2582	
Flt Permitted		1.00									0.98	
Satd. Flow (perm)		3611									2582	
Volume (vph)	0	510	115	0	0	0	0	0	0	105	210	0
Peak-hour factor, PHF	0.91	0.91	0.91	0.92	0.92	0.92	0.92	0.92	0.92	0.86	0.86	0.86
Adj. Flow (vph)	0	560	126	0	0	0	0	0	0	122	244	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	79	0
Lane Group Flow (vph)	0	686	0	0	0	0	0	0	0	0	287	0
Confl. Peds. (#/hr)			310							267		
Heavy Vehicles (%)	2%	15%	10%	2%	2%	2%	2%	2%	2%	8%	3%	2%
Parking (#/hr)		0	0							0	0	
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		76.1									15.9	
Effective Green, g (s)		76.1									15.9	
Actuated g/C Ratio		0.76									0.16	
Clearance Time (s)		4.0									4.0	
Vehicle Extension (s)		3.0									3.0	
Lane Grp Cap (vph)		2748									411	
v/s Ratio Prot		c0.19										
v/s Ratio Perm											0.11	
v/c Ratio		0.25									0.70	
Uniform Delay, d1		3.5									39.8	
Progression Factor		0.52									1.00	
Incremental Delay, d2		0.2									5.1	
Delay (s)		2.0									44.9	
Level of Service		A									D	
Approach Delay (s)		2.0			0.0			0.0			44.9	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM Average Control Delay	16.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	34.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBL	NBR2	SBL	SBT	SBR	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	12	16	12	12	12	12	10	12
Total Lost time (s)	4.0	4.0		4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		0.95		0.76			1.00	0.91
Frpb, ped/bikes	1.00	1.00		0.96		1.00			1.00	1.00
Flpb, ped/bikes	0.96	1.00		0.95		1.00			1.00	1.00
Frt	1.00	0.85		0.94		0.85			1.00	1.00
Flt Protected	0.95	1.00		0.98		1.00			0.95	1.00
Satd. Flow (prot)	1449	1357		2886		3135			1418	4095
Flt Permitted	0.42	1.00		0.98		1.00			0.95	1.00
Satd. Flow (perm)	639	1357		2886		3135			1418	4095
Volume (vph)	30	80	160	35	145	560	15	60	105	550
Peak-hour factor, PHF	0.78	0.78	0.98	0.98	0.98	0.91	0.91	0.94	0.94	0.94
Adj. Flow (vph)	38	103	163	36	148	615	16	64	112	585
RTOR Reduction (vph)	0	81	0	0	0	2	0	0	21	0
Lane Group Flow (vph)	38	22	0	347	0	629	0	0	155	585
Confl. Peds. (#/hr)	36	41	41		36					
Heavy Vehicles (%)	0%	0%	8%	0%	6%	5%	33%	19%	0%	14%
Parking (#/hr)			0		0					
Turn Type	D.Pm	custom	Perm			custom		custom	custom	
Protected Phases		4		4		3		1 2	1 2	2 3
Permitted Phases	4		4					1 2 3 4	1 2	
Actuated Green, G (s)	21.3	21.3		21.3		27.7			39.0	50.2
Effective Green, g (s)	21.3	21.3		21.3		27.7			39.0	50.2
Actuated g/C Ratio	0.21	0.21		0.21		0.28			0.39	0.50
Clearance Time (s)	4.0	4.0		4.0		4.0				
Vehicle Extension (s)	3.0	3.0		3.0		3.0				
Lane Grp Cap (vph)	136	289		615		868			553	2056
v/s Ratio Prot		0.02				c0.20			c0.11	0.14
v/s Ratio Perm	0.06			0.12						
v/c Ratio	0.28	0.08		0.56		0.72			0.28	0.28
Uniform Delay, d1	32.9	31.5		35.2		32.7			20.9	14.5
Progression Factor	1.00	1.00		0.64		0.73			1.00	1.00
Incremental Delay, d2	1.1	0.1		1.0		5.1			0.3	0.3
Delay (s)	34.1	31.6		23.6		29.1			21.2	14.8
Level of Service	C	C		C		C			C	B
Approach Delay (s)				23.6						16.3
Approach LOS				C						B

Intersection Summary			
HCM Average Control Delay	23.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	60.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	12	12	11	11	12	12	12
Total Lost time (s)		4.0			4.0			4.0	4.0			4.0
Lane Util. Factor		1.00			1.00			1.00	0.95			1.00
Frt		0.93			0.89			1.00	1.00			1.00
Flt Protected		0.98			0.99			0.95	1.00			0.95
Satd. Flow (prot)		1220			1393			1542	3020			1540
Flt Permitted		0.65			0.93			0.37	1.00			0.42
Satd. Flow (perm)		815			1303			597	3020			686
Volume (vph)	10	0	10	25	0	100	35	55	500	0	35	20
Peak-hour factor, PHF	0.70	0.70	0.70	0.83	0.83	0.83	0.90	0.90	0.90	0.90	0.92	0.92
Adj. Flow (vph)	14	0	14	30	0	120	39	61	556	0	38	22
RTOR Reduction (vph)	0	13	0	0	107	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	15	0	0	43	0	0	100	556	0	0	60
Heavy Vehicles (%)	31%	0%	24%	2%	0%	10%	0%	3%	4%	33%	0%	15%
Parking (#/hr)												
Turn Type	Perm			Perm			Perm	pm+pt			Perm	pm+pt
Protected Phases		4			8			5	2			1
Permitted Phases	4			8			2	2			6	6
Actuated Green, G (s)		9.5			9.5			66.8	61.0			65.8
Effective Green, g (s)		10.5			10.5			68.8	62.0			67.8
Actuated g/C Ratio		0.10			0.10			0.69	0.62			0.68
Clearance Time (s)		5.0			5.0			5.0	5.0			5.0
Vehicle Extension (s)		3.0			3.0			3.0	3.0			3.0
Lane Grp Cap (vph)		86			137			475	1872			519
v/s Ratio Prot								c0.01	0.18			0.01
v/s Ratio Perm		0.02			c0.03			0.13				0.07
v/c Ratio		0.18			0.31			0.21	0.30			0.12
Uniform Delay, d1		40.8			41.4			5.4	8.8			5.4
Progression Factor		1.00			1.20			1.00	1.00			0.57
Incremental Delay, d2		1.0			1.2			0.2	0.4			0.1
Delay (s)		41.8			51.0			5.6	9.3			3.2
Level of Service		D			D			A	A			A
Approach Delay (s)		41.8			51.0				8.7			
Approach LOS		D			D				A			

Intersection Summary			
HCM Average Control Delay	11.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.2
Intersection Capacity Utilization	42.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SWT	SWR
Lane Configurations		
Ideal Flow (vphpl)	1900	1900
Lane Width	12	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	2981	1045
Flt Permitted	1.00	1.00
Satd. Flow (perm)	2981	1045
Volume (vph)	600	70
Peak-hour factor, PHF	0.92	0.92
Adj. Flow (vph)	652	76
RTOR Reduction (vph)	0	29
Lane Group Flow (vph)	652	47
Heavy Vehicles (%)	9%	21%
Parking (#/hr)		0
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	60.5	60.5
Effective Green, g (s)	61.5	61.5
Actuated g/C Ratio	0.62	0.62
Clearance Time (s)	5.0	5.0
Vehicle Extension (s)	3.0	3.0
Lane Grp Cap (vph)	1833	643
v/s Ratio Prot	c0.22	
v/s Ratio Perm		0.04
v/c Ratio	0.36	0.07
Uniform Delay, d1	9.5	7.8
Progression Factor	0.59	0.50
Incremental Delay, d2	0.5	0.2
Delay (s)	6.1	4.1
Level of Service	A	A
Approach Delay (s)	5.7	
Approach LOS	A	

Intersection Summary

Evening (PM)

Movement	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	12	11	12	12	12	12	10	12	10	12	12	12
Total Lost time (s)		4.0					4.0	4.0				
Lane Util. Factor		0.95					1.00	1.00				
Frpb, ped/bikes		0.93					1.00	0.82				
Flpb, ped/bikes		0.93					0.44	1.00				
Frt		0.98					1.00	0.91				
Flt Protected		1.00					0.95	1.00				
Satd. Flow (prot)		2568					635	1210				
Flt Permitted		1.00					0.95	1.00				
Satd. Flow (perm)		2568					635	1210				
Volume (vph)	95	740	125	0	0	0	230	200	300	0	0	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.92	0.92	0.92	0.94	0.94	0.94	0.92	0.92	0.92
Adj. Flow (vph)	106	822	139	0	0	0	245	213	319	0	0	0
RTOR Reduction (vph)	0	12	0	0	0	0	0	43	0	0	0	0
Lane Group Flow (vph)	0	1055	0	0	0	0	245	489	0	0	0	0
Confl. Peds. (#/hr)	609		254				234		150			
Heavy Vehicles (%)	2%	3%	1%	2%	2%	2%	6%	2%	7%	2%	2%	2%
Parking (#/hr)	0		0									
Turn Type	Perm						Perm					
Protected Phases		2						4				
Permitted Phases	2						4					
Actuated Green, G (s)		62.0					30.0	30.0				
Effective Green, g (s)		62.0					30.0	30.0				
Actuated g/C Ratio		0.62					0.30	0.30				
Clearance Time (s)		4.0					4.0	4.0				
Vehicle Extension (s)		3.0					3.0	3.0				
Lane Grp Cap (vph)		1592					191	363				
v/s Ratio Prot								c0.40				
v/s Ratio Perm		0.41					0.39					
v/c Ratio		0.66					1.28	1.35				
Uniform Delay, d1		12.3					35.0	35.0				
Progression Factor		1.00					1.00	1.00				
Incremental Delay, d2		2.2					161.0	173.1				
Delay (s)		14.4					196.0	208.1				
Level of Service		B					F	F				
Approach Delay (s)		14.4			0.0			204.3			0.0	
Approach LOS		B			A			F			A	

Intersection Summary			
HCM Average Control Delay	94.4	HCM Level of Service	F
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	74.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	12	12	12
Total Lost time (s)		4.0			4.0	
Lane Util. Factor		0.91			0.97	
Frt		1.00			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		4115			2964	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		4115			2964	
Volume (vph)	0	870	0	0	405	0
Peak-hour factor, PHF	0.88	0.88	0.92	0.92	0.84	0.84
Adj. Flow (vph)	0	989	0	0	482	0
RTOR Reduction (vph)	0	0	0	0	250	0
Lane Group Flow (vph)	0	989	0	0	232	0
Heavy Vehicles (%)	0%	6%	2%	2%	1%	0%
Parking (#/hr)		0			0	
Turn Type						
Protected Phases		2			7	
Permitted Phases						
Actuated Green, G (s)		79.5			12.5	
Effective Green, g (s)		79.5			12.5	
Actuated g/C Ratio		0.80			0.12	
Clearance Time (s)		4.0			4.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		3271			371	
v/s Ratio Prot		c0.24			c0.08	
v/s Ratio Perm						
v/c Ratio		0.30			0.62	
Uniform Delay, d1		2.8			41.5	
Progression Factor		1.73			1.00	
Incremental Delay, d2		0.1			3.3	
Delay (s)		4.9			44.8	
Level of Service		A			D	
Approach Delay (s)		4.9	0.0		44.8	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	18.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	38.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↱					↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	11
Total Lost time (s)	4.0					4.0
Lane Util. Factor	0.95					1.00
Frt	0.95					0.86
Flt Protected	1.00					1.00
Satd. Flow (prot)	2915					1416
Flt Permitted	1.00					1.00
Satd. Flow (perm)	2915					1416
Volume (vph)	795	390	0	0	0	295
Peak-hour factor, PHF	0.96	0.96	0.92	0.92	0.85	0.85
Adj. Flow (vph)	828	406	0	0	0	347
RTOR Reduction (vph)	37	0	0	0	0	100
Lane Group Flow (vph)	1197	0	0	0	0	247
Heavy Vehicles (%)	1%	0%	2%	2%	0%	1%
Parking (#/hr)	0	0				
Turn Type						custom
Protected Phases	2					8
Permitted Phases						
Actuated Green, G (s)	69.8					22.2
Effective Green, g (s)	69.8					22.2
Actuated g/C Ratio	0.70					0.22
Clearance Time (s)	4.0					4.0
Vehicle Extension (s)	3.0					3.0
Lane Grp Cap (vph)	2035					314
v/s Ratio Prot	c0.41					c0.17
v/s Ratio Perm						
v/c Ratio	0.59					0.79
Uniform Delay, d1	7.7					36.7
Progression Factor	1.31					1.16
Incremental Delay, d2	1.2					12.3
Delay (s)	11.4					54.6
Level of Service	B					D
Approach Delay (s)	11.4			0.0	54.6	
Approach LOS	B			A	D	

Intersection Summary			
HCM Average Control Delay	20.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	65.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	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	
Lane Util. Factor		0.91									0.95	
Frpb, ped/bikes		0.93									1.00	
Flpb, ped/bikes		1.00									0.89	
Frt		0.97									1.00	
Flt Protected		1.00									0.98	
Satd. Flow (prot)		3860									2665	
Flt Permitted		1.00									0.98	
Satd. Flow (perm)		3860									2665	
Volume (vph)	0	925	185	0	0	0	0	0	0	190	350	0
Peak-hour factor, PHF	0.94	0.94	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.89	0.89	0.89
Adj. Flow (vph)	0	984	197	0	0	0	0	0	0	213	393	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	81	0
Lane Group Flow (vph)	0	1181	0	0	0	0	0	0	0	0	525	0
Confl. Peds. (#/hr)			680							240		
Heavy Vehicles (%)	0%	6%	4%	0%	0%	0%	0%	0%	0%	1%	1%	0%
Parking (#/hr)		0	0							0	0	
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		68.0									24.0	
Effective Green, g (s)		68.0									24.0	
Actuated g/C Ratio		0.68									0.24	
Clearance Time (s)		4.0									4.0	
Vehicle Extension (s)		3.0									3.0	
Lane Grp Cap (vph)		2625									640	
v/s Ratio Prot		c0.31										
v/s Ratio Perm											0.20	
v/c Ratio		0.45									0.82	
Uniform Delay, d1		7.4									36.0	
Progression Factor		1.06									1.00	
Incremental Delay, d2		0.4									8.1	
Delay (s)		8.3									44.1	
Level of Service		A									D	
Approach Delay (s)		8.3			0.0			0.0			44.1	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM Average Control Delay	20.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	49.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBL	NBR2	SBL	SBT	SBR	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	12	16	12	12	12	12	10	12
Total Lost time (s)	4.0	4.0		4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		0.95		0.76			1.00	0.91
Frpb, ped/bikes	1.00	1.00		0.89		1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00		0.85		1.00			1.00	1.00
Frt	1.00	0.85		0.93		0.85			1.00	1.00
Flt Protected	0.95	1.00		0.98		1.00			0.95	1.00
Satd. Flow (prot)	1516	1357		2498		3251			1478	4363
Flt Permitted	0.20	1.00		0.98		1.00			0.95	1.00
Satd. Flow (perm)	317	1357		2498		3251			1478	4363
Volume (vph)	55	170	325	25	290	805	20	60	55	525
Peak-hour factor, PHF	0.82	0.82	0.92	0.92	0.92	0.92	0.92	0.88	0.88	0.88
Adj. Flow (vph)	67	207	353	27	315	875	22	68	62	597
RTOR Reduction (vph)	0	147	0	0	0	2	0	0	44	0
Lane Group Flow (vph)	67	60	0	695	0	895	0	0	87	597
Confl. Peds. (#/hr)	90	115	115		90					
Heavy Vehicles (%)	0%	0%	2%	0%	3%	2%	0%	5%	0%	7%
Parking (#/hr)			0		0					
Turn Type	D.Pm	custom	Perm			custom		custom	custom	
Protected Phases		4		4		3		1 2	1 2!	2 3
Permitted Phases	4		4			2!		1 2 3 4	1 2	
Actuated Green, G (s)	29.0	29.0		29.0		45.7			27.5	49.7
Effective Green, g (s)	29.0	29.0		29.0		45.7			27.5	49.7
Actuated g/C Ratio	0.29	0.29		0.29		0.46			0.28	0.50
Clearance Time (s)	4.0	4.0		4.0		4.0				
Vehicle Extension (s)	3.0	3.0		3.0		3.0				
Lane Grp Cap (vph)	92	394		724		1616			406	2168
v/s Ratio Prot		0.04				c0.17			c0.06	0.14
v/s Ratio Perm	0.21			0.28		0.10				
v/c Ratio	0.73	0.15		0.96		0.55			0.21	0.28
Uniform Delay, d1	32.0	26.4		34.9		19.7			27.9	14.7
Progression Factor	1.00	1.00		1.11		0.63			1.00	1.00
Incremental Delay, d2	24.8	0.2		20.5		0.4			0.3	0.1
Delay (s)	56.7	26.6		59.2		12.8			28.2	14.7
Level of Service	E	C		E		B			C	B
Approach Delay (s)				59.2						17.1
Approach LOS				E						B

Intersection Summary			
HCM Average Control Delay	28.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	84.1%	ICU Level of Service	E
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	12	12	11	11	12	12	12
Total Lost time (s)		4.0			4.0			4.0	4.0			4.0
Lane Util. Factor		1.00			1.00			1.00	0.95			1.00
Frt		0.93			0.88			1.00	1.00			1.00
Flt Protected		0.98			0.99			0.95	1.00			0.95
Satd. Flow (prot)		1165			1478			1540	3073			1537
Flt Permitted		0.55			0.96			0.32	1.00			0.32
Satd. Flow (perm)		661			1427			515	3073			518
Volume (vph)	10	0	10	30	0	250	35	65	725	5	55	15
Peak-hour factor, PHF	0.59	0.59	0.59	0.72	0.72	0.72	0.97	0.97	0.97	0.97	0.92	0.92
Adj. Flow (vph)	17	0	17	42	0	347	36	67	747	5	60	16
RTOR Reduction (vph)	0	14	0	0	295	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	20	0	0	94	0	0	103	752	0	0	76
Heavy Vehicles (%)	42%	0%	25%	3%	0%	1%	0%	3%	2%	17%	0%	27%
Parking (#/hr)												
Turn Type	Perm			Perm			Perm	pm+pt			Perm	pm+pt
Protected Phases		4			8			5	2			1
Permitted Phases	4			8			2	2			6	6
Actuated Green, G (s)		14.1			14.1			62.3	57.0			61.1
Effective Green, g (s)		15.1			15.1			64.3	58.0			63.1
Actuated g/C Ratio		0.15			0.15			0.64	0.58			0.63
Clearance Time (s)		5.0			5.0			5.0	5.0			5.0
Vehicle Extension (s)		3.0			3.0			3.0	3.0			3.0
Lane Grp Cap (vph)		100			215			396	1782			385
v/s Ratio Prot								c0.02	c0.24			0.01
v/s Ratio Perm		0.03			c0.07			0.15				0.11
v/c Ratio		0.20			0.44			0.26	0.42			0.20
Uniform Delay, d1		37.1			38.6			7.2	11.7			7.5
Progression Factor		1.00			1.40			1.00	1.00			0.84
Incremental Delay, d2		1.0			1.2			0.4	0.7			0.2
Delay (s)		38.1			55.0			7.6	12.4			6.5
Level of Service		D			E			A	B			A
Approach Delay (s)		38.1			55.0				11.8			
Approach LOS		D			E				B			

Intersection Summary			
HCM Average Control Delay	18.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	17.2
Intersection Capacity Utilization	56.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	SWT	SWR
Lane Configurations		
Ideal Flow (vphpl)	1900	1900
Lane Width	12	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	3124	1171
Flt Permitted	1.00	1.00
Satd. Flow (perm)	3124	1171
Volume (vph)	680	140
Peak-hour factor, PHF	0.92	0.92
Adj. Flow (vph)	739	152
RTOR Reduction (vph)	0	65
Lane Group Flow (vph)	739	87
Heavy Vehicles (%)	4%	8%
Parking (#/hr)		0
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	56.4	56.4
Effective Green, g (s)	57.4	57.4
Actuated g/C Ratio	0.57	0.57
Clearance Time (s)	5.0	5.0
Vehicle Extension (s)	3.0	3.0
Lane Grp Cap (vph)	1793	672
v/s Ratio Prot	0.24	
v/s Ratio Perm		0.07
v/c Ratio	0.41	0.13
Uniform Delay, d1	11.9	9.8
Progression Factor	0.67	0.46
Incremental Delay, d2	0.6	0.3
Delay (s)	8.6	4.9
Level of Service	A	A
Approach Delay (s)	7.8	
Approach LOS	A	

Intersection Summary

Saturday

Movement	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	12	11	12	12	12	12	10	10	12	12	12	12
Total Lost time (s)		4.0					4.0	4.0				
Lane Util. Factor		0.95					1.00	1.00				
Frpb, ped/bikes		0.96					1.00	0.83				
Flpb, ped/bikes		0.94					0.46	1.00				
Frt		0.99					1.00	0.91				
Flt Protected		1.00					0.95	1.00				
Satd. Flow (prot)		2736					677	1167				
Flt Permitted		1.00					0.95	1.00				
Satd. Flow (perm)		2736					677	1167				
Volume (vph)	55	675	55	0	0	0	165	145	220	0	0	0
Peak-hour factor, PHF	0.95	0.95	0.95	0.92	0.92	0.92	0.93	0.93	0.93	0.92	0.92	0.92
Adj. Flow (vph)	58	711	58	0	0	0	177	156	237	0	0	0
RTOR Reduction (vph)	0	6	0	0	0	0	0	12	0	0	0	0
Lane Group Flow (vph)	0	821	0	0	0	0	177	381	0	0	0	0
Confl. Peds. (#/hr)	776		460				234		150			
Heavy Vehicles (%)	2%	2%	4%	2%	2%	2%	3%	0%	6%	0%	0%	0%
Parking (#/hr)	0		0									
Turn Type	Perm						Perm					
Protected Phases		2						4				
Permitted Phases	2						4					
Actuated Green, G (s)		50.0					30.0	30.0				
Effective Green, g (s)		51.0					31.0	31.0				
Actuated g/C Ratio		0.57					0.34	0.34				
Clearance Time (s)		5.0					5.0	5.0				
Vehicle Extension (s)		3.0					3.0	3.0				
Lane Grp Cap (vph)		1550					233	402				
v/s Ratio Prot								c0.33				
v/s Ratio Perm		0.30					0.26					
v/c Ratio		0.53					0.76	0.95				
Uniform Delay, d1		12.1					26.2	28.7				
Progression Factor		1.00					1.00	1.00				
Incremental Delay, d2		1.3					13.3	31.2				
Delay (s)		13.4					39.5	59.9				
Level of Service		B					D	E				
Approach Delay (s)		13.4			0.0			53.6			0.0	
Approach LOS		B			A			D			A	

Intersection Summary			
HCM Average Control Delay	29.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	59.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	12	12	12
Total Lost time (s)		4.0			4.0	
Lane Util. Factor		0.91			0.97	
Frt		1.00			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		4235			2964	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		4235			2964	
Volume (vph)	0	930	0	0	370	0
Peak-hour factor, PHF	0.95	0.95	0.92	0.92	0.81	0.81
Adj. Flow (vph)	0	979	0	0	457	0
RTOR Reduction (vph)	0	0	0	0	203	0
Lane Group Flow (vph)	0	979	0	0	254	0
Heavy Vehicles (%)	0%	3%	2%	2%	1%	0%
Parking (#/hr)		0			0	
Turn Type						
Protected Phases		2			4	
Permitted Phases						
Actuated Green, G (s)		69.5			12.5	
Effective Green, g (s)		69.5			12.5	
Actuated g/C Ratio		0.77			0.14	
Clearance Time (s)		4.0			4.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		3270			412	
v/s Ratio Prot		c0.23			c0.09	
v/s Ratio Perm						
v/c Ratio		0.30			0.62	
Uniform Delay, d1		3.0			36.5	
Progression Factor		0.70			1.00	
Incremental Delay, d2		0.2			2.7	
Delay (s)		2.3			39.2	
Level of Service		A			D	
Approach Delay (s)		2.3	0.0		39.2	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	14.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	38.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	11
Total Lost time (s)	4.0					4.0
Lane Util. Factor	0.95					1.00
Frt	0.96					0.86
Flt Protected	1.00					1.00
Satd. Flow (prot)	2951					1430
Flt Permitted	1.00					1.00
Satd. Flow (perm)	2951					1430
Volume (vph)	820	340	0	0	0	420
Peak-hour factor, PHF	0.97	0.97	0.92	0.92	0.83	0.83
Adj. Flow (vph)	845	351	0	0	0	506
RTOR Reduction (vph)	51	0	0	0	0	164
Lane Group Flow (vph)	1145	0	0	0	0	342
Heavy Vehicles (%)	0%	0%	2%	2%	0%	0%
Parking (#/hr)	0	0				
Turn Type						custom
Protected Phases	2					8
Permitted Phases						
Actuated Green, G (s)	61.0					21.0
Effective Green, g (s)	61.0					21.0
Actuated g/C Ratio	0.68					0.23
Clearance Time (s)	4.0					4.0
Vehicle Extension (s)	3.0					3.0
Lane Grp Cap (vph)	2000					334
v/s Ratio Prot	c0.39					c0.24
v/s Ratio Perm						
v/c Ratio	0.57					1.02
Uniform Delay, d1	7.6					34.5
Progression Factor	1.64					0.89
Incremental Delay, d2	1.2					55.4
Delay (s)	13.7					86.1
Level of Service	B					F
Approach Delay (s)	13.7			0.0	86.1	
Approach LOS	B			A	F	

Intersection Summary			
HCM Average Control Delay	35.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	72.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	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	
Lane Util. Factor		0.91									0.95	
Frpb, ped/bikes		0.94									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.98									1.00	
Flt Protected		1.00									0.98	
Satd. Flow (prot)		4041									3010	
Flt Permitted		1.00									0.98	
Satd. Flow (perm)		4041									3010	
Volume (vph)	0	1130	150	0	0	0	0	0	0	190	260	0
Peak-hour factor, PHF	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.90	0.90	0.90
Adj. Flow (vph)	0	1215	161	0	0	0	0	0	0	211	289	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	46	0
Lane Group Flow (vph)	0	1376	0	0	0	0	0	0	0	0	454	0
Confl. Peds. (#/hr)			1700			929						
Heavy Vehicles (%)	0%	3%	1%	2%	2%	2%	2%	2%	2%	1%	0%	0%
Parking (#/hr)		0	0							0	0	
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		64.1									17.9	
Effective Green, g (s)		64.1									17.9	
Actuated g/C Ratio		0.71									0.20	
Clearance Time (s)		4.0									4.0	
Vehicle Extension (s)		3.0									3.0	
Lane Grp Cap (vph)		2878									599	
v/s Ratio Prot		c0.34										
v/s Ratio Perm											0.15	
v/c Ratio		0.48									0.76	
Uniform Delay, d1		5.7									34.0	
Progression Factor		0.72									1.00	
Incremental Delay, d2		0.4									5.4	
Delay (s)		4.5									39.4	
Level of Service		A									D	
Approach Delay (s)		4.5			0.0			0.0			39.4	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM Average Control Delay	13.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	50.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBL	NBR2	SBL	SBT	SBR	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	12	16	12	12	12	12	10	12
Total Lost time (s)	4.0	4.0		4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		0.95		0.76			1.00	0.91
Frpb, ped/bikes	1.00	1.00		0.85		1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00		0.84		1.00			1.00	1.00
Frt	1.00	0.85		0.93		0.85			1.00	1.00
Flt Protected	0.95	1.00		0.98		1.00			0.95	1.00
Satd. Flow (prot)	1516	1357		2382		3250			1505	4489
Flt Permitted	0.17	1.00		0.98		1.00			0.95	1.00
Satd. Flow (perm)	278	1357		2382		3250			1505	4489
Volume (vph)	35	160	325	35	300	890	20	200	45	690
Peak-hour factor, PHF	0.79	0.79	0.96	0.96	0.96	0.90	0.90	0.97	0.97	0.97
Adj. Flow (vph)	44	203	339	36	312	989	22	206	46	711
RTOR Reduction (vph)	0	151	0	0	0	2	0	0	26	0
Lane Group Flow (vph)	44	52	0	687	0	1009	0	0	226	711
Confl. Peds. (#/hr)	175	178	178		175					
Heavy Vehicles (%)	0%	0%	1%	0%	1%	2%	0%	0%	4%	4%
Parking (#/hr)			0		0					
Turn Type	D.Pm	custom	Perm			custom		custom	custom	
Protected Phases		4		4		3		1 2	1 2	2 3
Permitted Phases	4		4					1 2 3 4	1 2	
Actuated Green, G (s)	23.0	23.0		23.0		31.9			23.1	41.9
Effective Green, g (s)	23.0	23.0		23.0		31.9			23.1	41.9
Actuated g/C Ratio	0.26	0.26		0.26		0.35			0.26	0.47
Clearance Time (s)	4.0	4.0		4.0		4.0				
Vehicle Extension (s)	3.0	3.0		3.0		3.0				
Lane Grp Cap (vph)	71	347		609		1152			386	2090
v/s Ratio Prot		0.04				c0.31			c0.15	0.16
v/s Ratio Perm	0.16			0.29						
v/c Ratio	0.62	0.15		1.13		0.88			0.59	0.34
Uniform Delay, d1	29.6	25.9		33.5		27.2			29.3	15.3
Progression Factor	1.00	1.00		0.82		0.57			1.00	1.00
Incremental Delay, d2	15.0	0.2		75.8		8.5			2.3	0.1
Delay (s)	44.7	26.1		103.4		24.1			31.5	15.4
Level of Service	D	C		F		C			C	B
Approach Delay (s)				103.4						19.6
Approach LOS				F						B

Intersection Summary			
HCM Average Control Delay	41.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	96.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	12	12	11	11	12	12	12
Total Lost time (s)		4.0			4.0			4.0	4.0			4.0
Lane Util. Factor		1.00			1.00			1.00	0.95			1.00
Frt		0.92			0.90			1.00	1.00			1.00
Flt Protected		0.98			0.99			0.95	1.00			0.95
Satd. Flow (prot)		1417			1514			1570	3040			1611
Flt Permitted		0.80			0.91			0.29	1.00			0.27
Satd. Flow (perm)		1160			1395			478	3040			458
Volume (vph)	10	0	15	65	10	195	40	75	695	10	55	15
Peak-hour factor, PHF	0.61	0.61	0.61	0.88	0.88	0.88	0.86	0.86	0.86	0.86	0.98	0.98
Adj. Flow (vph)	16	0	25	74	11	222	47	87	808	12	56	15
RTOR Reduction (vph)	0	20	0	0	99	0	0	0	1	0	0	0
Lane Group Flow (vph)	0	21	0	0	208	0	0	134	819	0	0	71
Heavy Vehicles (%)	5%	0%	11%	0%	0%	1%	0%	0%	3%	8%	0%	4%
Parking (#/hr)												
Turn Type	Perm			Perm			Perm	pm+pt			Perm	pm+pt
Protected Phases		4			8			5	2			1
Permitted Phases	4			8			2	2			6	6
Actuated Green, G (s)		18.5			18.5			49.6	41.8			45.0
Effective Green, g (s)		19.5			19.5			51.6	42.8			47.0
Actuated g/C Ratio		0.22			0.22			0.57	0.48			0.52
Clearance Time (s)		5.0			5.0			5.0	5.0			5.0
Vehicle Extension (s)		3.0			3.0			3.0	3.0			3.0
Lane Grp Cap (vph)		251			302			381	1446			322
v/s Ratio Prot								c0.03	c0.27			0.02
v/s Ratio Perm		0.02			c0.15			0.17				0.10
v/c Ratio		0.09			0.69			0.35	0.57			0.22
Uniform Delay, d1		28.1			32.4			9.8	16.9			11.2
Progression Factor		1.00			1.85			1.00	1.00			0.99
Incremental Delay, d2		0.1			5.2			0.6	1.6			0.3
Delay (s)		28.3			65.1			10.4	18.6			11.4
Level of Service		C			E			B	B			B
Approach Delay (s)		28.3			65.1				17.4			
Approach LOS		C			E				B			

Intersection Summary			
HCM Average Control Delay	23.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	21.2
Intersection Capacity Utilization	58.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	SWT	SWR
Lane Configurations		
Ideal Flow (vphpl)	1900	1900
Lane Width	12	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	3154	1228
Flt Permitted	1.00	1.00
Satd. Flow (perm)	3154	1228
Volume (vph)	680	140
Peak-hour factor, PHF	0.98	0.98
Adj. Flow (vph)	694	143
RTOR Reduction (vph)	0	79
Lane Group Flow (vph)	694	64
Heavy Vehicles (%)	3%	3%
Parking (#/hr)		0
Turn Type		Perm
Protected Phases	6	
Permitted Phases		6
Actuated Green, G (s)	39.5	39.5
Effective Green, g (s)	40.5	40.5
Actuated g/C Ratio	0.45	0.45
Clearance Time (s)	5.0	5.0
Vehicle Extension (s)	3.0	3.0
Lane Grp Cap (vph)	1419	553
v/s Ratio Prot	0.22	
v/s Ratio Perm		0.05
v/c Ratio	0.49	0.12
Uniform Delay, d1	17.5	14.4
Progression Factor	0.85	0.84
Incremental Delay, d2	1.0	0.4
Delay (s)	15.9	12.4
Level of Service	B	B
Approach Delay (s)	15.0	
Approach LOS	B	

Intersection Summary

E – PEDESTRIAN LEVEL WIND ANALYSIS by RWDI

TABLES

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			**Mean Wind Speed**			**Effective Gust Wind Speed**		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
1	A	Spring	8		Sitting	13		Acceptable
		Summer	7		Sitting	11		Acceptable
		Fall	8		Sitting	12		Acceptable
		Winter	8		Sitting	14		Acceptable
		Annual	8		Sitting	13		Acceptable
	B	Spring	8		Sitting	13		Acceptable
		Summer	6	-13%	Sitting	10		Acceptable
		Fall	8		Sitting	12		Acceptable
		Winter	9	+13%	Sitting	14		Acceptable
		Annual	8		Sitting	13		Acceptable
	C	Spring	9	+13%	Sitting	15	+15%	Acceptable
		Summer	7		Sitting	12		Acceptable
		Fall	9	+13%	Sitting	14	+17%	Acceptable
		Winter	10	+25%	Sitting	16	+14%	Acceptable
		Annual	9	+13%	Sitting	15	+15%	Acceptable
2	A	Spring	12		Sitting	20		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	13		Standing	21		Acceptable
		Annual	12		Sitting	19		Acceptable
	B	Spring	11		Sitting	17	-14%	Acceptable
		Summer	8	-19%	Sitting	13	-18%	Acceptable
		Fall	10	-16%	Sitting	16	-15%	Acceptable
		Winter	11	-14%	Sitting	18	-13%	Acceptable
		Annual	10	-16%	Sitting	17	-10%	Acceptable
	C	Spring	12		Sitting	19		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	13		Standing	21		Acceptable
		Annual	12		Sitting	19		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - Existing	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B - 2011 No-Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
C - 2011 Build	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
3	A	Spring	13		Standing	22		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	14		Standing	23		Acceptable
		Annual	13		Standing	21		Acceptable
	B	Spring	18	+38%	Walking	26	+18%	Acceptable
		Summer	14	+27%	Standing	20	+18%	Acceptable
		Fall	16	+23%	Walking	24	+20%	Acceptable
		Winter	20	+43%	Uncomfortable	29	+26%	Acceptable
		Annual	18	+38%	Walking	26	+24%	Acceptable
	C	Spring	18	+38%	Walking	27	+23%	Acceptable
		Summer	14	+27%	Standing	21	+24%	Acceptable
		Fall	16	+23%	Walking	25	+25%	Acceptable
		Winter	19	+36%	Walking	29	+26%	Acceptable
		Annual	18	+38%	Walking	26	+24%	Acceptable
4	A	Spring	12		Sitting	19		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	18		Acceptable
	B	Spring	10	-16%	Sitting	16	-15%	Acceptable
		Summer	8	-19%	Sitting	13	-12%	Acceptable
		Fall	10		Sitting	15	-16%	Acceptable
		Winter	11	-14%	Sitting	17	-14%	Acceptable
		Annual	10	-16%	Sitting	16	-10%	Acceptable
	C	Spring	12		Sitting	18		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	18		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

<u>Configurations</u>
A - Existing
B - 2011 No-Build
C - 2011 Build

<u>Mean Wind Speed Criteria</u>

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

<u>Effective Gust Criteria</u>

Acceptable:	≤ 31 mph
Unacceptable:	> 31 mph

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			**Mean Wind Speed**			**Effective Gust Wind Speed**		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
5	A	Spring	9		Sitting	15		Acceptable
		Summer	7		Sitting	12		Acceptable
		Fall	9		Sitting	14		Acceptable
		Winter	9		Sitting	16		Acceptable
		Annual	9		Sitting	15		Acceptable
	B	Spring	8	-10%	Sitting	13	-12%	Acceptable
		Summer	7		Sitting	11		Acceptable
		Fall	8	-10%	Sitting	13		Acceptable
		Winter	9		Sitting	15		Acceptable
		Annual	8	-10%	Sitting	13	-12%	Acceptable
	C	Spring	9		Sitting	15		Acceptable
		Summer	8	+14%	Sitting	12		Acceptable
		Fall	8	-10%	Sitting	14		Acceptable
		Winter	10	+11%	Sitting	16		Acceptable
		Annual	9		Sitting	15		Acceptable
6	A	Spring	18		Walking	26		Acceptable
		Summer	15		Standing	21		Acceptable
		Fall	17		Walking	25		Acceptable
		Winter	20		Uncomfortable	28		Acceptable
		Annual	18		Walking	26		Acceptable
	B	Spring	18		Walking	25		Acceptable
		Summer	15		Standing	21		Acceptable
		Fall	17		Walking	24		Acceptable
		Winter	19		Walking	27		Acceptable
		Annual	18		Walking	25		Acceptable
	C	Spring	18		Walking	26		Acceptable
		Summer	16		Walking	21		Acceptable
		Fall	17		Walking	24		Acceptable
		Winter	19		Walking	27		Acceptable
		Annual	18		Walking	25		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - Existing	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B - 2011 No-Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
C - 2011 Build	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			**Mean Wind Speed**			**Effective Gust Wind Speed**		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
7	A	Spring	17		Walking	25		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	18		Walking	27		Acceptable
		Annual	17		Walking	24		Acceptable
	B	Spring	17		Walking	25		Acceptable
		Summer	13		Standing	20		Acceptable
		Fall	16		Walking	24		Acceptable
		Winter	18		Walking	27		Acceptable
		Annual	17		Walking	25		Acceptable
	C	Spring	20	+18%	Uncomfortable	29	+16%	Acceptable
		Summer	16	+23%	Walking	23	+21%	Acceptable
		Fall	19	+19%	Walking	27	+17%	Acceptable
		Winter	22	+22%	Uncomfortable	32	+19%	Unacceptable
		Annual	20	+18%	Uncomfortable	29	+21%	Acceptable
8	A	Spring	15		Standing	23		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	14		Standing	22		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	15		Standing	23		Acceptable
	B	Spring	17	+13%	Walking	25		Acceptable
		Summer	13		Standing	20	+11%	Acceptable
		Fall	16	+14%	Walking	24		Acceptable
		Winter	18	+13%	Walking	27	+13%	Acceptable
		Annual	17	+13%	Walking	25		Acceptable
	C	Spring	19	+27%	Walking	28	+22%	Acceptable
		Summer	15	+25%	Standing	21	+17%	Acceptable
		Fall	18	+29%	Walking	26	+18%	Acceptable
		Winter	21	+31%	Uncomfortable	30	+25%	Acceptable
		Annual	19	+27%	Walking	27	+17%	Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - Existing	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B - 2011 No-Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
C - 2011 Build	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			**Mean Wind Speed**			**Effective Gust Wind Speed**		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
9	A	Spring	15		Standing	22		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	16		Walking	23		Acceptable
		Annual	14		Standing	21		Acceptable
	B	Spring	15		Standing	21		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	15		Standing	22		Acceptable
		Annual	14		Standing	20		Acceptable
	C	Spring	16		Walking	22		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	15		Standing	21		Acceptable
		Winter	17		Walking	24		Acceptable
		Annual	16	+14%	Walking	22		Acceptable
10	A	Spring	14		Standing	22		Acceptable
		Summer	11		Sitting	18		Acceptable
		Fall	13		Standing	21		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	14		Standing	22		Acceptable
	B	Spring	13		Standing	21		Acceptable
		Summer	10		Sitting	17		Acceptable
		Fall	12		Sitting	20		Acceptable
		Winter	14		Standing	22		Acceptable
		Annual	13		Standing	20		Acceptable
	C	Spring	13		Standing	21		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	14		Standing	23		Acceptable
		Annual	13		Standing	21		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - Existing	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B - 2011 No-Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
C - 2011 Build	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			**Mean Wind Speed**			**Effective Gust Wind Speed**		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
11	A	Spring	13		Standing	21		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	14		Standing	22		Acceptable
		Annual	13		Standing	20		Acceptable
	B	Spring	12		Sitting	20		Acceptable
		Summer	10		Sitting	17		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	13		Standing	22		Acceptable
		Annual	12		Sitting	20		Acceptable
	C	Spring	12		Sitting	18	-13%	Acceptable
		Summer	9	-17%	Sitting	15	-11%	Acceptable
		Fall	11	-14%	Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	18		Acceptable
12	A	Spring	15		Standing	22		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	15		Standing	22		Acceptable
	B	Spring	13	-12%	Standing	20		Acceptable
		Summer	10	-16%	Sitting	16		Acceptable
		Fall	12	-13%	Sitting	19		Acceptable
		Winter	14	-12%	Standing	22		Acceptable
		Annual	13	-12%	Standing	20		Acceptable
	C	Spring	13	-12%	Standing	20		Acceptable
		Summer	10	-16%	Sitting	16		Acceptable
		Fall	12	-13%	Sitting	19		Acceptable
		Winter	14	-12%	Standing	22		Acceptable
		Annual	13	-12%	Standing	20		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - Existing	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B - 2011 No-Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
C - 2011 Build	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
13	A	Spring	9		Sitting	16		Acceptable
		Summer	7		Sitting	12		Acceptable
		Fall	9		Sitting	15		Acceptable
		Winter	10		Sitting	17		Acceptable
		Annual	9		Sitting	16		Acceptable
	B	Spring	9		Sitting	16		Acceptable
		Summer	7		Sitting	12		Acceptable
		Fall	8	-10%	Sitting	15		Acceptable
		Winter	10		Sitting	17		Acceptable
		Annual	9		Sitting	15		Acceptable
	C	Spring	8	-10%	Sitting	15		Acceptable
		Summer	7		Sitting	12		Acceptable
		Fall	8	-10%	Sitting	14		Acceptable
		Winter	9		Sitting	16		Acceptable
		Annual	8	-10%	Sitting	15		Acceptable
14	A	Spring	17		Walking	24		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	18		Walking	26		Acceptable
		Annual	17		Walking	23		Acceptable
	B	Spring	16		Walking	23		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	17		Walking	25		Acceptable
		Annual	16		Walking	23		Acceptable
	C	Spring	16		Walking	23		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	15		Standing	21		Acceptable
		Winter	18		Walking	25		Acceptable
		Annual	16		Walking	23		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - Existing	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B - 2011 No-Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
C - 2011 Build	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			**Mean Wind Speed**			**Effective Gust Wind Speed**		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
15	A	Spring	11		Sitting	17		Acceptable
		Summer	8		Sitting	13		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	12		Sitting	18		Acceptable
		Annual	11		Sitting	17		Acceptable
	B	Spring	11		Sitting	18		Acceptable
		Summer	8		Sitting	14		Acceptable
		Fall	10		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	17		Acceptable
	C	Spring	12		Sitting	18		Acceptable
		Summer	9	+13%	Sitting	14		Acceptable
		Fall	11	+10%	Sitting	17		Acceptable
		Winter	13		Standing	20	+11%	Acceptable
		Annual	11		Sitting	18		Acceptable
16	A	Spring	10		Sitting	17		Acceptable
		Summer	8		Sitting	13		Acceptable
		Fall	9		Sitting	16		Acceptable
		Winter	11		Sitting	18		Acceptable
		Annual	10		Sitting	16		Acceptable
	B	Spring	10		Sitting	16		Acceptable
		Summer	7	-12%	Sitting	12		Acceptable
		Fall	9		Sitting	15		Acceptable
		Winter	10		Sitting	17		Acceptable
		Annual	10		Sitting	16		Acceptable
	C	Spring	13	+30%	Standing	21	+24%	Acceptable
		Summer	10	+25%	Sitting	16	+23%	Acceptable
		Fall	12	+33%	Sitting	19	+19%	Acceptable
		Winter	14	+27%	Standing	22	+22%	Acceptable
		Annual	13	+30%	Standing	20	+25%	Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - Existing	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B - 2011 No-Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
C - 2011 Build	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
17	A	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	13		Standing	21		Acceptable
		Annual	12		Sitting	19		Acceptable
	B	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	19		Acceptable
	C	Spring	14		Standing	21		Acceptable
		Summer	11	+10%	Sitting	16		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	14		Standing	21		Acceptable
		Annual	13		Standing	20		Acceptable
18	A	Spring	10		Sitting	17		Acceptable
		Summer	8		Sitting	13		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	11		Sitting	18		Acceptable
		Annual	10		Sitting	16		Acceptable
	B	Spring	10		Sitting	16		Acceptable
		Summer	8		Sitting	13		Acceptable
		Fall	9		Sitting	15		Acceptable
		Winter	11		Sitting	17		Acceptable
		Annual	10		Sitting	16		Acceptable
	C	Spring	11	+10%	Sitting	17		Acceptable
		Summer	8		Sitting	13		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11	+10%	Sitting	17		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - Existing	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B - 2011 No-Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
C - 2011 Build	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
19	A	Spring	11		Sitting	17		Acceptable
		Summer	8		Sitting	13		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	17		Acceptable
	B	Spring	12		Sitting	18		Acceptable
		Summer	9	+13%	Sitting	14		Acceptable
		Fall	11	+10%	Sitting	17		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	11		Sitting	18		Acceptable
	C	Spring	11		Sitting	17		Acceptable
		Summer	8		Sitting	13		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	17		Acceptable
20	A	Spring	11		Sitting	17		Acceptable
		Summer	9		Sitting	13		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	11		Sitting	18		Acceptable
		Annual	11		Sitting	16		Acceptable
	B	Spring	11		Sitting	17		Acceptable
		Summer	9		Sitting	13		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	12		Sitting	18		Acceptable
		Annual	11		Sitting	16		Acceptable
	C	Spring	11		Sitting	17		Acceptable
		Summer	8	-10%	Sitting	13		Acceptable
		Fall	10		Sitting	15		Acceptable
		Winter	11		Sitting	18		Acceptable
		Annual	10		Sitting	16		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations
A - Existing
B - 2011 No-Build
C - 2011 Build

Mean Wind Speed Criteria

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

Effective Gust Criteria

Acceptable:	≤ 31 mph
Unacceptable:	> 31 mph

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
21	A	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	13		Standing	21		Acceptable
		Annual	13		Standing	19		Acceptable
	B	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	21		Acceptable
		Annual	12		Sitting	19		Acceptable
	C	Spring	15	+15%	Standing	23	+15%	Acceptable
		Summer	12	+20%	Sitting	18	+13%	Acceptable
		Fall	14	+17%	Standing	22	+16%	Acceptable
		Winter	16	+23%	Walking	25	+19%	Acceptable
		Annual	15	+15%	Standing	23	+21%	Acceptable
22	A	Spring	14		Standing	22		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	14		Standing	22		Acceptable
		Annual	13		Standing	21		Acceptable
	B	Spring	13		Standing	20		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	13		Standing	21		Acceptable
		Annual	12		Sitting	19		Acceptable
	C	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	13		Standing	21		Acceptable
		Annual	13		Standing	20		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - Existing	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B - 2011 No-Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
C - 2011 Build	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
23	A	Spring	12		Sitting	19		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	18		Acceptable
	B	Spring	11		Sitting	18		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	10		Sitting	17		Acceptable
		Winter	11		Sitting	18		Acceptable
		Annual	11		Sitting	17		Acceptable
	C	Spring	12		Sitting	20		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	13		Standing	21	+11%	Acceptable
		Annual	12		Sitting	19		Acceptable
24	A	Spring	20		Uncomfortable	28		Acceptable
		Summer	15		Standing	22		Acceptable
		Fall	18		Walking	26		Acceptable
		Winter	22		Uncomfortable	30		Acceptable
		Annual	20		Uncomfortable	28		Acceptable
	B	Spring	20		Uncomfortable	28		Acceptable
		Summer	15		Standing	21		Acceptable
		Fall	18		Walking	26		Acceptable
		Winter	21		Uncomfortable	30		Acceptable
		Annual	19		Walking	27		Acceptable
	C	Spring	16	-19%	Walking	26		Acceptable
		Summer	12	-19%	Sitting	19	-13%	Acceptable
		Fall	15	-16%	Standing	24		Acceptable
		Winter	17	-22%	Walking	27		Acceptable
		Annual	16	-19%	Walking	25	-10%	Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

<u>Configurations</u>
A - Existing
B - 2011 No-Build
C - 2011 Build

<u>Mean Wind Speed Criteria</u>

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

<u>Effective Gust Criteria</u>

Acceptable:	≤ 31 mph
Unacceptable:	> 31 mph

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			**Mean Wind Speed**			**Effective Gust Wind Speed**		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
25	A	Spring	14		Standing	22		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	13		Standing	21		Acceptable
		Winter	14		Standing	22		Acceptable
		Annual	13		Standing	21		Acceptable
	B	Spring	14		Standing	21		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	14		Standing	22		Acceptable
		Annual	13		Standing	20		Acceptable
	C	Spring	15		Standing	22		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	14		Standing	21		Acceptable
26	A	Spring	13		Standing	20		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	19		Acceptable
	B	Spring	13		Standing	19		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	12		Sitting	18		Acceptable
	C	Spring	8	-37%	Sitting	13	-34%	Acceptable
		Summer	6	-44%	Sitting	10	-37%	Acceptable
		Fall	8	-32%	Sitting	12	-32%	Acceptable
		Winter	8	-37%	Sitting	14	-29%	Acceptable
		Annual	8	-32%	Sitting	13	-31%	Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - Existing	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B - 2011 No-Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
C - 2011 Build	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			**Mean Wind Speed**			**Effective Gust Wind Speed**		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
27	A	Spring	11		Sitting	17		Acceptable
		Summer	9		Sitting	13		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	11		Sitting	18		Acceptable
		Annual	10		Sitting	16		Acceptable
	B	Spring	11		Sitting	17		Acceptable
		Summer	9		Sitting	13		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	11		Sitting	17		Acceptable
		Annual	10		Sitting	16		Acceptable
	C	Spring	12		Sitting	18		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	11	+10%	Sitting	17		Acceptable
		Winter	12		Sitting	18		Acceptable
		Annual	11	+10%	Sitting	17		Acceptable
28	A	Spring	14		Standing	21		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	14		Standing	21		Acceptable
	B	Spring	14		Standing	21		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	13		Standing	21		Acceptable
	C	Spring	14		Standing	21		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	14		Standing	22		Acceptable
		Annual	13		Standing	20		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - Existing	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B - 2011 No-Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
C - 2011 Build	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			**Mean Wind Speed**			**Effective Gust Wind Speed**		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
29	A	Spring	17		Walking	24		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	15		Standing	23		Acceptable
	B	Spring	17		Walking	24		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	16		Walking	22		Acceptable
	C	Spring	18		Walking	26		Acceptable
		Summer	15		Standing	21		Acceptable
		Fall	17	+13%	Walking	24		Acceptable
		Winter	20	+25%	Uncomfortable	28	+17%	Acceptable
		Annual	18	+20%	Walking	26	+13%	Acceptable
30	A	Spring	19		Walking	29		Acceptable
		Summer	16		Walking	23		Acceptable
		Fall	18		Walking	27		Acceptable
		Winter	20		Uncomfortable	30		Acceptable
		Annual	18		Walking	28		Acceptable
	B	Spring	19		Walking	28		Acceptable
		Summer	16		Walking	23		Acceptable
		Fall	18		Walking	27		Acceptable
		Winter	20		Uncomfortable	30		Acceptable
		Annual	18		Walking	28		Acceptable
	C	Spring	26	+37%	Uncomfortable	35	+21%	Unacceptable
		Summer	20	+25%	Uncomfortable	27	+17%	Acceptable
		Fall	24	+33%	Uncomfortable	33	+22%	Unacceptable
		Winter	28	+40%	Dangerous	38	+27%	Unacceptable
		Annual	25	+39%	Uncomfortable	35	+25%	Unacceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - Existing	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B - 2011 No-Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
C - 2011 Build	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			**Mean Wind Speed**			**Effective Gust Wind Speed**		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
31	A	Spring	16		Walking	24		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	15		Standing	23		Acceptable
		Winter	17		Walking	26		Acceptable
		Annual	16		Walking	24		Acceptable
	B	Spring	16		Walking	24		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	15		Standing	23		Acceptable
		Winter	17		Walking	25		Acceptable
		Annual	16		Walking	23		Acceptable
	C	Spring	18	+13%	Walking	28	+17%	Acceptable
		Summer	14		Standing	22	+16%	Acceptable
		Fall	17	+13%	Walking	26	+13%	Acceptable
		Winter	19	+12%	Walking	31	+19%	Acceptable
		Annual	17		Walking	28	+17%	Acceptable
32	A	Spring	14		Standing	23		Acceptable
		Summer	11		Sitting	18		Acceptable
		Fall	13		Standing	22		Acceptable
		Winter	16		Walking	25		Acceptable
		Annual	14		Standing	23		Acceptable
	B	Spring	14		Standing	23		Acceptable
		Summer	11		Sitting	18		Acceptable
		Fall	13		Standing	21		Acceptable
		Winter	15		Standing	25		Acceptable
		Annual	14		Standing	23		Acceptable
	C	Spring	13		Standing	21		Acceptable
		Summer	10		Sitting	16	-10%	Acceptable
		Fall	12		Sitting	19	-13%	Acceptable
		Winter	13	-18%	Standing	22	-11%	Acceptable
		Annual	12	-13%	Sitting	20	-12%	Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - Existing	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B - 2011 No-Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
C - 2011 Build	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			**Mean Wind Speed**			**Effective Gust Wind Speed**		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
33	A	Spring	14		Standing	22		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	13		Standing	21		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	14		Standing	22		Acceptable
	B	Spring	15		Standing	22		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	14		Standing	22		Acceptable
	C	Spring	15		Standing	22		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	13		Standing	21		Acceptable
		Winter	16		Walking	23		Acceptable
		Annual	14		Standing	22		Acceptable
34	A	Spring	10		Sitting	17		Acceptable
		Summer	8		Sitting	13		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	11		Sitting	18		Acceptable
		Annual	10		Sitting	16		Acceptable
	B	Spring	10		Sitting	16		Acceptable
		Summer	8		Sitting	12		Acceptable
		Fall	9		Sitting	15		Acceptable
		Winter	10		Sitting	17		Acceptable
		Annual	10		Sitting	16		Acceptable
	C	Spring	10		Sitting	16		Acceptable
		Summer	7	-12%	Sitting	12		Acceptable
		Fall	9		Sitting	15		Acceptable
		Winter	10		Sitting	17		Acceptable
		Annual	9		Sitting	15		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - Existing	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B - 2011 No-Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
C - 2011 Build	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			**Mean Wind Speed**			**Effective Gust Wind Speed**		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
35	A	Spring	16		Walking	25		Acceptable
		Summer	12		Sitting	19		Acceptable
		Fall	15		Standing	23		Acceptable
		Winter	17		Walking	27		Acceptable
		Annual	16		Walking	24		Acceptable
	B	Spring	16		Walking	25		Acceptable
		Summer	12		Sitting	19		Acceptable
		Fall	15		Standing	23		Acceptable
		Winter	18		Walking	27		Acceptable
		Annual	16		Walking	25		Acceptable
	C	Spring	16		Walking	25		Acceptable
		Summer	12		Sitting	19		Acceptable
		Fall	15		Standing	23		Acceptable
		Winter	18		Walking	27		Acceptable
		Annual	16		Walking	25		Acceptable
36	A	Spring	14		Standing	21		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	15		Standing	22		Acceptable
		Annual	14		Standing	20		Acceptable
	B	Spring	14		Standing	20		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	13		Standing	19		Acceptable
		Winter	15		Standing	21		Acceptable
		Annual	13		Standing	20		Acceptable
	C	Spring	15		Standing	21		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	14		Standing	19		Acceptable
		Winter	16		Walking	22		Acceptable
		Annual	14		Standing	20		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - Existing	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B - 2011 No-Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
C - 2011 Build	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
37	A	Spring	12		Sitting	20		Acceptable
		Summer	9		Sitting	16		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	12		Sitting	20		Acceptable
		Annual	12		Sitting	19		Acceptable
	B	Spring	11		Sitting	19		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	18		Acceptable
	C	Spring	12		Sitting	19		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	18		Acceptable
38	A	Spring	15		Standing	22		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	16		Walking	23		Acceptable
		Annual	14		Standing	21		Acceptable
	B	Spring	15		Standing	21		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	14		Standing	21		Acceptable
	C	Spring	15		Standing	21		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	16		Walking	23		Acceptable
		Annual	14		Standing	21		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - Existing	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B - 2011 No-Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
C - 2011 Build	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			**Mean Wind Speed**			**Effective Gust Wind Speed**		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
39	A	Spring	20		Uncomfortable	28		Acceptable
		Summer	18		Walking	24		Acceptable
		Fall	17		Walking	24		Acceptable
		Winter	18		Walking	27		Acceptable
		Annual	18		Walking	26		Acceptable
	B	Spring	20		Uncomfortable	28		Acceptable
		Summer	18		Walking	24		Acceptable
		Fall	17		Walking	24		Acceptable
		Winter	18		Walking	27		Acceptable
		Annual	18		Walking	26		Acceptable
	C	Spring	20		Uncomfortable	29		Acceptable
		Summer	18		Walking	25		Acceptable
		Fall	17		Walking	25		Acceptable
		Winter	18		Walking	28		Acceptable
		Annual	18		Walking	26		Acceptable
40	A	Spring	26		Uncomfortable	36		Unacceptable
		Summer	20		Uncomfortable	27		Acceptable
		Fall	24		Uncomfortable	33		Unacceptable
		Winter	28		Dangerous	39		Unacceptable
		Annual	25		Uncomfortable	35		Unacceptable
	B	Spring	26		Uncomfortable	36		Unacceptable
		Summer	20		Uncomfortable	27		Acceptable
		Fall	24		Uncomfortable	33		Unacceptable
		Winter	28		Dangerous	39		Unacceptable
		Annual	25		Uncomfortable	35		Unacceptable
	C	Spring	25		Uncomfortable	35		Unacceptable
		Summer	19		Walking	27		Acceptable
		Fall	23		Uncomfortable	33		Unacceptable
		Winter	27		Uncomfortable	39		Unacceptable
		Annual	25		Uncomfortable	35		Unacceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - Existing	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B - 2011 No-Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
C - 2011 Build	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
41	A	Spring	21		Uncomfortable	31		Acceptable
		Summer	16		Walking	24		Acceptable
		Fall	19		Walking	29		Acceptable
		Winter	22		Uncomfortable	33		Unacceptable
		Annual	20		Uncomfortable	30		Acceptable
	B	Spring	21		Uncomfortable	31		Acceptable
		Summer	16		Walking	24		Acceptable
		Fall	19		Walking	29		Acceptable
		Winter	22		Uncomfortable	33		Unacceptable
		Annual	20		Uncomfortable	30		Acceptable
	C	Spring	18	-13%	Walking	27	-12%	Acceptable
		Summer	14	-12%	Standing	20	-16%	Acceptable
		Fall	17	-10%	Walking	25	-13%	Acceptable
		Winter	19	-13%	Walking	28	-14%	Acceptable
		Annual	17	-14%	Walking	25	-16%	Acceptable
42	A	Spring	18		Walking	25		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	18		Walking	25		Acceptable
		Annual	17		Walking	24		Acceptable
	B	Spring	18		Walking	24		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	17		Walking	25		Acceptable
		Annual	16		Walking	23		Acceptable
	C	Spring	17		Walking	25		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	18		Walking	25		Acceptable
		Annual	17		Walking	24		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - Existing	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B - 2011 No-Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
C - 2011 Build	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			**Mean Wind Speed**			**Effective Gust Wind Speed**		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
43	A	Spring	17		Walking	23		Acceptable
		Summer	14		Standing	19		Acceptable
		Fall	16		Walking	22		Acceptable
		Winter	17		Walking	24		Acceptable
		Annual	16		Walking	23		Acceptable
	B	Spring	17		Walking	23		Acceptable
		Summer	14		Standing	19		Acceptable
		Fall	16		Walking	22		Acceptable
		Winter	17		Walking	23		Acceptable
		Annual	16		Walking	22		Acceptable
	C	Spring	17		Walking	24		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	17		Walking	25		Acceptable
		Annual	16		Walking	23		Acceptable
44	A	Spring	16		Walking	26		Acceptable
		Summer	13		Standing	20		Acceptable
		Fall	15		Standing	24		Acceptable
		Winter	17		Walking	27		Acceptable
		Annual	16		Walking	25		Acceptable
	B	Spring	17		Walking	26		Acceptable
		Summer	13		Standing	20		Acceptable
		Fall	16		Walking	24		Acceptable
		Winter	18		Walking	28		Acceptable
		Annual	16		Walking	26		Acceptable
	C	Spring	16		Walking	26		Acceptable
		Summer	13		Standing	20		Acceptable
		Fall	15		Standing	23		Acceptable
		Winter	18		Walking	28		Acceptable
		Annual	16		Walking	25		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - Existing	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B - 2011 No-Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
C - 2011 Build	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			**Mean Wind Speed**			**Effective Gust Wind Speed**		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
45	A	Spring	12		Sitting	19		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	19		Acceptable
	B	Spring	12		Sitting	19		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	18		Acceptable
	C	Spring	13		Standing	19		Acceptable
		Summer	11	+10%	Sitting	16		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	18		Acceptable
46	A	Spring	17		Walking	27		Acceptable
		Summer	14		Standing	21		Acceptable
		Fall	16		Walking	25		Acceptable
		Winter	18		Walking	29		Acceptable
		Annual	17		Walking	26		Acceptable
	B	Spring	17		Walking	27		Acceptable
		Summer	14		Standing	21		Acceptable
		Fall	16		Walking	25		Acceptable
		Winter	18		Walking	29		Acceptable
		Annual	17		Walking	27		Acceptable
	C	Spring	16		Walking	25		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	15		Standing	23		Acceptable
		Winter	17		Walking	26		Acceptable
		Annual	16		Walking	24		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations
A - Existing
B - 2011 No-Build
C - 2011 Build

Mean Wind Speed Criteria

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

Effective Gust Criteria

Acceptable:	≤ 31 mph
Unacceptable:	> 31 mph

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
47	A	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	13		Standing	21		Acceptable
		Annual	12		Sitting	19		Acceptable
	B	Spring	12		Sitting	19		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	19		Acceptable
	C	Spring	13		Standing	21		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	14		Standing	22		Acceptable
		Annual	13		Standing	20		Acceptable
48	A	Spring	15		Standing	22		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	15		Standing	22		Acceptable
	B	Spring	14		Standing	22		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	14		Standing	21		Acceptable
	C	Spring	17	+13%	Walking	24		Acceptable
		Summer	13		Standing	19	+12%	Acceptable
		Fall	15		Standing	23	+10%	Acceptable
		Winter	18	+13%	Walking	27	+13%	Acceptable
		Annual	16		Walking	24		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

<u>Configurations</u>
A - Existing
B - 2011 No-Build
C - 2011 Build

<u>Mean Wind Speed Criteria</u>

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

<u>Effective Gust Criteria</u>

Acceptable:	≤ 31 mph
Unacceptable:	> 31 mph

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			**Mean Wind Speed**			**Effective Gust Wind Speed**		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
49	A	Spring	17		Walking	24		Acceptable
		Summer	14		Standing	19		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	18		Walking	26		Acceptable
		Annual	17		Walking	24		Acceptable
	B	Spring	17		Walking	24		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	18		Walking	26		Acceptable
		Annual	17		Walking	24		Acceptable
	C	Spring	17		Walking	24		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	18		Walking	26		Acceptable
		Annual	17		Walking	24		Acceptable
50	A	Spring	17		Walking	25		Acceptable
		Summer	13		Standing	20		Acceptable
		Fall	16		Walking	24		Acceptable
		Winter	18		Walking	27		Acceptable
		Annual	17		Walking	25		Acceptable
	B	Spring	17		Walking	25		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	16		Walking	24		Acceptable
		Winter	18		Walking	27		Acceptable
		Annual	17		Walking	25		Acceptable
	C	Spring	16		Walking	25		Acceptable
		Summer	13		Standing	20		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	17		Walking	26		Acceptable
		Annual	16		Walking	24		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - Existing	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B - 2011 No-Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
C - 2011 Build	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
51	A	Spring	14		Standing	23		Acceptable
		Summer	12		Sitting	19		Acceptable
		Fall	13		Standing	21		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	14		Standing	22		Acceptable
	B	Spring	14		Standing	23		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	13		Standing	21		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	13		Standing	22		Acceptable
	C	Spring	14		Standing	22		Acceptable
		Summer	11		Sitting	18		Acceptable
		Fall	13		Standing	21		Acceptable
		Winter	14		Standing	23		Acceptable
		Annual	13		Standing	22		Acceptable
52	A	Spring	27		Uncomfortable	36		Unacceptable
		Summer	21		Uncomfortable	28		Acceptable
		Fall	25		Uncomfortable	34		Unacceptable
		Winter	30		Dangerous	39		Unacceptable
		Annual	27		Uncomfortable	36		Unacceptable
	B	Spring	27		Uncomfortable	37		Unacceptable
		Summer	21		Uncomfortable	28		Acceptable
		Fall	25		Uncomfortable	34		Unacceptable
		Winter	30		Dangerous	39		Unacceptable
		Annual	27		Uncomfortable	36		Unacceptable
	C	Spring	27		Uncomfortable	37		Unacceptable
		Summer	21		Uncomfortable	28		Acceptable
		Fall	25		Uncomfortable	34		Unacceptable
		Winter	30		Dangerous	40		Unacceptable
		Annual	27		Uncomfortable	36		Unacceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - Existing	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B - 2011 No-Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
C - 2011 Build	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			**Mean Wind Speed**			**Effective Gust Wind Speed**		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
53	A	Spring	22		Uncomfortable	31		Acceptable
		Summer	17		Walking	24		Acceptable
		Fall	21		Uncomfortable	29		Acceptable
		Winter	23		Uncomfortable	32		Unacceptable
		Annual	21		Uncomfortable	29		Acceptable
	B	Spring	23		Uncomfortable	31		Acceptable
		Summer	17		Walking	24		Acceptable
		Fall	21		Uncomfortable	29		Acceptable
		Winter	23		Uncomfortable	32		Unacceptable
		Annual	22		Uncomfortable	30		Acceptable
	C	Spring	22		Uncomfortable	31		Acceptable
		Summer	17		Walking	24		Acceptable
		Fall	21		Uncomfortable	29		Acceptable
		Winter	23		Uncomfortable	32		Unacceptable
		Annual	21		Uncomfortable	30		Acceptable
54	A	Spring	21		Uncomfortable	30		Acceptable
		Summer	18		Walking	26		Acceptable
		Fall	20		Uncomfortable	28		Acceptable
		Winter	21		Uncomfortable	30		Acceptable
		Annual	20		Uncomfortable	29		Acceptable
	B	Spring	21		Uncomfortable	30		Acceptable
		Summer	18		Walking	26		Acceptable
		Fall	19		Walking	28		Acceptable
		Winter	21		Uncomfortable	30		Acceptable
		Annual	20		Uncomfortable	28		Acceptable
	C	Spring	21		Uncomfortable	30		Acceptable
		Summer	18		Walking	26		Acceptable
		Fall	20		Uncomfortable	28		Acceptable
		Winter	21		Uncomfortable	30		Acceptable
		Annual	20		Uncomfortable	28		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - Existing	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B - 2011 No-Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
C - 2011 Build	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
55	A	Spring	16		Walking	24		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	15		Standing	23		Acceptable
	B	Spring	16		Walking	24		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	16		Walking	23		Acceptable
	C	Spring	16		Walking	24		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	15		Standing	22		Acceptable
56	A	Spring	12		Sitting	19		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	12		Sitting	20		Acceptable
		Annual	11		Sitting	18		Acceptable
	B	Spring	12		Sitting	19		Acceptable
		Summer	10	+11%	Sitting	15		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	18		Acceptable
	C	Spring	12		Sitting	18		Acceptable
		Summer	10	+11%	Sitting	15		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	18		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - Existing	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B - 2011 No-Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
C - 2011 Build	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			**Mean Wind Speed**			**Effective Gust Wind Speed**		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
57	A	Spring	10		Sitting	16		Acceptable
		Summer	8		Sitting	13		Acceptable
		Fall	9		Sitting	15		Acceptable
		Winter	11		Sitting	17		Acceptable
		Annual	10		Sitting	16		Acceptable
	B	Spring	10		Sitting	16		Acceptable
		Summer	8		Sitting	13		Acceptable
		Fall	10	+11%	Sitting	15		Acceptable
		Winter	11		Sitting	17		Acceptable
		Annual	10		Sitting	16		Acceptable
	C	Spring	10		Sitting	16		Acceptable
		Summer	8		Sitting	13		Acceptable
		Fall	9		Sitting	15		Acceptable
		Winter	11		Sitting	17		Acceptable
		Annual	10		Sitting	15		Acceptable
58	A	Spring	15		Standing	23		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	14		Standing	22		Acceptable
		Winter	17		Walking	25		Acceptable
		Annual	15		Standing	23		Acceptable
	B	Spring	15		Standing	23		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	14		Standing	22		Acceptable
		Winter	16		Walking	25		Acceptable
		Annual	15		Standing	23		Acceptable
	C	Spring	14		Standing	22		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	13		Standing	21		Acceptable
		Winter	15	-11%	Standing	24		Acceptable
		Annual	14		Standing	22		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - Existing	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B - 2011 No-Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
C - 2011 Build	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			**Mean Wind Speed**			**Effective Gust Wind Speed**		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
59	A	Spring	12		Sitting	19		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	18		Acceptable
	B	Spring	13		Standing	19		Acceptable
		Summer	11	+10%	Sitting	16		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	19		Acceptable
	C	Spring	12		Sitting	18		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	18		Acceptable
60	A	Spring	13		Standing	21		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	14		Standing	22		Acceptable
		Annual	13		Standing	20		Acceptable
	B	Spring	13		Standing	21		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	14		Standing	22		Acceptable
		Annual	13		Standing	20		Acceptable
	C	Spring	13		Standing	20		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	13		Standing	21		Acceptable
		Annual	13		Standing	19		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations
A - Existing
B - 2011 No-Build
C - 2011 Build

Mean Wind Speed Criteria
Comfortable for Sitting: ≤ 12 mph
Comfortable for Standing: > 12 and ≤ 15 mph
Comfortable for Walking: > 15 and ≤ 19 mph
Uncomfortable for Walking: > 19 and ≤ 27 mph
Dangerous Conditions: > 27 mph

Effective Gust Criteria
Acceptable: ≤ 31 mph
Unacceptable: > 31 mph

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			**Mean Wind Speed**			**Effective Gust Wind Speed**		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
61	A	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	13		Standing	21		Acceptable
		Annual	12		Sitting	19		Acceptable
	B	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	21		Acceptable
		Annual	12		Sitting	19		Acceptable
	C	Spring	12		Sitting	19		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	18		Acceptable
62	A	Spring	11		Sitting	17		Acceptable
		Summer	9		Sitting	13		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	11		Sitting	17		Acceptable
		Annual	10		Sitting	16		Acceptable
	B	Spring	11		Sitting	17		Acceptable
		Summer	8	-10%	Sitting	13		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	11		Sitting	17		Acceptable
		Annual	10		Sitting	16		Acceptable
	C	Spring	10		Sitting	17		Acceptable
		Summer	8	-10%	Sitting	13		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	11		Sitting	17		Acceptable
		Annual	10		Sitting	16		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - Existing	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B - 2011 No-Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
C - 2011 Build	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
63	A	Spring	15		Standing	23		Acceptable
		Summer	12		Sitting	19		Acceptable
		Fall	14		Standing	22		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	14		Standing	22		Acceptable
	B	Spring	16		Walking	23		Acceptable
		Summer	12		Sitting	19		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	15		Standing	22		Acceptable
	C	Spring	16		Walking	23		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	15		Standing	22		Acceptable
64	A	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	13		Standing	19		Acceptable
		Winter	14		Standing	22		Acceptable
		Annual	13		Standing	20		Acceptable
	B	Spring	13		Standing	19		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	21		Acceptable
		Annual	12		Sitting	19		Acceptable
	C	Spring	13		Standing	19		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	19		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - Existing	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B - 2011 No-Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
C - 2011 Build	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			**Mean Wind Speed**			**Effective Gust Wind Speed**		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
65	A	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	13		Standing	19		Acceptable
	B	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	19		Acceptable
	C	Spring	13		Standing	19		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	18		Acceptable
66	A	Spring	17		Walking	26		Acceptable
		Summer	14		Standing	21		Acceptable
		Fall	16		Walking	24		Acceptable
		Winter	19		Walking	28		Acceptable
		Annual	17		Walking	26		Acceptable
	B	Spring	18		Walking	26		Acceptable
		Summer	14		Standing	21		Acceptable
		Fall	17		Walking	25		Acceptable
		Winter	19		Walking	28		Acceptable
		Annual	18		Walking	26		Acceptable
	C	Spring	18		Walking	26		Acceptable
		Summer	14		Standing	21		Acceptable
		Fall	17		Walking	24		Acceptable
		Winter	19		Walking	28		Acceptable
		Annual	17		Walking	25		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - Existing	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B - 2011 No-Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
C - 2011 Build	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			**Mean Wind Speed**			**Effective Gust Wind Speed**		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
67	A	Spring	14		Standing	23		Acceptable
		Summer	11		Sitting	18		Acceptable
		Fall	13		Standing	22		Acceptable
		Winter	15		Standing	24		Acceptable
		Annual	14		Standing	22		Acceptable
	B	Spring	15		Standing	23		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	14		Standing	22		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	14		Standing	23		Acceptable
	C	Spring	14		Standing	23		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	15		Standing	24		Acceptable
		Annual	14		Standing	22		Acceptable
68	A	Spring	12		Sitting	18		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	18		Acceptable
	B	Spring	12		Sitting	19		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	18		Acceptable
	C	Spring	13		Standing	20	+11%	Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	14		Standing	21		Acceptable
		Annual	13		Standing	20	+11%	Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations
A - Existing
B - 2011 No-Build
C - 2011 Build

Mean Wind Speed Criteria
Comfortable for Sitting: ≤ 12 mph
Comfortable for Standing: > 12 and ≤ 15 mph
Comfortable for Walking: > 15 and ≤ 19 mph
Uncomfortable for Walking: > 19 and ≤ 27 mph
Dangerous Conditions: > 27 mph

Effective Gust Criteria
Acceptable: ≤ 31 mph
Unacceptable: > 31 mph

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
69	A	Spring	16		Walking	23		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	17		Walking	25		Acceptable
		Annual	16		Walking	23		Acceptable
	B	Spring	16		Walking	23		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	17		Walking	25		Acceptable
		Annual	15		Standing	23		Acceptable
	C	Spring	16		Walking	23		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	17		Walking	24		Acceptable
		Annual	15		Standing	22		Acceptable
70	A	Spring	13		Standing	21		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	14		Standing	23		Acceptable
		Annual	13		Standing	21		Acceptable
	B	Spring	13		Standing	21		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	14		Standing	22		Acceptable
		Annual	13		Standing	21		Acceptable
	C	Spring	14		Standing	22		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	13		Standing	21		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	13		Standing	22		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - Existing	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B - 2011 No-Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
C - 2011 Build	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
71	A	Spring	14		Standing	21		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	15		Standing	22		Acceptable
		Annual	14		Standing	21		Acceptable
	B	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	14		Standing	22		Acceptable
		Annual	13		Standing	20		Acceptable
	C	Spring	12	-13%	Sitting	19		Acceptable
		Summer	9	-17%	Sitting	15		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13	-12%	Standing	21		Acceptable
		Annual	12	-13%	Sitting	19		Acceptable
72	A	Spring	12		Sitting	19		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	18		Acceptable
	B	Spring	12		Sitting	18		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	20		Acceptable
		Annual	11		Sitting	18		Acceptable
	C	Spring	11		Sitting	18		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	20		Acceptable
		Annual	11		Sitting	18		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - Existing	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B - 2011 No-Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
C - 2011 Build	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
73	A	Spring	12		Sitting	19		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	18		Acceptable
	B	Spring	12		Sitting	19		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	18		Acceptable
	C	Spring	13		Standing	20		Acceptable
		Summer	10	+11%	Sitting	16		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	21		Acceptable
		Annual	13		Standing	19		Acceptable
74	A	Spring	14		Standing	22		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	13		Standing	21		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	14		Standing	22		Acceptable
	B	Spring	14		Standing	22		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	13		Standing	21		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	14		Standing	22		Acceptable
	C	Spring	15		Standing	22		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	14		Standing	22		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - Existing	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B - 2011 No-Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
C - 2011 Build	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
75	A	Spring	19		Walking	28		Acceptable
		Summer	15		Standing	21		Acceptable
		Fall	18		Walking	26		Acceptable
		Winter	21		Uncomfortable	30		Acceptable
		Annual	19		Walking	27		Acceptable
	B	Spring	19		Walking	28		Acceptable
		Summer	15		Standing	21		Acceptable
		Fall	18		Walking	26		Acceptable
		Winter	21		Uncomfortable	30		Acceptable
		Annual	19		Walking	27		Acceptable
	C	Spring	21	+11%	Uncomfortable	28		Acceptable
		Summer	16		Walking	22		Acceptable
		Fall	19		Walking	27		Acceptable
		Winter	23	+10%	Uncomfortable	31		Acceptable
		Annual	20		Uncomfortable	28		Acceptable
76	A	Spring	11		Sitting	18		Acceptable
		Summer	8		Sitting	14		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	18		Acceptable
	B	Spring	11		Sitting	18		Acceptable
		Summer	8		Sitting	14		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	17		Acceptable
	C	Spring	11		Sitting	18		Acceptable
		Summer	8		Sitting	14		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	17		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations
A - Existing
B - 2011 No-Build
C - 2011 Build

Mean Wind Speed Criteria	
Comfortable for Sitting:	≤ 12 mph
Comfortable for Standing:	> 12 and ≤ 15 mph
Comfortable for Walking:	> 15 and ≤ 19 mph
Uncomfortable for Walking:	> 19 and ≤ 27 mph
Dangerous Conditions:	> 27 mph

Effective Gust Criteria	
Acceptable:	≤ 31 mph
Unacceptable:	> 31 mph

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
77	A	Spring	15		Standing	24		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	14		Standing	23		Acceptable
		Winter	17		Walking	27		Acceptable
		Annual	15		Standing	24		Acceptable
	B	Spring	15		Standing	24		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	14		Standing	22		Acceptable
		Winter	17		Walking	26		Acceptable
		Annual	15		Standing	24		Acceptable
	C	Spring	23	+52%	Uncomfortable	33	+38%	Unacceptable
		Summer	18	+50%	Walking	25	+39%	Acceptable
		Fall	22	+57%	Uncomfortable	31	+35%	Acceptable
		Winter	24	+41%	Uncomfortable	34	+26%	Unacceptable
		Annual	23	+52%	Uncomfortable	32	+33%	Unacceptable
78	A	Spring	18		Walking	29		Acceptable
		Summer	14		Standing	23		Acceptable
		Fall	17		Walking	27		Acceptable
		Winter	20		Uncomfortable	31		Acceptable
		Annual	18		Walking	28		Acceptable
	B	Spring	18		Walking	29		Acceptable
		Summer	14		Standing	23		Acceptable
		Fall	17		Walking	27		Acceptable
		Winter	19		Walking	31		Acceptable
		Annual	18		Walking	28		Acceptable
	C	Spring	17		Walking	27		Acceptable
		Summer	13		Standing	21		Acceptable
		Fall	16		Walking	25		Acceptable
		Winter	18		Walking	29		Acceptable
		Annual	16	-10%	Walking	27		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations
A - Existing
B - 2011 No-Build
C - 2011 Build

Mean Wind Speed Criteria

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

Effective Gust Criteria

Acceptable:	≤ 31 mph
Unacceptable:	> 31 mph

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
79	A	Spring	18		Walking	28		Acceptable
		Summer	14		Standing	22		Acceptable
		Fall	17		Walking	27		Acceptable
		Winter	20		Uncomfortable	31		Acceptable
		Annual	18		Walking	28		Acceptable
	B	Spring	18		Walking	28		Acceptable
		Summer	14		Standing	22		Acceptable
		Fall	17		Walking	26		Acceptable
		Winter	20		Uncomfortable	30		Acceptable
		Annual	18		Walking	28		Acceptable
	C	Spring	22	+22%	Uncomfortable	32	+14%	Unacceptable
		Summer	17	+21%	Walking	24		Acceptable
		Fall	20	+18%	Uncomfortable	29		Acceptable
		Winter	24	+20%	Uncomfortable	35	+13%	Unacceptable
		Annual	21	+17%	Uncomfortable	32	+14%	Unacceptable
80	A	Spring	23		Uncomfortable	33		Unacceptable
		Summer	18		Walking	25		Acceptable
		Fall	21		Uncomfortable	30		Acceptable
		Winter	25		Uncomfortable	35		Unacceptable
		Annual	22		Uncomfortable	32		Unacceptable
	B	Spring	23		Uncomfortable	32		Unacceptable
		Summer	18		Walking	25		Acceptable
		Fall	21		Uncomfortable	29		Acceptable
		Winter	25		Uncomfortable	35		Unacceptable
		Annual	22		Uncomfortable	31		Acceptable
	C	Spring	23		Uncomfortable	32		Unacceptable
		Summer	18		Walking	25		Acceptable
		Fall	21		Uncomfortable	30		Acceptable
		Winter	25		Uncomfortable	35		Unacceptable
		Annual	22		Uncomfortable	31		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

<u>Configurations</u>
A - Existing
B - 2011 No-Build
C - 2011 Build

<u>Mean Wind Speed Criteria</u>
Comfortable for Sitting: ≤ 12 mph
Comfortable for Standing: > 12 and ≤ 15 mph
Comfortable for Walking: > 15 and ≤ 19 mph
Uncomfortable for Walking: > 19 and ≤ 27 mph
Dangerous Conditions: > 27 mph

<u>Effective Gust Criteria</u>
Acceptable: ≤ 31 mph
Unacceptable: > 31 mph

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
81	A	Spring	23		Uncomfortable	34		Unacceptable
		Summer	18		Walking	27		Acceptable
		Fall	22		Uncomfortable	32		Unacceptable
		Winter	26		Uncomfortable	37		Unacceptable
		Annual	23		Uncomfortable	34		Unacceptable
	B	Spring	21		Uncomfortable	31		Acceptable
		Summer	16	-10%	Walking	24	-10%	Acceptable
		Fall	19	-13%	Walking	29		Acceptable
		Winter	23	-11%	Uncomfortable	34		Unacceptable
		Annual	20	-12%	Uncomfortable	30	-11%	Acceptable
	C	Spring	17	-25%	Walking	27	-20%	Acceptable
		Summer	13	-27%	Standing	22	-18%	Acceptable
		Fall	16	-26%	Walking	26	-18%	Acceptable
		Winter	18	-30%	Walking	29	-21%	Acceptable
		Annual	16	-29%	Walking	26	-23%	Acceptable
82	A	Spring	16		Walking	24		Acceptable
		Summer	12		Sitting	19		Acceptable
		Fall	15		Standing	23		Acceptable
		Winter	17		Walking	26		Acceptable
		Annual	15		Standing	24		Acceptable
	B	Spring	15		Standing	23		Acceptable
		Summer	11		Sitting	18		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	16		Walking	25		Acceptable
		Annual	15		Standing	22		Acceptable
	C	Spring	13	-18%	Standing	21	-12%	Acceptable
		Summer	10	-16%	Sitting	16	-15%	Acceptable
		Fall	12	-19%	Sitting	19	-16%	Acceptable
		Winter	14	-17%	Standing	23	-11%	Acceptable
		Annual	13	-12%	Standing	20	-16%	Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

<u>Configurations</u>
A - Existing
B - 2011 No-Build
C - 2011 Build

<u>Mean Wind Speed Criteria</u>

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

<u>Effective Gust Criteria</u>

Acceptable:	≤ 31 mph
Unacceptable:	> 31 mph

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
83	A	Spring	16		Walking	25		Acceptable
		Summer	12		Sitting	19		Acceptable
		Fall	15		Standing	23		Acceptable
		Winter	17		Walking	27		Acceptable
		Annual	15		Standing	24		Acceptable
	B	Spring	16		Walking	25		Acceptable
		Summer	12		Sitting	19		Acceptable
		Fall	15		Standing	23		Acceptable
		Winter	17		Walking	27		Acceptable
		Annual	16		Walking	24		Acceptable
	C	Spring	16		Walking	25		Acceptable
		Summer	12		Sitting	19		Acceptable
		Fall	15		Standing	23		Acceptable
		Winter	17		Walking	27		Acceptable
		Annual	16		Walking	25		Acceptable
84	A	Spring	22		Uncomfortable	32		Unacceptable
		Summer	17		Walking	25		Acceptable
		Fall	21		Uncomfortable	30		Acceptable
		Winter	23		Uncomfortable	34		Unacceptable
		Annual	21		Uncomfortable	31		Acceptable
	B	Spring	23		Uncomfortable	33		Unacceptable
		Summer	18		Walking	26		Acceptable
		Fall	22		Uncomfortable	31		Acceptable
		Winter	24		Uncomfortable	36		Unacceptable
		Annual	23	+10%	Uncomfortable	33		Unacceptable
	C	Spring	22		Uncomfortable	31		Acceptable
		Summer	17		Walking	24		Acceptable
		Fall	21		Uncomfortable	29		Acceptable
		Winter	23		Uncomfortable	32		Unacceptable
		Annual	21		Uncomfortable	30		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations
A - Existing
B - 2011 No-Build
C - 2011 Build

Mean Wind Speed Criteria	
Comfortable for Sitting:	≤ 12 mph
Comfortable for Standing:	> 12 and ≤ 15 mph
Comfortable for Walking:	> 15 and ≤ 19 mph
Uncomfortable for Walking:	> 19 and ≤ 27 mph
Dangerous Conditions:	> 27 mph

Effective Gust Criteria	
Acceptable:	≤ 31 mph
Unacceptable:	> 31 mph

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			**Mean Wind Speed**			**Effective Gust Wind Speed**		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
85	A	Spring	16		Walking	24		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	15		Standing	23		Acceptable
		Winter	17		Walking	26		Acceptable
		Annual	16		Walking	24		Acceptable
	B	Spring	15		Standing	23		Acceptable
		Summer	11	-14%	Sitting	18		Acceptable
		Fall	14		Standing	22		Acceptable
		Winter	16		Walking	25		Acceptable
		Annual	14	-12%	Standing	23		Acceptable
	C	Spring	16		Walking	25		Acceptable
		Summer	12		Sitting	20		Acceptable
		Fall	15		Standing	23		Acceptable
		Winter	17		Walking	26		Acceptable
		Annual	15		Standing	24		Acceptable
86	A	Spring	24		Uncomfortable	33		Unacceptable
		Summer	19		Walking	26		Acceptable
		Fall	22		Uncomfortable	31		Acceptable
		Winter	26		Uncomfortable	36		Unacceptable
		Annual	24		Uncomfortable	33		Unacceptable
	B	Spring	23		Uncomfortable	31		Acceptable
		Summer	18		Walking	24		Acceptable
		Fall	21		Uncomfortable	29		Acceptable
		Winter	25		Uncomfortable	33		Unacceptable
		Annual	22		Uncomfortable	31		Acceptable
	C	Spring	20	-16%	Uncomfortable	28	-14%	Acceptable
		Summer	15	-20%	Standing	22	-14%	Acceptable
		Fall	18	-17%	Walking	26	-15%	Acceptable
		Winter	22	-14%	Uncomfortable	30	-16%	Acceptable
		Annual	20	-16%	Uncomfortable	28	-14%	Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations
A - Existing
B - 2011 No-Build
C - 2011 Build

Mean Wind Speed Criteria	
Comfortable for Sitting:	≤ 12 mph
Comfortable for Standing:	> 12 and ≤ 15 mph
Comfortable for Walking:	> 15 and ≤ 19 mph
Uncomfortable for Walking:	> 19 and ≤ 27 mph
Dangerous Conditions:	> 27 mph

Effective Gust Criteria	
Acceptable:	≤ 31 mph
Unacceptable:	> 31 mph

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
87	A	Spring	30		Dangerous	41		Unacceptable
		Summer	24		Uncomfortable	33		Unacceptable
		Fall	28		Dangerous	39		Unacceptable
		Winter	32		Dangerous	45		Unacceptable
		Annual	29		Dangerous	41		Unacceptable
	B	Spring	30		Dangerous	41		Unacceptable
		Summer	23		Uncomfortable	32		Unacceptable
		Fall	28		Dangerous	38		Unacceptable
		Winter	33		Dangerous	45		Unacceptable
		Annual	29		Dangerous	40		Unacceptable
	C	Spring	26	-12%	Uncomfortable	36	-11%	Unacceptable
		Summer	20	-16%	Uncomfortable	28	-14%	Acceptable
		Fall	24	-13%	Uncomfortable	33	-14%	Unacceptable
		Winter	28	-12%	Dangerous	39	-12%	Unacceptable
		Annual	25	-13%	Uncomfortable	36	-11%	Unacceptable
88	A	Spring	25		Uncomfortable	35		Unacceptable
		Summer	19		Walking	26		Acceptable
		Fall	23		Uncomfortable	32		Unacceptable
		Winter	27		Uncomfortable	38		Unacceptable
		Annual	24		Uncomfortable	34		Unacceptable
	B	Spring	25		Uncomfortable	35		Unacceptable
		Summer	19		Walking	27		Acceptable
		Fall	23		Uncomfortable	32		Unacceptable
		Winter	28		Dangerous	39		Unacceptable
		Annual	25		Uncomfortable	35		Unacceptable
	C	Spring	25		Uncomfortable	35		Unacceptable
		Summer	19		Walking	27		Acceptable
		Fall	23		Uncomfortable	32		Unacceptable
		Winter	28		Dangerous	39		Unacceptable
		Annual	24		Uncomfortable	34		Unacceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - Existing	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B - 2011 No-Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
C - 2011 Build	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
89	A	Spring	23		Uncomfortable	36		Unacceptable
		Summer	18		Walking	27		Acceptable
		Fall	22		Uncomfortable	33		Unacceptable
		Winter	25		Uncomfortable	38		Unacceptable
		Annual	23		Uncomfortable	35		Unacceptable
	B	Spring	24		Uncomfortable	36		Unacceptable
		Summer	18		Walking	27		Acceptable
		Fall	22		Uncomfortable	33		Unacceptable
		Winter	26		Uncomfortable	39		Unacceptable
		Annual	23		Uncomfortable	35		Unacceptable
	C	Spring	23		Uncomfortable	35		Unacceptable
		Summer	18		Walking	27		Acceptable
		Fall	22		Uncomfortable	33		Unacceptable
		Winter	25		Uncomfortable	38		Unacceptable
		Annual	23		Uncomfortable	35		Unacceptable

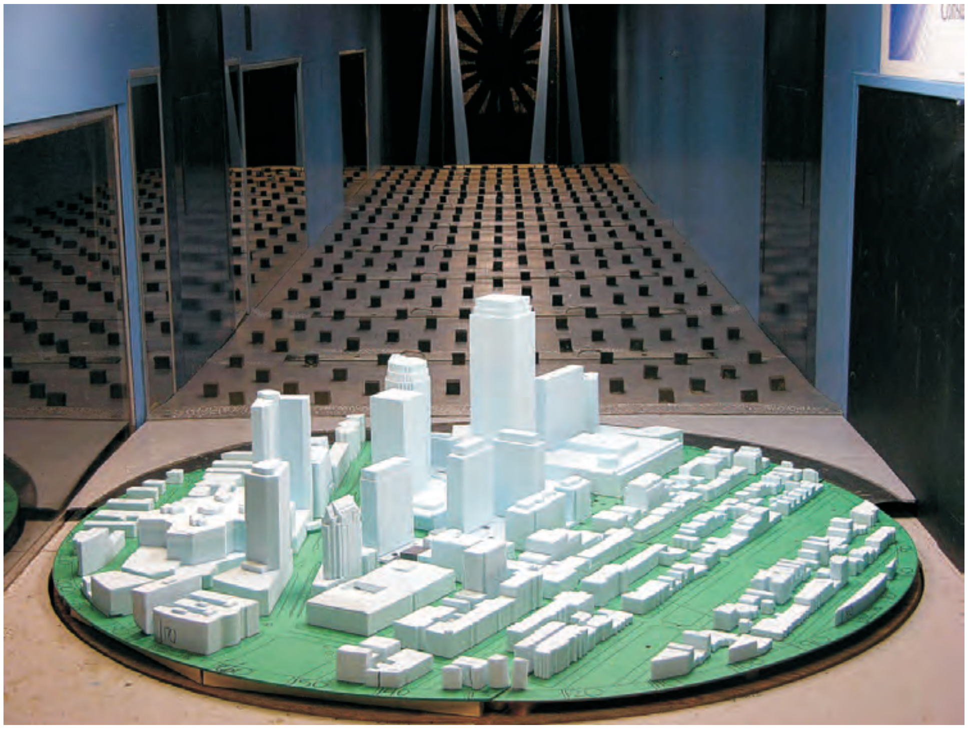
Notes: 1) Wind speeds are for a 1% probability of exceedance, and
2) %Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations
A - Existing
B - 2011 No-Build
C - 2011 Build

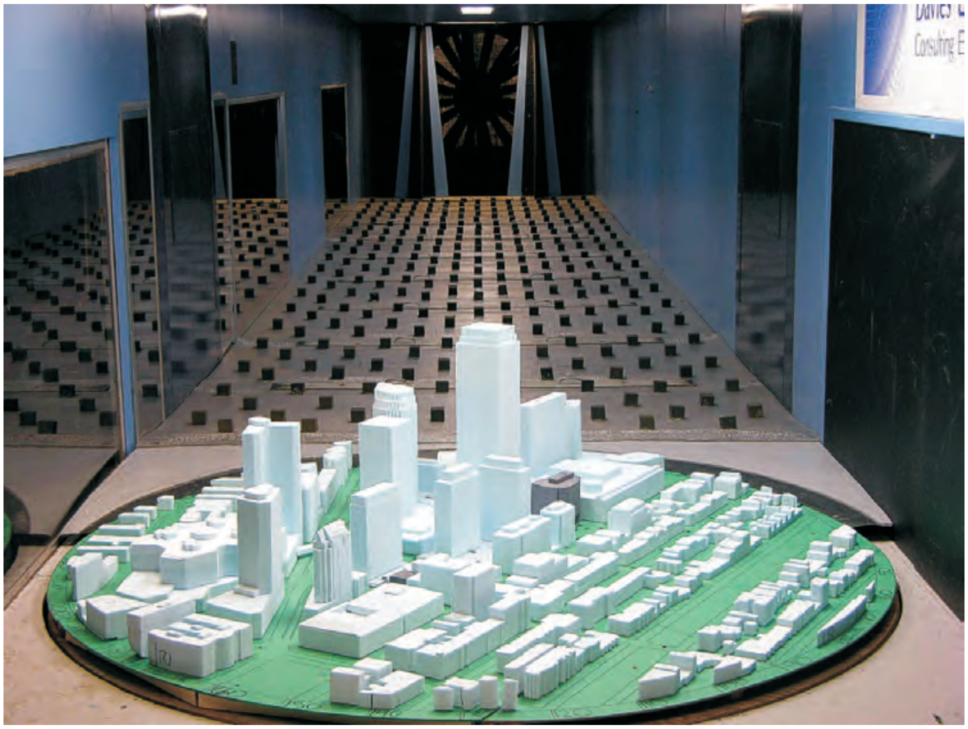
Mean Wind Speed Criteria	
Comfortable for Sitting:	≤ 12 mph
Comfortable for Standing:	> 12 and ≤ 15 mph
Comfortable for Walking:	> 15 and ≤ 19 mph
Uncomfortable for Walking:	> 19 and ≤ 27 mph
Dangerous Conditions:	> 27 mph

Effective Gust Criteria	
Acceptable:	≤ 31 mph
Unacceptable:	> 31 mph

FIGURES



Wind Tunnel Study Model **Existing Configuration**	Figure: 1a
Prudential Center - Boston, Massachusetts Project #07-1071	Date: November 15, 2006



Wind Tunnel Study Model
2011 - No Build Configuration

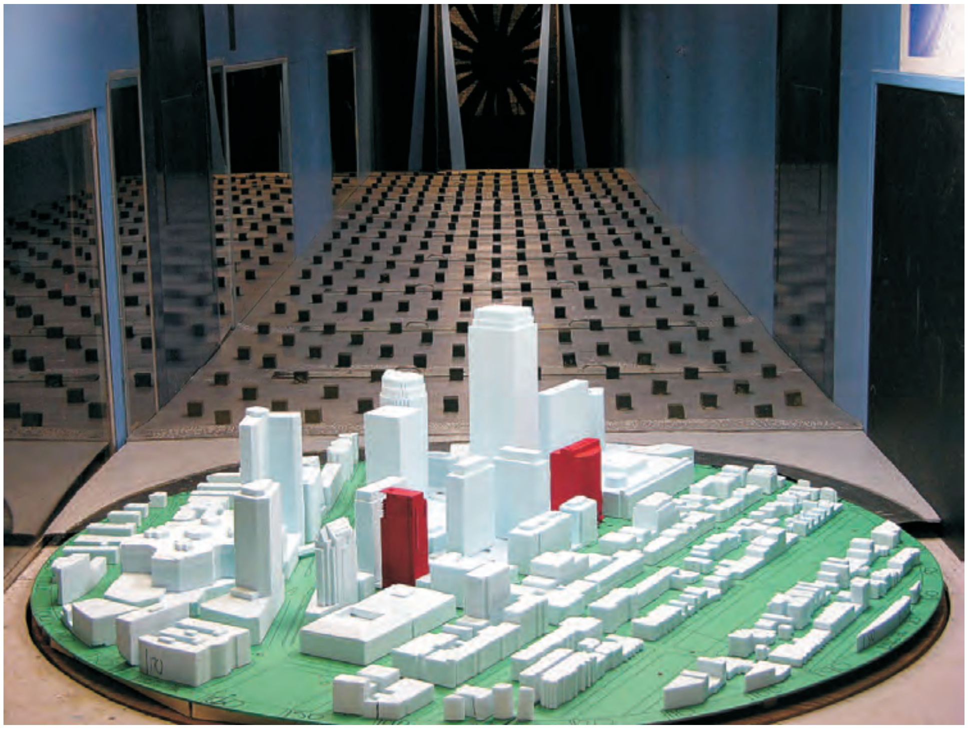
Prudential Center - Boston, Massachusetts

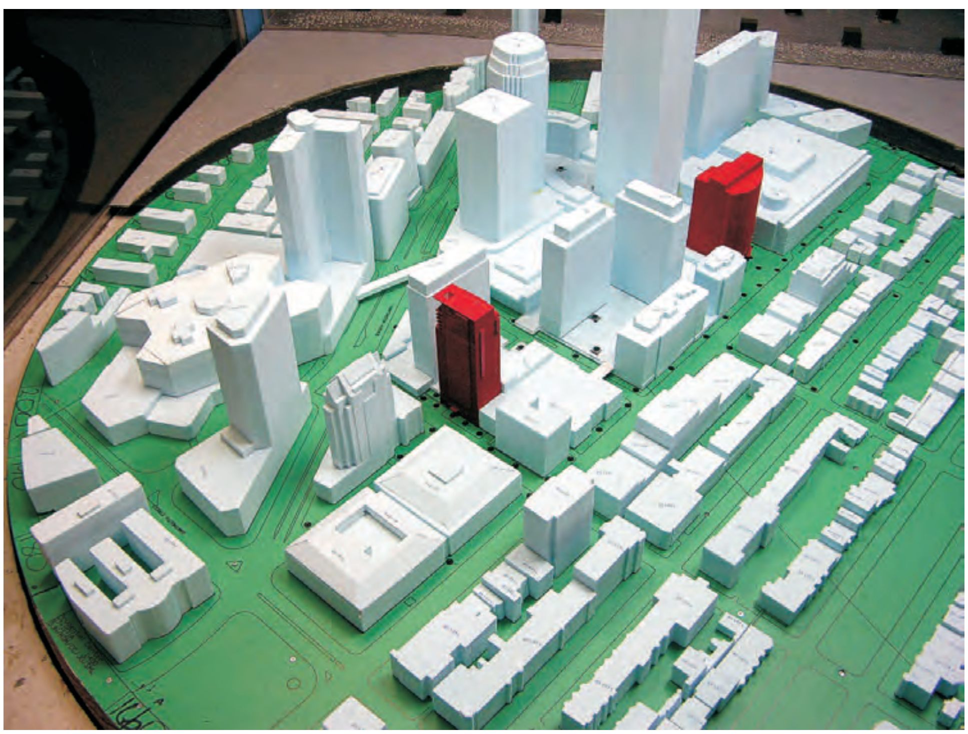
Project #07-1071

Figure: 1b

Date: November 15, 2006

RWDI





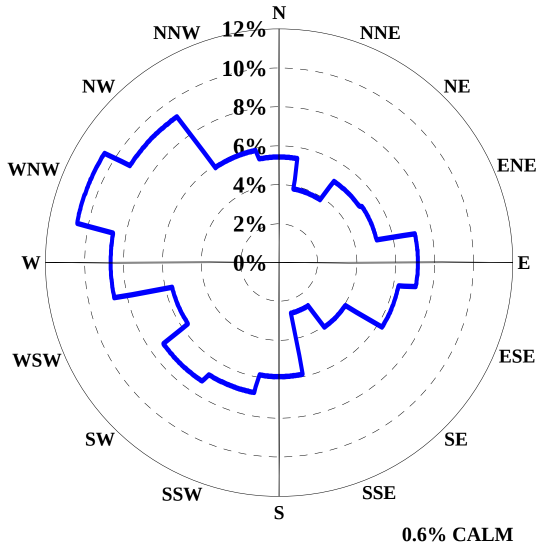
Wind Tunnel Study Model
2011 - Build Configuration

Prudential Center - Boston, Massachusetts

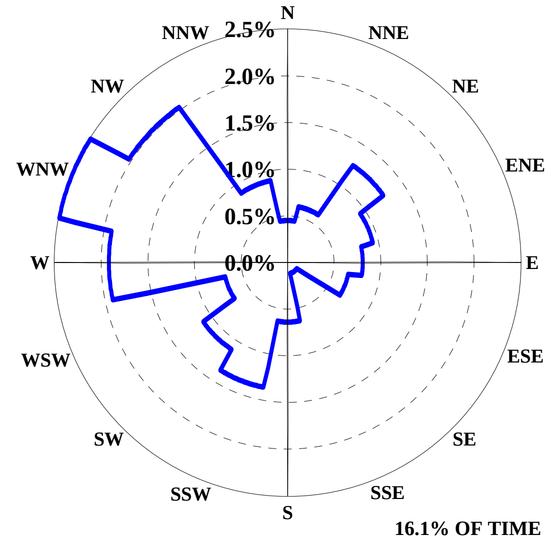
Project #07-1071

Figure:	1c
Date:	November 15, 2006

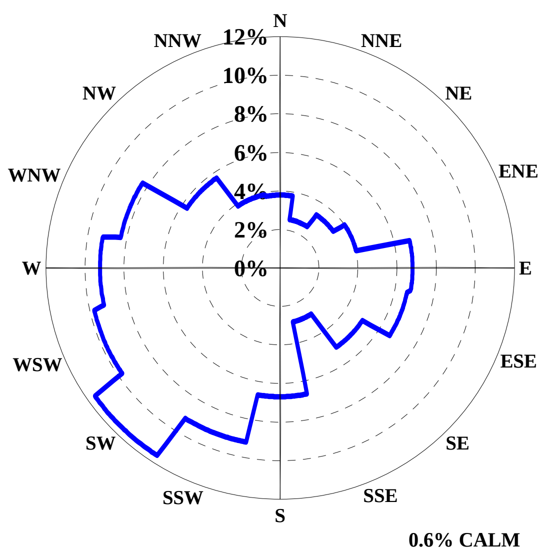
RWDI



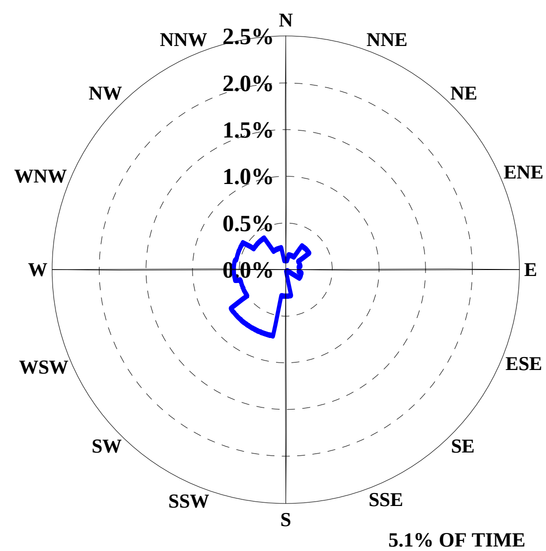
ALL SPRING WINDS



SPRING WINDS EXCEEDING 20 mph

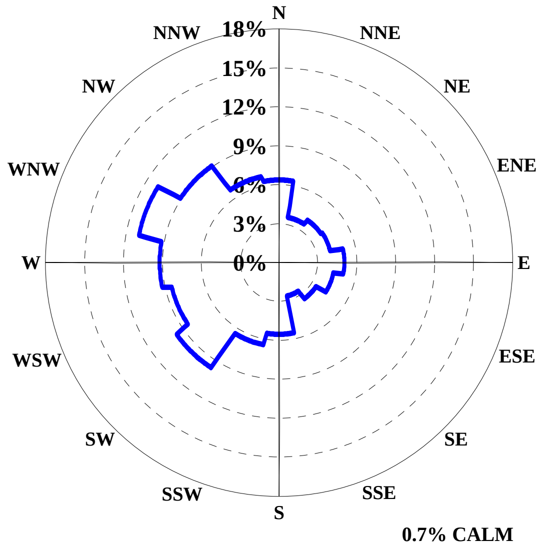


ALL SUMMER WINDS

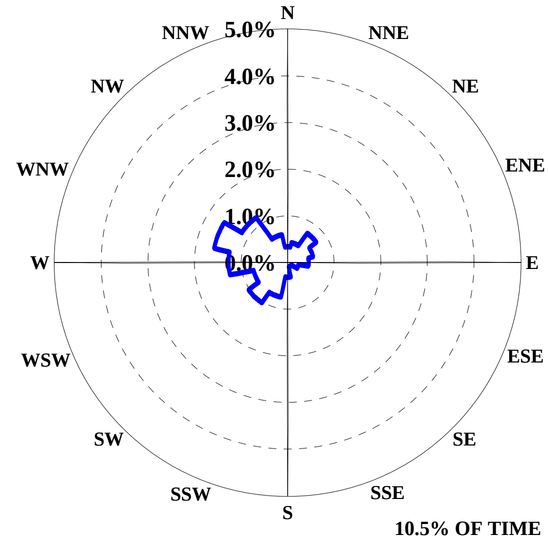


SUMMER WINDS EXCEEDING 20 mph

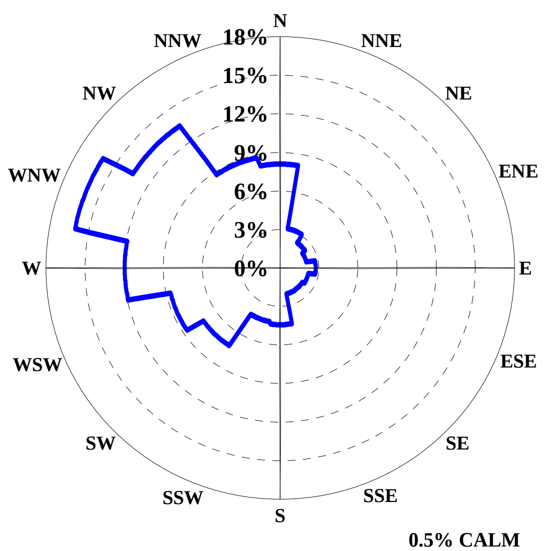
Directional Distribution (%) of Winds (Blowing From) **Station: Boston-Logan International Airport, MA (1945 - 1998)** Prudential Center - Boston, Massachusetts Project #: 07-1071	Figure: **2a** Date: May 18, 2007	RWDI



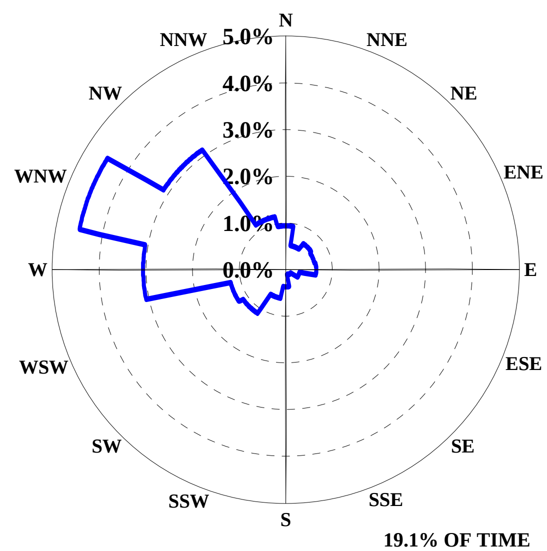
ALL FALL WINDS



FALL WINDS EXCEEDING 20 mph



ALL WINTER WINDS



WINTER WINDS EXCEEDING 20 mph

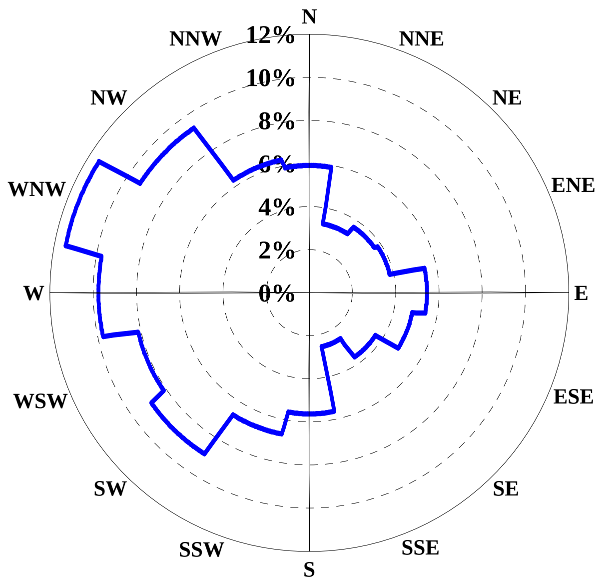
Directional Distribution (%) of Winds (Blowing From)
Station: Boston-Logan International Airport, MA (1945 - 1998)

Prudential Center - Boston, Massachusetts   Project #: 07-1071

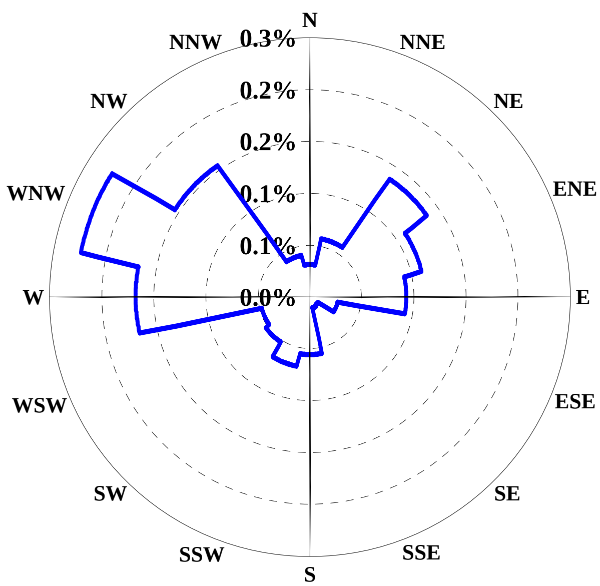
Figure: **2b**

Date: May 18, 2007

RWDI

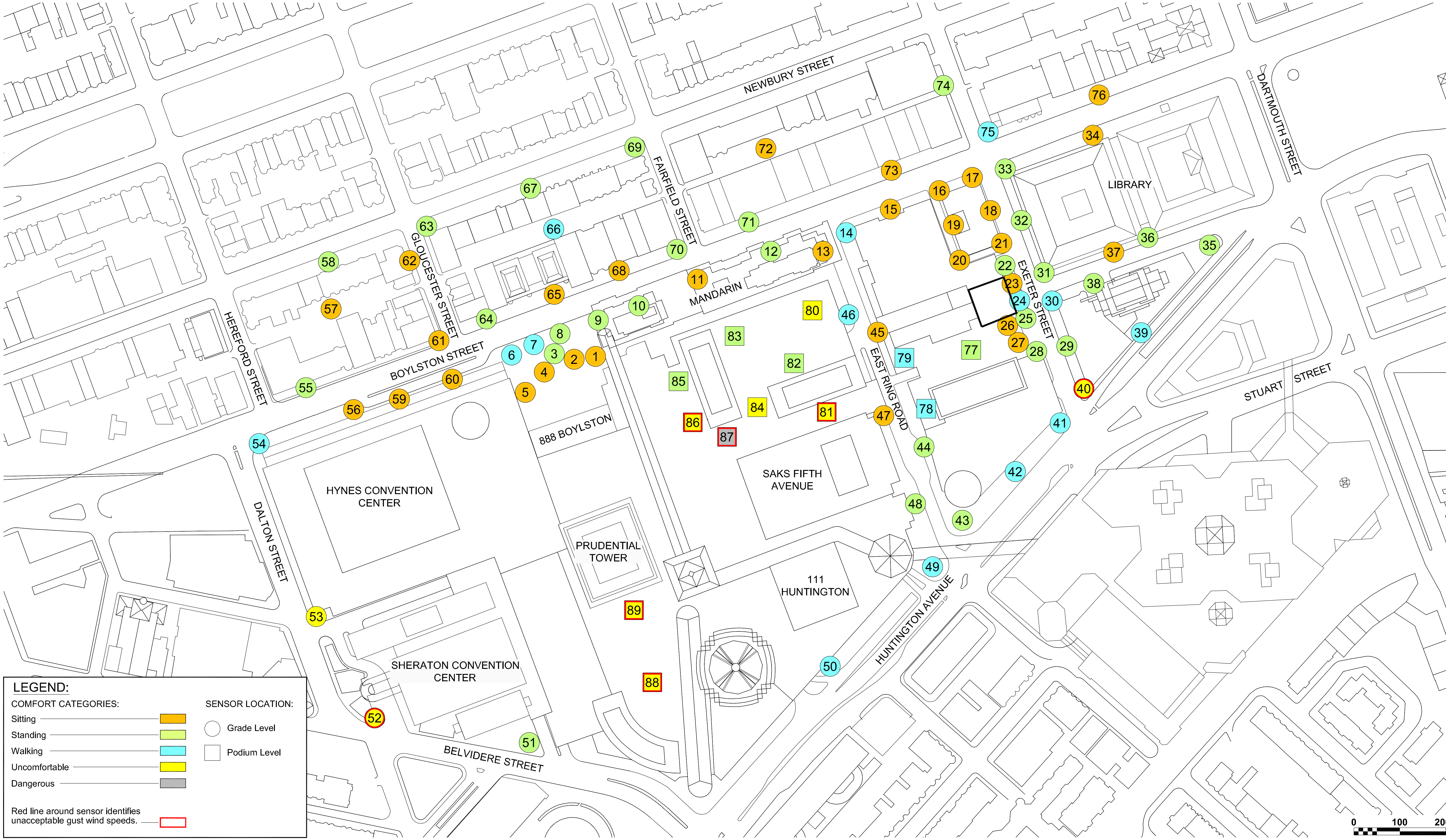


ALL ANNUAL WINDS



STRONG ANNUAL WINDS

Directional Distribution (%) of Winds (Blowing From) **Station: Boston Logan International Airport (1945 - 1998)** Prudential Center - Boston, Massachusetts Project #: 07-1071	Figure: **2c** Date: May 18, 2007	RWDI



LEGEND:

COMFORT CATEGORIES:
- Sitting
- Standing
- Walking
- Uncomfortable
- Dangerous

SENSOR LOCATION:
- Grade Level
- Podium Level

Red line around sensor identifies unacceptable gust wind speeds.

Pedestrian Wind Conditions - Existing
Annual

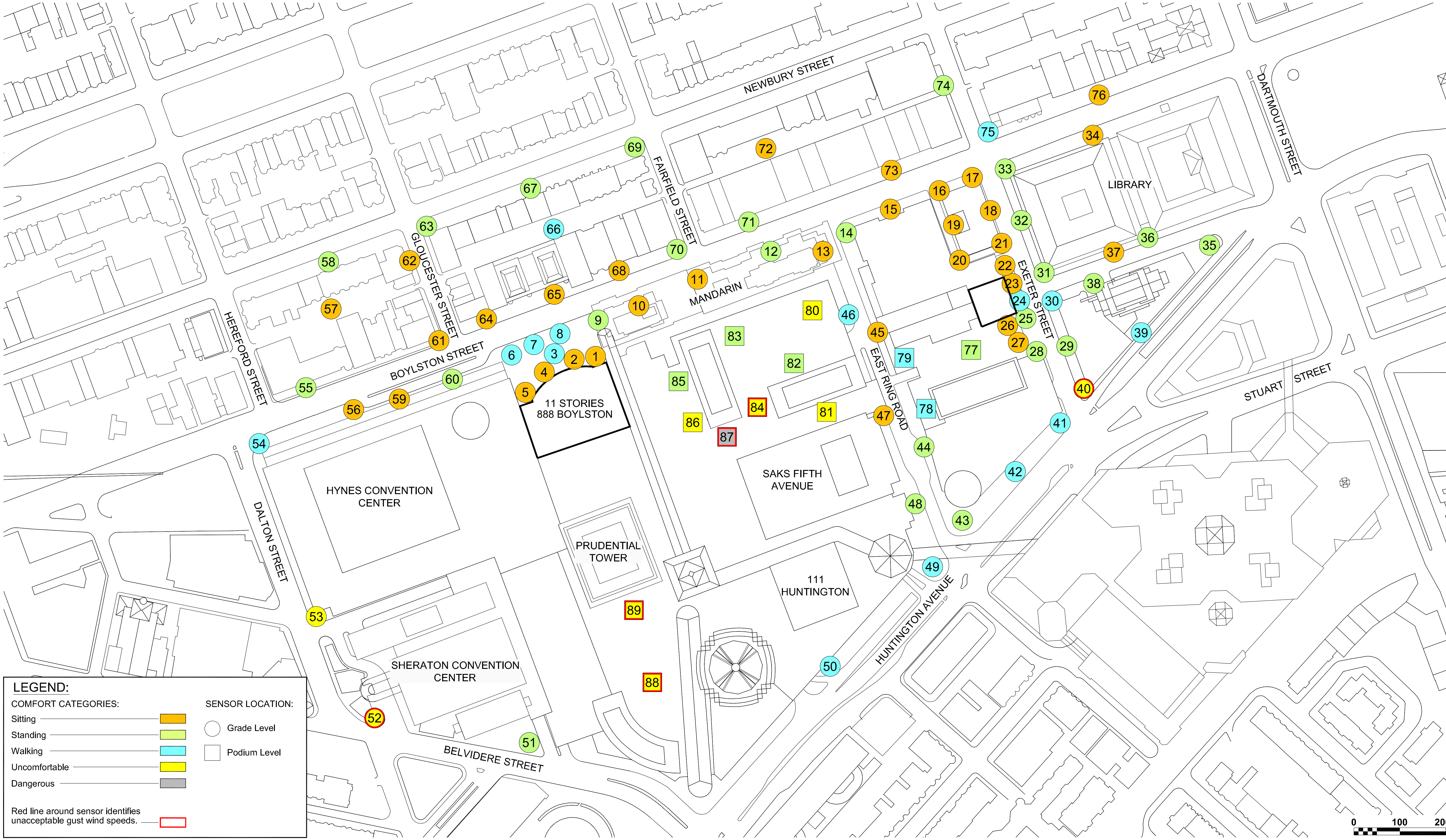
Prudential Center - Boston, Massachusetts

True North

Project #07-1071

Drawn by: GLG	Figure: 3a
Approx. Scale:	1"=200'
Date Revised:	Jan. 16, 2007

RWDI



Pedestrian Wind Conditions - 2011 No-Build Configuration
Annual

Prudential Center - Boston, Massachusetts

True North

Project #07-1071

Drawn by: GLG	Figure: **3b**
Approx. Scale:	1"=200'
Date Revised:	Jan. 16, 2007

RWDI

Pedestrian Wind Conditions - 2011 Build Configuration
Annual

Prudential Center - Boston, Massachusetts

True North

Project #07-1071

Drawn by: GLG	Figure: **3c**
Approx. Scale:	1"=200'
Date Revised:	Jan. 16, 2007

RWDI

F – NOISE ANALYSIS by CAVANAUGH TOCCI ASSOCIATES

CAVANAUGH TOCCI ASSOCIATES, INCORPORATED
327 F BOSTON POST ROAD, SUDBURY, MA 01776-3027 ▯ TEL: (978) 443-7871 ▯ FAX: (978) 443-7873 ▯ E-MAIL: cta@cavtocci.com

December 7, 2006

Mr. David Stewart, Project Manager - Development
Boston Properties, Inc.
111 Huntington Avenue
Boston, MA 02199

Project: 888 Boylston and One Exeter Buildings

Subject: "Base-line" Background Sound Monitoring Data

Dear Mr. Stewart,

This letter and attachments summarize sound level monitoring conducted for a one-week time interval during November 2006 at the Prudential Center in the near vicinity of the proposed 888 Boylston Street and One Exeter Street buildings.

The sound monitoring data quantify the existing (Fall 2006) ambient acoustical environment in the immediate vicinity of each of the two proposed building sites.

Executive Summary

The sound monitoring data establish a "base-line" of existing ambient environmental sound levels, quantified <u>prior to the construction of each building</u>. The existing ambient sound level data serve as a basis to establish pertinent acoustical criteria for the design, construction and occupancy/operation of the buildings, in accordance with applicable government agency requirements (as explained herein).

Our evaluation of the data indicates that pertinent aspects of building design, construction and operation will require acoustical review, in order to achieve compliance with applicable government agency acoustical criteria. In particular, the building design review would focus on the exterior building facades (particularly the windows) and building mechanical equipment (particularly rooftop equipment and/or air transfer louvers in the building facades).

However, based on the evaluation summarized herein, we conclude that the acoustical design requirements for these two buildings are not extraordinary, and compliance with the applicable acoustical criteria will not be unusually difficult or expensive to achieve.

Attachments

Figure 1 is a Prudential Center Site Plan, annotated to show the sound monitoring locations used for this acoustical study.

Figures 2a and 2b present the most pertinent sound monitoring data collected, in graph format.

Table 1 contains a summary of sound level descriptors extracted from the sound monitoring data, which are pertinent to the applicable government agency acoustical criteria.

Appendix A contains a brief glossary of pertinent acoustical terminology, and portions of the most pertinent acoustical criteria promulgated by the government agencies listed below.

Government Agencies

The sound monitoring data presented in this report provide a basis to establish pertinent acoustical criteria for the buildings, in accordance with the various acoustical guidelines and requirements of the following:

- The Boston Redevelopment Authority (BRA) Development Review Guidelines
- The City of Boston Noise Regulation
- The Massachusetts Department of Environmental Protection (MDEP) Community Sound Levels Criteria
- The U.S. Department of Housing and Urban Development (HUD) Site Acceptability Criteria

Acoustical Terminology and Criteria

The government agency acoustical criteria are introduced below and are more extensively explained in Appendix A. These agency criteria apply (separately or together) to different phases of the project, as follows:

1. *Site Evaluation and Building Design*

   Portions of the BRA Review Guidelines and HUD Site Acceptability Standards are applicable to this phase of the two building projects. These criteria apply to the evaluation (and potential control) of urban environmental sound that would be potentially transmitted <u>into</u> each of the proposed buildings. These criteria potentially affect the design specifications for building exterior façade components, such as windows, walls, balcony doors, ventilation louvers, etc.

2. *Site Preparation and Building Construction*

   A portion of the Boston Noise Regulation (Regulation #3) is applicable to the construction phase of the two building projects. Regulation #3 applies to evaluation (and potential control) of construction noise transmitted from the building construction sites to adjacent/nearby properties. This regulation potentially affects the selection, use, and scheduling of some of the noisiest construction equipment and activities.

3. *Occupancy of the Buildings and Operation of Building Mechanical Systems*

   Portions of the BRA Review Guidelines, the Boston Noise Regulations, and the MDEP Community Sound Levels Criteria are applicable to this phase of the projects. These criteria apply to evaluation (and potential control) of sound transmitted from the buildings to adjacent/nearby properties. These criteria potentially affect the design specifications for rooftop mechanical equipment and/or rooftop noise barriers and/or mechanical room acoustical louvers in the building façade.

To some extent, the various government agency acoustical criteria are inter-related. For instance, the BRA does not specify criteria specifically developed by the BRA. Rather, the BRA requires that environmental noise transmitted into residential buildings must be in conformance with a specific criterion of the HUD environmental noise criteria. The BRA also requires that sound produced by building mechanical systems and transmitted to nearby properties must comply with the MDEP Community Sound Levels Criteria.

- The BRA and HUD criteria for environmental sound impact on the proposed residential buildings are expressed in terms of the Day-Night Sound Level (abbreviated DNL, symbolized L_{dn}). Briefly, the DNL is an average of sound levels measured for a full 24-hour day, with an adjustment or "penalty" for sound levels measured during late-night hours, which accounts for increased community sensitivity to nighttime noise levels (see Appendix A).

  The BRA and HUD criteria include an Interior Design Noise Level, which is a DNL of 45 dB. Typically, Cavanaugh Tocci Associates, Inc. recommends interior sound levels that are lower than DNL of 45 dB (pending the potential cost ramifications of achieving our more conservative design goal).

  The HUD Standards also include a table of exterior DNL classifications. Based on the exterior classifications, sites with exterior DNL exceeding 65 dB typically require some type of exterior-to-interior noise control to achieve the DNL 45 interior design goal. This is typically achieved by air-conditioning the building spaces and installing double pane windows (insulated glazing). The higher the exterior DNL (above DNL of 65 dB), the more noise reduction must be provided. In the experience of this office, typical new-construction multi-story exterior façade construction incorporating air-conditioning and "standard" ½-inch insulated glazing windows will achieve an interior DNL of 45 dB, for any exterior environments that are at or below DNL of 70 dB. For exterior DNL above 70, more specialized acoustical review and window selection would be required to achieve interior DNL at or below 45 dB. (Again, this office recommends interior sound levels that are somewhat lower than DNL of 45 dB. Therefore, this office recommends window acoustical review whenever exterior sound levels exceed DNL of 65 dB)

- The City of Boston Noise Regulations, Regulation #3 pertains to construction noise. This regulation includes a maximum sound level limit of 86 dBA (except for impact sound, such as produced by pile-driving), and also includes a "tenth percentile" (symbolized L_{10}) sound level limit of 75 dBA. However, if the pre-existing acoustical environment L_{10} is already at or above 75 dBA, then the construction noise L_{10} limit becomes the pre-existing L_{10} plus 5 dBA.

- Both the City of Boston and MDEP noise regulations include limits for occupied/operational building mechanical systems sound transmitted to adjacent/nearby properties. Both agency regulations include a quantity criterion (sound level) and a quality criterion (frequency characteristic), but do so in different ways:

  - The Boston Noise Regulations include a series of specific sound level and frequency limits listed in a table (see Appendix A). Each series of limits is based on time of day/night and land use classifications for the project site and adjacent properties. In the simplest summary, for this project mechanical system sound must not exceed 60 dBA during daytime hours and must not exceed 50 dBA during nighttime hours at nearest residential receptor properties.

  - The MDEP sound level criterion is not a "fixed limit" listed on a table. Rather, it is a "reference limit" based on the pre-existing background sound level, defined as the "ninetieth percentile" (symbolized L_{90}). The MDEP requires that sound produced by a "facility" must not increase the pre-existing L_{90} by more than <u>10 dBA</u>. We note that the term "facility" could be interpreted to be each/both of the proposed new buildings, or could be interpreted to be the entire Prudential Center. As a practical matter, this office suggests a much more conservative design goal, which is no more than <u>3 dBA</u> above the pre-existing background L_{90} for each/both of the proposed buildings. In addition, the MDEP prohibits a "pure-tone condition". An acoustical review of proposed mechanical systems would ensure that sound levels produced by each/both buildings would be well within the MDEP sound level limit and ensure that a pure-tone condition would not occur.

Measured Sound Data

Figures 2a and 2b present the most pertinent sound data in graph format. On these graphs:

- The upper data trace shows the maximum sound level (symbolized L_{max}) that occurred each hour during the one-week sound monitoring time period. There is no government agency requirement to report the ambient L_{max} data for the 888 Boylston Street and One Exeter building projects. However, these data are presented to demonstrate that existing ambient maximum sound levels occasionally exceed 86 dBA, which is the Boston Noise Regulation limit for construction noise. This does not change the Boston Noise Regulation requirement that 888 Boylston Street and One Exeter construction noise L_{max} must not exceed 86 dBA. It simply demonstrates that the pre-existing ambient acoustical environment at the project sites already includes intermittent acoustical events that result in L_{max} sound levels at or above 86 dBA.

- The 2nd data trace shows the tenth percentile sound level (symbolized L_{10}) for each hour. As further explained in Appendix A, the L_{10} data are used to provide a baseline for the Boston Noise regulations construction sound L_{10} limit.

- The 3rd data trace is the energy equivalent sound level (symbolized L_{eq}), which is considered the "average" sound level for each one-hour time interval. As further explained in Appendix A, the hourly L_{eq} data are used to calculate the 24-hour Day-Night Sound Level (alternatively abbreviated/symbolized as DNL or L_{dn}) which is the acoustical descriptor specified in the BRA and HUD criteria to evaluate environmental noise impact on housing sites.

- The lower trace is the ninetieth percentile sound level (symbolized L_{90}), which is considered the "background" sound level for each one-hour time interval. As further explained in Appendix A, the L_{90} is used to establish the base-line background sound level in accordance with specific MDEP criteria.

The sound monitoring data exhibit the classic diurnal pattern of sound levels expected in an urban environment in the near vicinity of busy main artery surface streets (Boylston Street and Huntington Ave.). Sound levels are generally higher during the day and lower at night.

Evaluation of Measured Sound Levels with Respect to Government Agency Criteria

Table 1 summarizes the most pertinent sound monitoring data with respect to the government agency acoustical criteria. On Table 1:

- The L_{max} data indicate that existing ambient maximum sound levels occasionally exceeded the Boston 86 dBA L_{max} limit for construction noise. Therefore, in the future, if sound level monitoring may be conducted during construction, and L_{max} sound levels may exceed 86 dBA, that would not necessarily indicate that construction activities caused the L_{max} levels. (In such an event, measurements with an acoustical technician observer and hand-held sound meter would be required to differentiate construction noise from ambient noise.)

- The L_{10} data indicate that existing ambient L_{10} levels that occurred at the pertinent sound study Locations 1, 4 and 5 were almost always below 75 dBA. Therefore, the City of Boston Noise Regulations construction L_{10} sound limit applicable to both buildings is 75 dBA.

- The L_{eq} data, and the resultant calculations of Day-Night Sound Level (DNL) indicate that exterior sound levels at both building sites exceeded DNL of 65 dB. This indicates that an evaluation of building façade exterior design specifications (principally window design review) would be required to achieve compliance with the BRA and HUD Interior Design Noise Level.

- The L_{90} data indicate that the lowest background sound levels were 57 dBA during daytime hours and 55 dBA during nighttime hours. Therefore, the MDEP limit would be 67 dBA during daytime hours and 65 dBA during nighttime hours (background sound level, plus 10 dBA). However, we recommend more conservative limits of 60 dBA during daytime hours and 58 dBA during nighttime hours (background sound level, plus 3 dBA).

We trust this report fulfills the BRA submittal requirements.

Sincerely,
Cavanaugh Tocci Associates, Inc.

Brion G. Koning

Brion G. Koning, Senior Consultant
BostonProperties-BaselineSoundMonitoring-12-7-06.doc

Location	Descriptor	Lowest	Average	Highest
1: Security camera mount overlooking Boylston St. and Prudential courtyard	L_{eq}:	61	64	66
	L_{eq} (day*):	61	65	68
	L_{eq} (night**):	60	61	65
	Lowest L_{90} (day):	57	59	61
	Lowest L_{90} (night):	55	56	58
	L_{dn}	67	68	69
2: Roof terrace of Gloucester building overlooking Exeter St.	Leq:	64	67	69
	Leq (day*):	64	68	71
	Leq (night**):	64	65	70
	Lowest L90 (day):	56	59	62
	Lowest L90 (night):	54	55	58
	Ldn	70	72	73

Table 1: Summary of Sound Monitoring Data

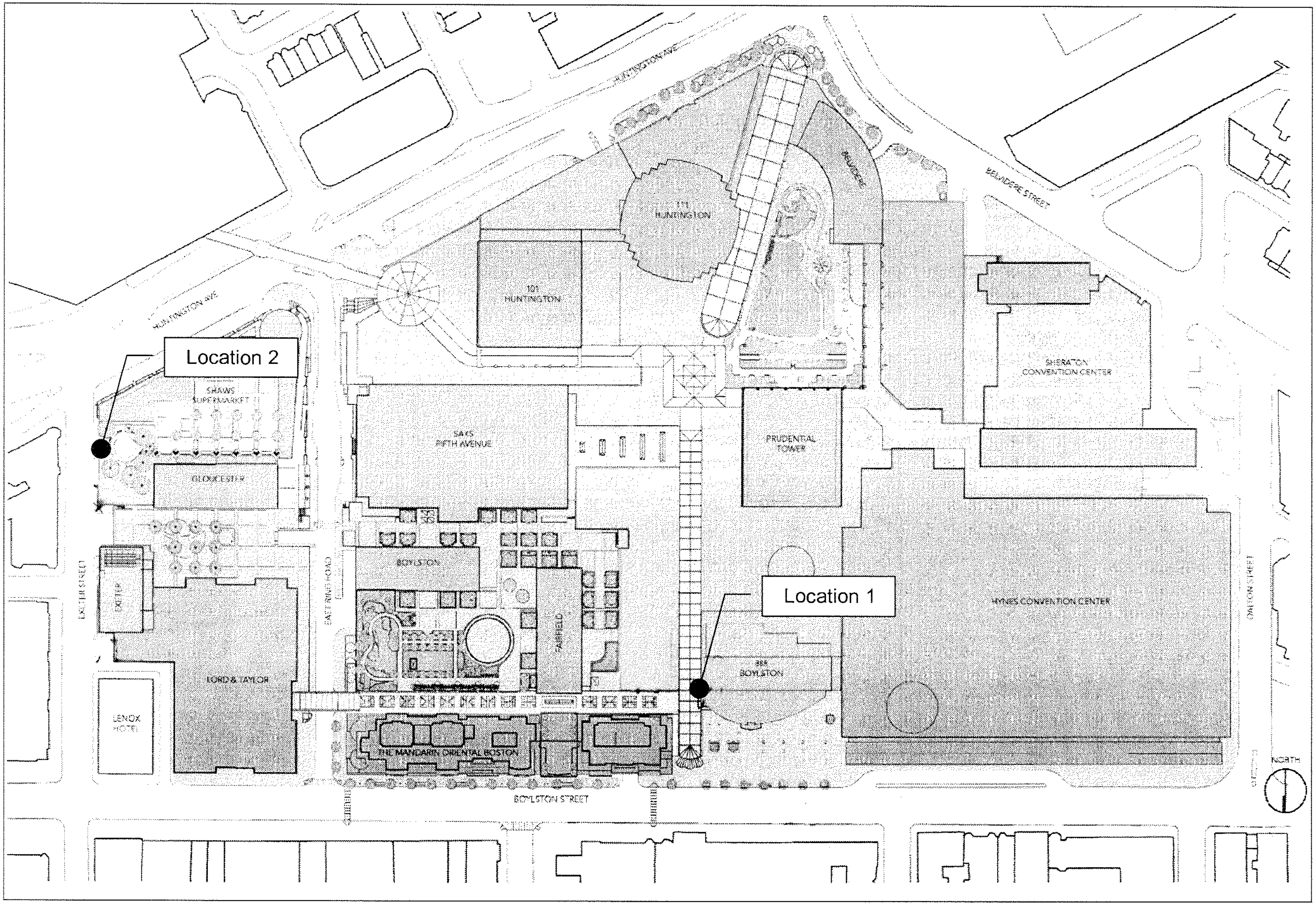


Figure 1: Site plan showing sound monitoring locations

cta

Location 1: Security camera mount overlooking Boylston St. and Prudential courtyard

November 2, 2006 - November 9, 2006

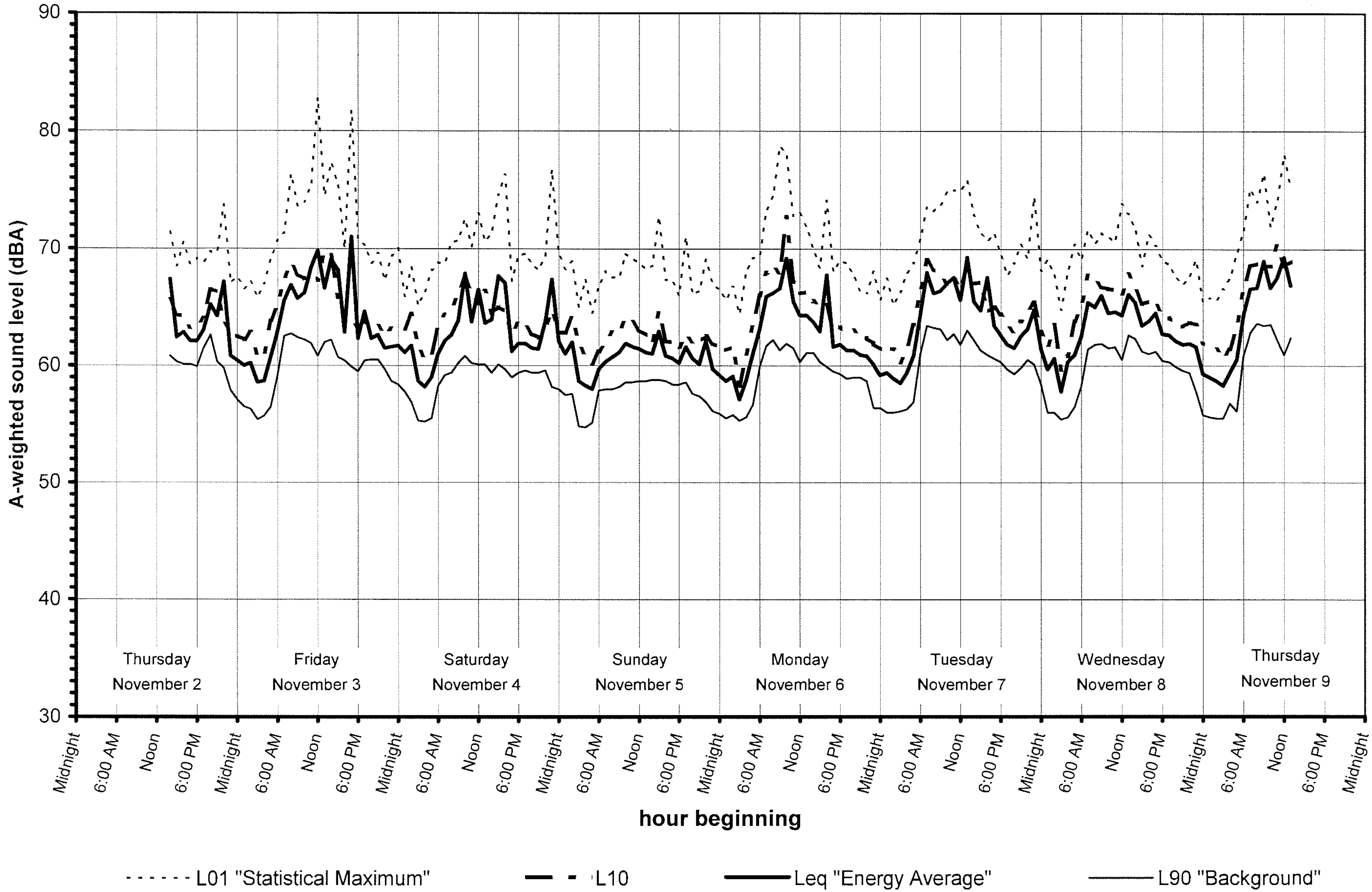


Figure 2a

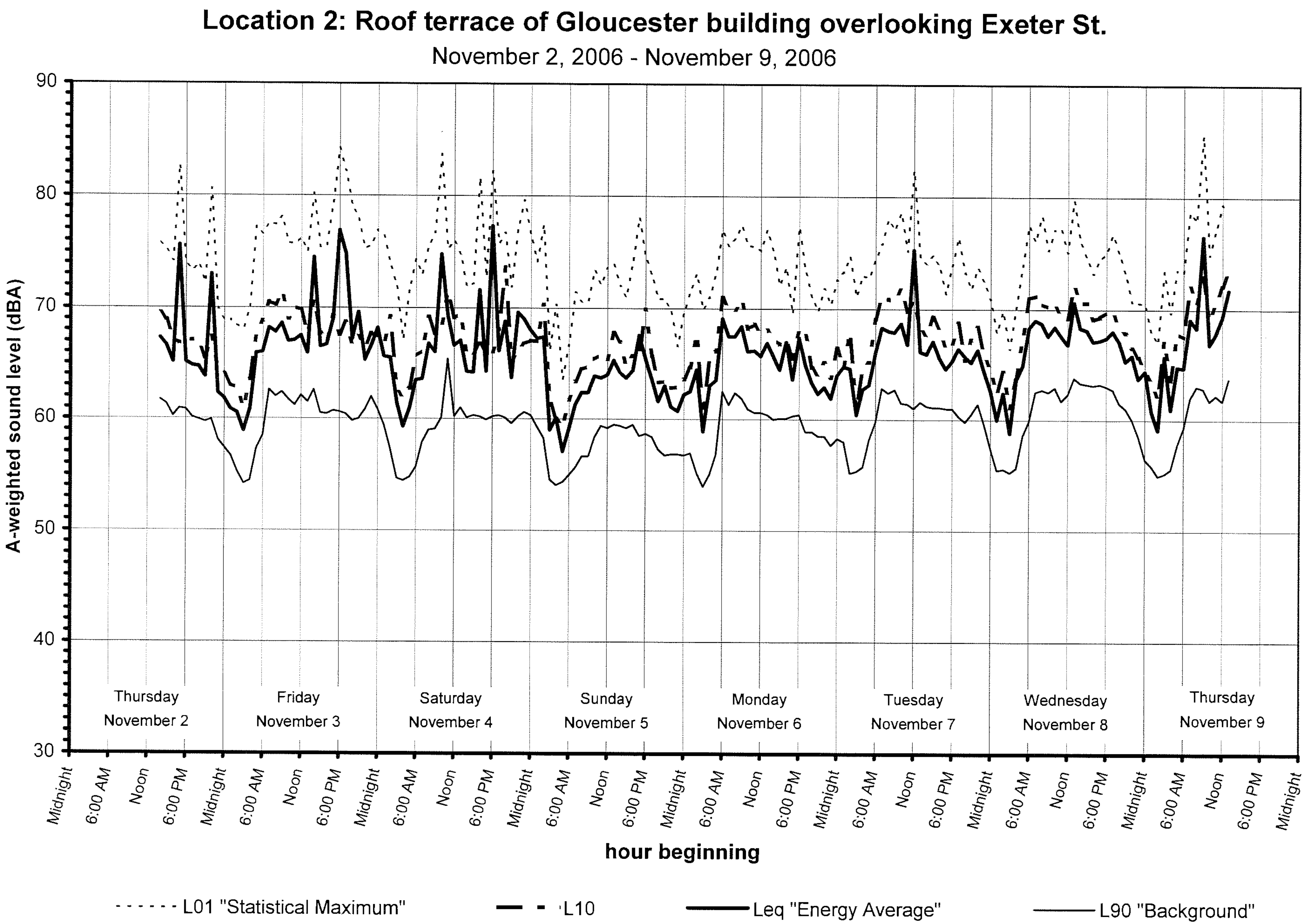

Location 2: Roof terrace of Gloucester building overlooking Exeter St.
November 2, 2006 - November 9, 2006
A-weighted sound level (dBA)
90
80
70
60
50
40
30
Thursday November 2
Friday November 3
Saturday November 4
Sunday November 5
Monday November 6
Tuesday November 7
Wednesday November 8
Thursday November 9
Midnight
6:00 AM
Noon
6:00 PM
hour beginning
L01 "Statistical Maximum"
L10
Leq "Energy Average"
L90 "Background"

Figure 2b

APPENDIX A

Pertinent Acoustical Terminology and Criteria

A-weighting

Generally, the sensitivity of human hearing is restricted to the frequency range of 20 Hz to 20,000 Hz. The human ear, however, is most sensitive to sound in the 500 to 8,000 Hz frequency range. Above and below this range, the ear becomes progressively less sensitive. To account for this feature of human hearing, sound level meters incorporate a filtering of acoustic signals according to frequency. This filtering is devised to correspond to the varying sensitivity of the human ear to sound over the audible frequency range. This filtering is called **A-weighting**. Sound pressure level values obtained using this weighting are referred to as A-weighted sound pressure levels and are signified by the identifier **dBA**. To provide some perspective, Figure 2.1 gives typical A-weighted sound pressure levels of various common sounds.

An important feature of the human perception of continuous sound is that an increase or decrease in sound pressure level by 3 dB or less is barely perceptible; an increase or decrease of 5 dB is clearly perceptible; and an increase or decrease of 10 dB is perceived as a doubling or halving of noise level.

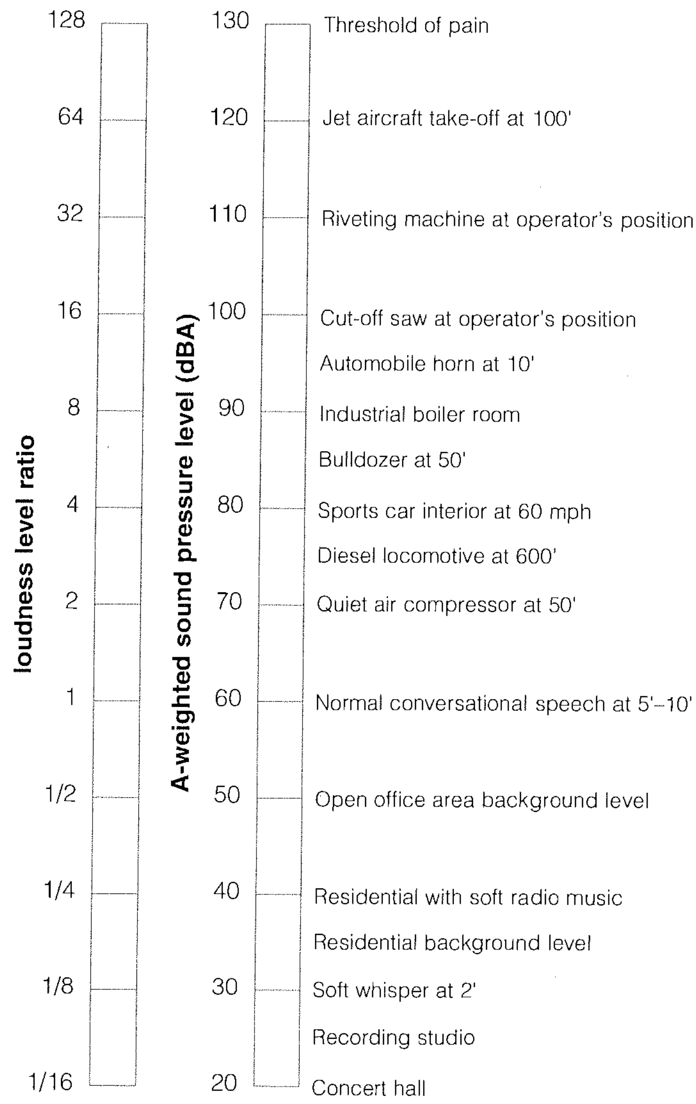


Figure 2.1

Loudness ratio and decibel scale (dBA) for common sounds.

Octave Band Sound Pressure Level

For general environmental sounds, inside and outside of buildings, acoustic analysis usually involves determining the sound pressure level in groups or bands of frequencies. It is customary to divide the audible frequency range into octave frequency bands. Figure 2.2 provides a list of octave band frequencies which have been defined in ANSI Standard S1.6–1984 Preferred Reference Quantities for Acoustical Measurements [10]. The ANSI standard does not define octave band numbers. These have been given in Figure 2.2 as they are commonly used in technical literature, particularly information pertinent to buildings.

Octave Band No.	Low Frequency Limit (Hz)	Center Frequency* (Hz)	High Frequency Limit (Hz)
	22.4	31.5	44.7
1	44.7	63.0	89.1
2	89.1	125.0	178.0
3	178.0	250.0	355.0
4	355.0	500.0	708.0
5	708.0	1,000.0	1,413.0
6	1,413.0	2,000.0	2,818.0
7	2,818.0	4,000.0	5,623.0
8	5,623.0	8,000.0	11,200.0
9	11,220.0	16,000.0	22,387.0

*Nominal Values

Figure 2.2

Preferred octave band frequencies.

Sound level meters often are outfitted with octave band measurement capabilities. This allows the instrument user to directly measure the sound pressure level in each octave band. Although this data can be listed in tabular form, it is more useful to graph octave band values on a chart, as shown in Figure 2.3. This allows the user to more easily identify specific features of background noise which might be of concern. Data presented in this fashion are referred to as an **octave band spectrum**. Also shown in Figure 2.3 is an octave band spectrum of noise produced by an aircraft taking-off at a distance of 1,000 feet.

Under certain circumstances, more frequency resolution in acoustical data is needed so that one-third octave band sound level spectra are used. For example, the 1,000 Hz octave band is divided into one-third octave bands with center frequencies at 800 Hz, 1,000 Hz and 1,250 Hz. In Section 3 of this guide, sound transmission loss (TL) for various glass configurations is reported in one-third octave band frequencies as required by applicable standards.

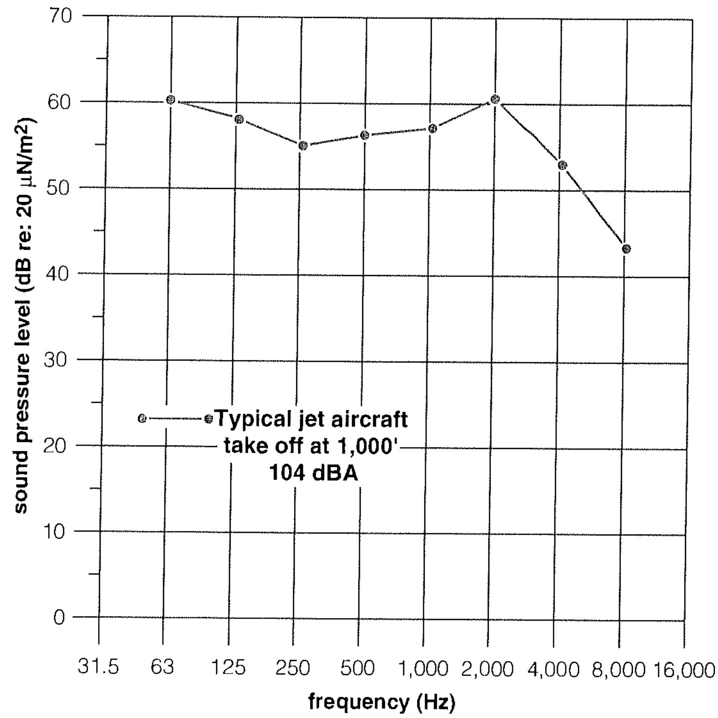


Figure 2.3

Octave band sound pressure level spectrum for typical commercial jet aircraft take-off.

Environmental Noise Descriptors

Besides frequency and level, environmental sounds exhibit a time-varying or temporal characteristic. The temporal character of noise level can be illustrated by considering noise levels that occur near a highway. During the day, noise levels are generally high, increasing to higher peaks when a noisy truck passes and decreasing to a lower level between vehicle platoons. At night, when traffic volumes are lower, the same variation occurs, but is centered around a lower level.

Noise descriptors are quantifications of noise that combine, into a single value, the three chief features of environmental noise: level, frequency and temporal characteristics. The use of A-weighted sound pressure level combines the first two characteristics — level and frequency — into a single number. Then, by averaging A-weighted sound pressure levels over time in various fashions, noise descriptors that combine all three features can be developed.

A commonly used descriptor is **percentile A-weighted sound levels**, A-weighted sound pressure levels exceeded for specific percentages of time within a noise monitoring period. For example, the one-hour 50 percentile A-weighted noise level, symbolized as the L_{50} (1 hour), is the A-weighted noise level exceeded a total of 30 minutes out of a continuous 60-minute period. Likewise, the L_{10} (20 minutes) is the A-weighted noise level exceeded a total of two minutes out of a continuous 20-minute period.

Percentile A-weighted noise levels most often are used to assess the time-varying character of noise. The **residual noise level** (defined as the nearly constant, low level of noise produced by distant motor vehicle traffic or industrial activity) is indicative of the lowest level in a monitoring period. Residual noise level is commonly defined as the L_{90}, i.e., the A-weighted sound level exceeded 90% of a monitoring time period. Intrusive noise is characterized as a high noise level that endures for only a short period and is produced by such events as aircraft flyovers and truck passbys.

Intrusive noise level is often defined as the L_{10}, i.e., the A-weighted sound level exceeded 10% of a monitoring time period. Although the L_{10} is useful for understanding environmental noise, it is no longer used by any federal agency in setting standards. Instead, the equivalent sound level has become commonly adopted as discussed below.

Equivalent Sound Level

For several years, the U.S. Environmental Protection Agency (EPA) has encouraged the use of the **equivalent sound level**: a descriptor that uses the average A-weighted energy and differs significantly from 50th percentile, or median, sound pressure level. Unlike the 50th percentile sound level which is not influenced by peak noise levels of short duration, the equivalent sound level is. Therefore, the A-weighted equivalent sound level combines level, frequency and temporal character into a single-valued descriptor. Equivalent sound level, symbolized as $\mathbf{L_{eq}}$, is always higher than the L_{50}, as it is influenced by noise contributions of high level and short duration such as aircraft flyovers or noisy truck passbys.

Day-Night Average Sound Level

Noise levels occurring at night generally produce greater annoyance than do the same levels which occur during the day. It is generally agreed that community perception of nighttime noise levels is 10 dBA higher [11]. That is, a given level of environmental noise during the day would appear to be approximately 10 dBA louder at night — at least in terms of its potential for causing community annoyance. This is largely because nighttime ambient environmental noise levels in most areas are approximately 10 dBA lower than daytime noise levels.

This feature of nighttime annoyance has been incorporated into a day-night noise descriptor which uses the equivalent sound level. This descriptor, referred to as the **day-night average sound level** (DNL) applies a 10 dBA "penalty" to noise levels occurring between 10:00 p.m. and 7:00 a.m., thus accounting for increased community sensitivity to nighttime noise levels. To help place day-night average sound levels into perspective, Figure 2.4 contains a scale showing DNL values for various types of outdoor locations.

Note that the mathematical symbol for day-night average sound level is L_{dn}. L_{dn} and DNL (the abbreviation) are often used interchangeably, as has been done in this guide.

Because of their sensitivity to frequency and temporal characteristics of noise, both the L_{eq} and the DNL have become widely accepted for use in environmental noise regulations and criteria. Among the federal agencies using L_{eq} or DNL sound levels are the U.S. Environmental Protection Agency, the Federal Highway Administration, the U.S. Department of Housing and Urban Development, the Federal Aviation Administration and the Department of Defense.

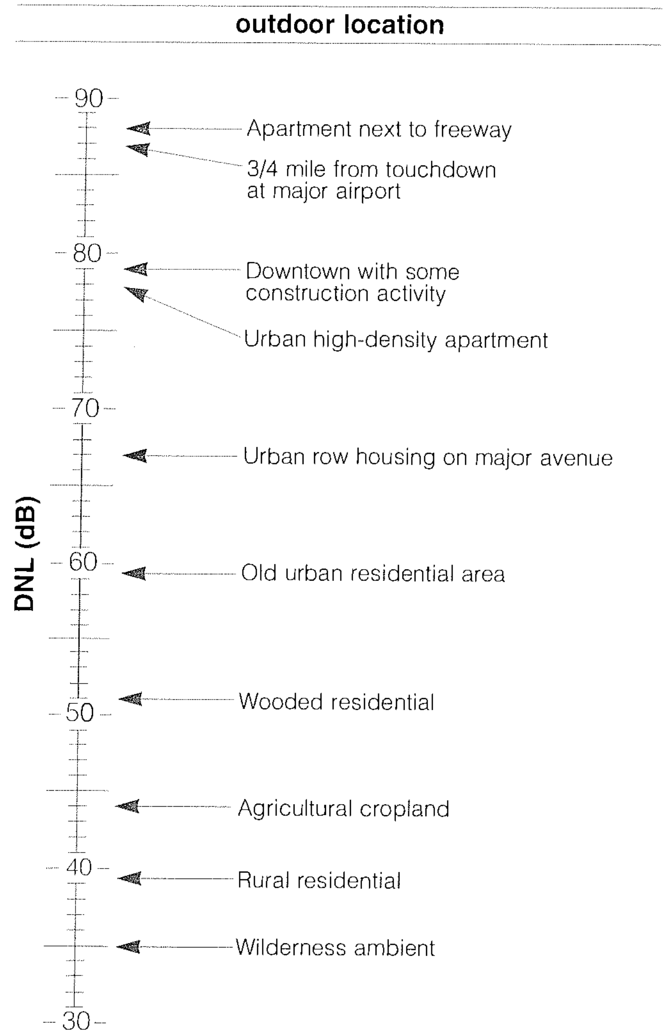


Figure 2.4

Examples of outdoor day-night average sound levels in dB measured at various locations [11].

PART II

Agency Regulations and Guidelines

The following discussion of various agency regulations and guidelines should be helpful in understanding how noise limits are expressed. It also provides much needed guidance in assessing environmental noise exposure. It must be noted, however, the federal government recognizes that it is the states' and local governments' right and responsibility to set noise limits as a function of land use. Federal agencies do not have the authority to do so. In discussing noise exposure and land use, information is presented only as recommended guidelines. Such guidelines function as regulations only when used within an agency's statutory authority.

For example, the U.S. Department of Housing and Urban Development (HUD) has the authority to establish regulations relative to noise exposure for housing projects that it supports under its jurisdiction. The Federal Highway Administration (FHWA) has the right to regulate the design and construction of highways that are federally supported, etc. Hence, how these guidelines function in connection with a specific project depends upon applicable authority over a project.

U.S. Environmental Protection Agency

The U.S. Environmental Protection Agency (EPA) has taken the lead among all federal agencies in studying the general impact of environmental noise. In spite of this, however, it has not promulgated specific regulations setting limits on general environmental noise levels. (It has promulgated noise limits for specific types of equipment such as air compressors.)

More importantly, the EPA has unified usage of environmental noise descriptors among federal agencies and has produced an extensive log of environmental noise measurements in different environmental settings. Also, it has recommended day-night average sound levels which represent "... values that protect public health and welfare with a margin of safety." A summary of these levels is provided in Figure 2.5 (taken from Table VIII of *Protective Noise Levels —Condensed Version of EPA Levels Document*) [11].

The EPA carefully guards against misuse of these levels by stating that:

"On the basis of its interpretation of available scientific information, EPA has identified a range of yearly day-night sound levels sufficient to protect public health and welfare from the effects of environmental noise. It is very important that these noise levels summarized in Table VIII not be misconstrued. Since the protective levels were derived without concern for technical or economic feasibility and contain a margin of safety to ensure their protective value, they must not be viewed as standards, criteria, regulations, or goals. Rather, they should be viewed as levels below which there is no reason to suspect that the general population will be at risk from any of the identified effects of noise."

According to the EPA, outdoor yearly levels are sufficient to protect public health and welfare if they do not exceed a day-night average sound level (DNL) of 55 dB in sensitive areas (residences, schools and hospitals). Inside buildings, yearly levels are sufficient to protect public health and welfare if they do not exceed a DNL of 45 dB. Maintaining a DNL of 55 dB outdoors should ensure adequate protection for indoor living. To protect against hearing damage, one's 24-hour equivalent sound level exposure at the ear should not exceed 70 dB.

	Level		
Effect	**DNL**	**L_{eq}(24 hrs)**	**Area**
Hearing		≤ 70 dBA	All areas (at the ear)
Outdoor activity	≤ 55 dB		Outdoors in residential areas and farms and other outdoor areas where people spend widely varying amounts of time and other places in which quiet is a basis for use
		≤ 55 dBA	Outdoor areas where people spend limited amounts of time such as schoolyards, playgrounds, etc.
Indoor activity	≤ 45 dB		Indoor residential areas
		≤ 45 dBA	Other indoor areas with human activities such as schools, etc.

Source: U.S. Environmental Protection Agency (Table VIII, ref. 11)

Figure 2.5

Yearly DNL and L_{eq} values that protect public health and welfare with a margin of safety.

U.S. Department of Housing and Urban Development

The U.S. Department of Housing and Urban Development (HUD) is the lead federal agency setting standards for interior and exterior noise for housing. These standards, outlined in 24 CFR Part 51, establish Site Acceptability Standard based on day-night average sound levels [6]. These are presented in Figure 2.6.

	Day-night average sound level in decibels (DNL)
Acceptable	Not exceeding 65 dB
Normally unacceptable	Above 65 dB but not exceeding 75 dB
Unacceptable	Above 75 dB

*Taken from 24 CFR PART. 51.103 Criteria and Standards

Figure 2.6

HUD site acceptability criteria [6].

U.S. Department of Housing and Urban Development Site Acceptability Criteria*

In Figure 2.6, ranges of DNL are correlated with various dispositions that classify HUD approval procedures and identify the need for noise abatement, either at the site property line or in the construction of the building exterior. These have been devised to achieve the HUD goal for interior noise levels, i.e., a day-night average sound level not exceeding 45 dB. "Acceptable" sites are those where noise levels do not exceed a DNL of 65 dB. Housing on acceptable sites does not require additional noise attenuation other than that provided in customary building techniques.

"Normally unacceptable" sites are those where the DNL is above 65 dB, but does not exceed 75 dB. Housing on normally unacceptable sites requires some means of noise abatement, either at the property line or in the building exterior construction, to assure that interior noise levels are acceptable. From a practical standpoint, this usually means that buildings must be air-conditioned so that windows can be closed to reduce exterior sound transmission into interior spaces.

"Unacceptable" sites are those where the DNL is 75 dB or higher. The term "unacceptable" does not necessarily mean that housing cannot be built on these sites, but rather that more sophisticated sound attenuation would likely be needed and that there must exist some benefits that outweigh the disadvantages caused by high noise levels. Most often, housing on unacceptable sites requires high sound transmission loss glazing and air-conditioning.

Federal Highway Administration

Among criteria established by the Federal Highway Administration (FHWA) for the design of highways is a set of design goals for traffic noise exposure. The FHWA noise abatement criteria are given in 23 CFR Part 772. These define various categories of land use and ascribe corresponding maximum hourly equivalent sound levels. Figure 2.7 contains a table presenting the FHWA limits expressed as hourly equivalent sound levels for various categories of land use identified as A through E.

These limits are viewed by the FHWA as goals in the design and evaluation of highway facilities and are helpful for planning building projects near existing or future highways. Also of use to the building designer are various traffic noise prediction methodologies that have been developed. Up to now, the most widely used methodology is that developed by the U.S. Department of Transportation and described in FHWA Publication RD-77-108. Through the use of various charts and tables, and by knowing traffic volume, speed, auto and truck mix and highway geometry, it is possible to predict noise levels at building locations. This methodology has been developed into a FORTRAN program by FHWA and is called STAMINA II. Various other institutional and commercial enterprises have produced versions able to be used on personal computers and have incorporated various input/output enhancements beyond the basic program.

In 1996, the RD-77-108 methodology and the STAMINA program are being replaced by a new computer program called FHWA Traffic Noise Model Version 1.0. This new program will operate on personal computers under Windows 3.1. It will incorporate convenient data handling and graphing capabilities, and a means for defining new classes of vehicles. Besides automobiles, medium and heavy trucks, the new program will also include motorcycles and buses as additional standard classes of vehicles.

In the case of a proposed building site near an existing highway, actual measurement of traffic noise levels can be used in lieu of traffic noise modeling. Traffic noise measurements may also be preferred as they can usually be completed more quickly than can computer modeling of traffic noise levels. This is especially true if all that is required is determining the maximum traffic sound level typically occurring at a building site during weekday rush-hour periods.

Activity Category	$L_{eq}(h)$	$L_{10}(h)$	Description of Activity Category
A	57 (Exterior)	60 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose
B	67 (Exterior)	70 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries and hospitals
C	72 (Exterior)	75 (Exterior)	Developed lands, properties or activities not included in Categories A or B above
D			Undeveloped lands
E	52 (Interior)	55 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums

[1]Either $L_{10}(h)$ or $L_{eq}(h)$ (but not both) may be used on a project.

Figure 2.7

FHWA Traffic Noise Abatement Criteria [23 CFR Part 772].

BRA

DEVELOPMENT REVIEW GUIDELINES

Boston
Redevelopment
Authority

ONE CITY HALL SQUARE BOSTON MASSACHUSETTS 02201
2006

BRA

parking facilities and a description of the proposed ventilation system must be provided

e. Building/garage air intake and exhaust systems and specifications and an analysis of the impact of exhausts on pedestrians and any sensitive receptors must be identified and described

f. Mitigation measures required to minimize or avoid any violation of state or federal ambient air quality standards must be described

6. Water Quality and Resources

a. The impacts of the proposed project on the water quality of Boston Harbor or other water bodies that could be affected by the proposed project must be evaluated, if applicable

b. The impacts of any in-water construction activities must be evaluated, if applicable, including dredging, pile driving, pile removal, pier reconstruction, seawall or shoreline stabilization and/or repair, and site de-watering and runoff

c. Study must be made of the potential increase in turbidity and impact on benthic organisms, fish, and other marine resources

d. Mitigation measures to reduce or eliminate impacts on water quality must be described

7. Flood Hazard Zone/Wetlands

a. Where appropriate, a determination must be made of whether or not a proposed project falls within a Federal Flood Hazard Zone or requires a Wetlands Permit

b. The impact of the proposed project on wetland resources must be evaluated, if applicable

c. Measures to minimize potential flood damage and to comply with city and federal flood hazard regulations and any Order of Conditions issued by the Boston Conservation Commission must be described, if applicable

8. Stormwater Management (see also Infrastructure)

a. Existing and future stormwater drainage from the project site must be described and quantified

b. Best Management Practices must be offered to prevent groundwater contamination and to promote the retention of stormwater discharges within the project site

c. Compliance with the Commonwealth's Stormwater Management Policy must be indicated, if applicable. Projects involving disturbances of land of one acre or more shall obtain a Stormwater National Pollution Discharge Elimination System ("NPDES") General Permit for Construction from the EPA and the DEP. If a permit is required, a stormwater pollution prevention plan shall be submitted to the BWSC and BRA (and DEP, if requested) prior to commencing construction

d. Measures to reduce Inflow/Infiltration into the stormwater drainage system must be described, if applicable

9. Noise

a. Noise impacts from the proposed project must be analyzed, including rooftop mechanical equipment and other noise sources (e.g., emergency generators), and a determination made of compliance with City of Boston noise regulations and applicable state and federal regulations and guidelines

b. For residential projects, noise levels shall be evaluated to determine

BRA

conformance with the Interior Design Noise Level (not to exceed day-night average sound level of 45 decibels) established by the U.S. Department of Housing and Urban Development (24 CFR Part 51, Subpart B)

c. Mitigation measures to reduce excessive noise levels to acceptable limits must be described

* noise (cont.)

d. A post-construction noise monitoring program may be required to ensure predicted and modeled noise levels are consistent with all applicable City, State, and Federal noise criteria and regulations. Cooperation Agreements may require commitments to post-construction monitoring on a case-by-case basis

10. Solid and Hazardous Wastes
    a. Any known or potential hazardous wastes or contaminants on the project site must be described, together with a description of remediation measures to ensure their safe removal and disposal, pursuant to M.G.L., Chapter 21E and the Massachusetts Contingency Plan
    b. Any potential hazardous wastes to be generated by the proposed project must be identified (see also Infrastructure)
    c. The existence of underground storage tanks ("USTs"), and above ground storage tanks ("ASTs") on the project site must be identified
    d. Potential waste generation must be estimated and plans for disposal indicated
    e. Measures to promote the reduction of waste generation and to promote recycling in compliance with the city's recycling program must be described
11. Groundwater
    a. An engineering analysis of the impact of development on groundwater levels, surrounding structures, and wooden pile foundations must be performed
    b. An assessment of existing groundwater level conditions and an inventory of buildings that may be supported on wooden piles should be provided
    c. A description of measures to be used to ensure that groundwater levels will not be lowered during and after construction must be provided, including monitoring of groundwater levels, as applicable
    d. Mitigation measures must be described such as recharging or recirculating systems, as applicable
    e. The installation of permanent monitoring wells shall be required
    f. If monitoring wells are located on private property, permanent easements for access by the Boston Groundwater Trust ("BGT"), or its designated representative, shall be provided
    g. A mechanism for monthly reporting of monitoring well data to the BRA and BGT should be established
    h. If on-going pumping or dewatering is required, the metering of discharge should be conducted with oversight by the BWSC
    i. If the project is located within the Groundwater Conservation Overlay District an analysis demonstrating compliance with Article 32 of the Code must be performed

12. Geotechnical
    a. Existing subsoil conditions must be analyzed, including the potential for

CITY OF BOSTON

AIR POLLUTION CONTROL COMMISSION

BOSTON CITY HALL

BOSTON, MASSACHUSETTS 02201

REGULATIONS FOR THE CONTROL OF NOISE IN THE CITY OF BOSTON

The Air Pollution Control Commission of the City of Boston, acting under the authority granted in Chapter 40, Section 21 of the General Laws of the Commonwealth of Massachusetts, and by the City of Boston Code, Ordinances, Title 7, Section 50, hereby adopts the following Regulations for the Control of Noise in the City of Boston.

REGULATIONS FOR THE CONTROL OF NOISE

IN THE CITY OF BOSTON

REGULATION 1: General Prohibition of Noise Emissions

No person or persons owning, leasing, or controlling the operation of any source or sources of noise shall willfully, negligently, or through failure to provide necessary equipment or facilities or to take necessary precautions, permit the establishment of a condition of noise pollution.

REGULATION 2: Noise Restrictions According to Zoning Districts

2.1 This Regulation shall apply to the use or occupancy of any lot or structure thereon and to the noise produced thereby, but shall not apply to the following:

a) The intermittent or occasional use, during the daytime, of homeowner's light residential outdoor equipment or commercial service equipment, provided said equipment and its use complies with other provisions of these Regulations;

b) Construction activities and the associated use of construction devices nor to the noise produced thereby, provided such activities, and such equipment and its use complies with other provisions of these Regulations;

c) The operation of any motor vehicle on any public way, nor to the noise produced thereby.

2.2 Noise in Residential Zoning Districts or Affecting Residential or Institutional Property

No person shall create or cause to be emitted from or by any source subject to Regulation 2, any noise which causes or results in a maximum noise level, measured at any lot line of any lot located in any Residential Zoning District or in residential or institutional use elsewhere in compliance with the Boston Zoning Code, in excess of any level of the "Residential District Noise Standard", Regulation 2.5; provided that if said lot is located in any Industrial Zoning District, the maximum noise level, measured at the lot line, shall not exceed any level of the "Residential-Industrial Noise Standard", Regulation 2.5.

2.3 Noise in Business Zoning Districts

No person shall create or cause to be emitted from any source subject to Regulation 2, any noise which causes or results in a maximum noise level, measured at any lot line of any lot in any Business Zoning District other than a lot in residential or institutional use in conformance with the Boston Zoning Code, in excess of any level of the "Business District Noise Standard", Regulation 2.5.

Boston

2.4 Noise in Industrial Zoning Districts

No person shall create or cause to be emitted from or by any source subject to Regulation 2, any noise which causes or results in a maximum noise level, measured at any lot line of any lot in recreational or business use in any Industrial Zoning District in conformance with the Boston Zoning Code, in excess of any level of the "Industrial District Noise Standard", Regulation 2.5.

2.5 Zoning District Noise Standards

Noise standards referred to in these Regulations for the several zoning districts of the City of Boston, as defined in and established pursuant to the Boston Zoning Code, are as established by the following table:

TABLE OF ZONING DISTRICT NOISE STANDARDS

Maximum Allowable Octave Band Sound Pressure Levels

Octave Band Center Frequency of Measurement	Residential		Residential / Industrial		Business	Industrial
(Hz)	Daytime	All Other Times	Daytime	All Other Times	Anytime	Anytime
31.5	76	68	79	72	79	83
63	75	67	78	71	78	82
125	69	61	73	65	73	77
250	62	52	68	57	68	73
500	56	46	62	51	62	67
1000	50	40	56	45	56	61
2000	45	33	51	39	51	57
4000	40	28	47	34	47	53
8000	38	26	44	32	44	50
Single Number Equivalent	60 dBA	50 dBA	65 dBA	55 dBA	65 dBA	70 dBA

Boston

REGULATION 3: Restrictions on Noise Emitted from Construction Sites

3.1 Except as provided for in Regulation 3.3 and 3.4, it shall be unlawful for any person to operate any construction device or devices on any construction site if the operation of such device or devices emits noise, measured at the lot line of the affected property, in excess of the values shown below:

Lot Use of Affected Property	L_{10} level	Maximum Noise Level
Residential or Institutional	75 dBA	86 dBA
Business or Recreational	80 dBA	--
Industrial	85 dBA	--

The same level shall apply to any public way as applies to an industrial use. Measurements should not be taken closer than fifteen (15) meters (50 feet) from the nearest active construction device on the construction site. The maximum noise level shall be measured on the sound level meter on "Slow" response.

3.2 The L_{10} level shall be determined in the following manner:

a) Every ten seconds, on the mark, the A-weighted noise level on the sound level meter on "slow" response is recorded until one hundred (100) observations have been made. If, during any of these observations, a measurement is substantially affected by any source outside the construction site (such as an aircraft overflight), measurements made during these periods will not be considered. However, the observation period shall be extended until 100 valid measurements are obtained. The L_{10} level will be that level that is equal to the tenth highest level recorded.

b) If, in the estimation of the person taking the measurements, outside noise sources contribute significantly to the noise level, the above procedure shall be repeated (with the same outside noise source contributions) when construction is inactive, in order to determine the existing background L_{10} level. The L_{10} level during construction must exceed the background L_{10} level by five (5) dBA to be considered a violation of Regulation 3.1.

3.3 Except as provided for in Regulation 3.4, it shall be unlawful to operate a construction device at any street excavation, grading or repair, utility street work installation or repair, which produces a noise level exceeding 86 dBA at a distance of fifteen meters (50 feet) from the device.

The provisions of Regulation 3.1 shall not apply to any construction site covered by Regulation 3.3. The provisions of Regulation 3.3 will not be applicable to any construction device used in emergency service work that is necessary to return utility service to an area, provided that within 24 hours such device is brought into compliance with Regulation 3.3, or is not reused within the City until it does comply.

Boston

3.4 The provisions of Regulations 3.1 and 3.3 shall not be applicable to impact devices.

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
ONE WINTER STREET, BOSTON, MA 02108 617-292-5500

January 16, 1990

DAQC Policy 90-001

DIVISION OF AIR QUALITY CONTROL POLICY

This policy is adopted by the Division of Air Quality Control. The Department's existing guideline for enforcing its noise regulation (310 CMR 7.10) is being reaffirmed.

POLICY

A noise source will be considered to be violating the Department's noise regulation (310 CMR 7.10) if it does not:

1. Increase the broadband sound level by more than 10 dB(A) bove ambient.

2. Produce a "pure tone" condition - when any octave band center frequency sound pressure level exceeds the two adjacent center frequency sound pressure levels by 3 decibels or more.

These criteria are measured both at the property line and at the nearest inhabited residence. Ambient is defined as the background A-weighted sound level that is exceeded 90% of the time measured during equipment operating hours. The ambient may also be established by other means with the consent of the Department.

Approved: January 16, 1990 Effective: Immediately

Barbara A. Kwetz
Acting Director
Division of Air Quality Control

1/16/90

HUD

and in advising local agencies about noise abatement strategies. The guidance documents shall be updated periodically in accordance with advances in the state-of-the-art.

(7) *Construction equipment, building equipment and appliances.* HUD shall encourage the use of quieter construction equipment and methods in population centers, the use of quieter equipment and appliances in buildings, and the use of appropriate noise abatement techniques in the design of residential structures with potential noise problems.

(8) *Exterior noise goals.* It is a HUD goal that exterior noise levels do not exceed a day-night average sound level of 55 decibels. This level is recommended by the Environmental Protection Agency as a goal for outdoors in residential areas. The levels recommended by EPA are not standards and do not take into account cost or feasibility. For the purposes of this regulation and to meet other program objectives, sites with a day-night average sound level of 65 and below are acceptable and are allowable (see Standards in § 51.103(c)).

(9) *Interior noise goals.* It is a HUD goal that the interior auditory environment shall not exceed a day-night average sound level of 45 decibels. Attenuation measures to meet these interior goals shall be employed where feasible. Emphasis shall be given to noise sensitive interior spaces such as bedrooms. Minimum attenuation requirements are prescribed in § 51.104(a).

(10) *Acoustical privacy in multifamily buildings.* HUD shall require the use of building design and acoustical treatment to afford acoustical privacy in multifamily buildings pursuant to requirements of the Minimum Property Standards.

[44 FR 40861, July 12, 1979, as amended at 50 FR 9268, Mar. 7, 1985; 61 FR 13333, Mar. 26, 1996]

§ 51.102 Responsibilities.

(a) *Surveillance of noise problem areas.* Appropriate field staff shall maintain surveillance of potential noise problem areas and advise local officials, developers, and planning groups of the unacceptability of sites because of noise exposure at the earliest possible time in the decision process. Every attempt shall be made to insure that applicants' site choices are consistent with the policy and standards contained herein.

(b) *Notice to applicants.* At the earliest possible stage, HUD program staff shall:

(1) Determine the suitability of the acoustical environment of proposed projects;

(2) Notify applicants of any adverse or questionable situations; and

(3) Assure that prospective applicants are apprised of the standards contained herein so that future site choices will be consistent with these standards.

(c) *Interdepartmental coordination.* HUD shall foster appropriate coordination between field offices and other departments and agencies, particularly the Environmental Protection Agency, the Department of Transportation, Department of Defense representatives, and the Department of Veterans Affairs. HUD staff shall utilize the acceptability standards in commenting on the prospective impacts of transportation facilities and other noise generators in the Environmental Impact Statement review process.

[44 FR 40861, July 12, 1979, as amended at 54 FR 39525, Sept. 27, 1989; 61 FR 13333, Mar. 26, 1996]

§ 51.103 Criteria and standards.

These standards apply to all programs as indicated in § 51.101.

(a) *Measure of external noise environments.* The magnitude of the external noise environment at a site is determined by the value of the day-night average sound level produced as the result of the accumulation of noise from all sources contributing to the external noise environment at the site. Day-night average sound level, abbreviated as DNL and symbolized as L_{dn}, is the 24-hour average sound level, in decibels, obtained after addition of 10 decibels to sound levels in the night from 10 p.m. to 7 a.m. Mathematical expressions for average sound level and day-night average sound level are stated in the Appendix I to this subpart.

(b) *Loud impulsive sounds.* On an interim basis, when loud impulsive sounds, such as explosions or sonic booms, are experienced at a site, the

HUD

day-night average sound level produced by the loud impulsive sounds alone shall have 8 decibels added to it in assessing the acceptability of the site (see Appendix I to this subpart). Alternatively, the C-weighted day-night average sound level (L_{Cdn}) may be used without the 8 decibel addition, as indicated in §51.106(a)(3). Methods for assessing the contribution of loud impulsive sounds to day-night average sound level at a site and mathematical expressions for determining whether a sound is classed as "loud impulsive" are provided in the Appendix I to this subpart.

(c) *Exterior standards.* (1) The degree of acceptability of the noise environment at a site is determined by the sound levels external to buildings or other facilities containing noise sensitive uses. The standards shall usually apply at a location 2 meters (6.5 feet) from the building housing noise sensitive activities in the direction of the predominant noise source. Where the building location is undetermined, the standards shall apply 2 meters (6.5 feet) from the building setback line nearest to the predominant noise source. The standards shall also apply at other locations where it is determined that quiet outdoor space is required in an area ancillary to the principal use on the site.

(2) The noise environment inside a building is considered acceptable if: (i) The noise environment external to the building complies with these standards, and (ii) the building is constructed in a manner common to the area or, if of uncommon construction, has at least the equivalent noise attenuation characteristics.

SITE ACCEPTABILITY STANDARDS

	Day-night average sound level (in decibels)	Special approvals and requirements
Acceptable	Not exceeding 65 dB(1)	None.
Normally Unacceptable	Above 65 dB but not exceeding 75 dB	Special Approvals (2) Environmental Review (3). Attenuation (4).
Unacceptable	Above 75 dB	Special Approvals (2). Environmental Review (3). Attenuation (5).

Notes: (1) Acceptable threshold may be shifted to 70 dB in special circumstances pursuant to §51.105(a).
(2) See §51.104(b) for requirements.
(3) See §51.104(b) for requirements.
(4) 5 dB additional attenuation required for sites above 65 dB but not exceeding 70 dB and 10 dB additional attenuation required for sites above 70 dB but not exceeding 75 dB. (See §51.104(a).)
(5) Attenuation measures to be submitted to the Assistant Secretary for CPD for approval on a case-by-case basis.

[44 FR 40861, July 12, 1979, as amended at 49 FR 12214, Mar. 29, 1984]

§51.104 Special requirements.

(a)(1) *Noise attenuation.* Noise attenuation measures are those required in addition to attenuation provided by buildings as commonly constructed in the area, and requiring open windows for ventilation. Measures that reduce external noise at a site shall be used wherever practicable in preference to the incorporation of additional noise attenuation in buildings. Building designs and construction techniques that provide more noise attenuation than typical construction may be employed also to meet the noise attenuation requirements.

(2) *Normally unacceptable noise zones and unacceptable noise zones.* Approvals in Normally Unacceptable Noise Zones require a minimum of 5 decibels additional sound attenuation for buildings having noise-sensitive uses if the day-night average sound level is greater than 65 decibels but does not exceed 70 decibels, or a minimum of 10 decibels of additional sound attenuation if the day-night average sound level is greater than 70 decibels but does not exceed 75 decibels. Noise attenuation measures in Unacceptable Noise Zones require the approval of the Assistant Secretary for Community Planning and Development, or the Certifying Officer for activities subject to 24 CFR part 58. (See §51.104(b)(2).)

G – LEED CHECKLIST

- Exeter Residences (Phase 6)
- 888 Boylston (Phase 4a)

LEED-NC

LEED-NC Version 2.2 Registered Project Checklist

Exeter Tower
Boston, Massachusetts

Yes	?	No			
8	3	3	**Sustainable Sites**		**14** Points
Y			Prereq 1	**Construction Activity Pollution Prevention**	Required
1			Credit 1	**Site Selection**	1
1			Credit 2	**Development Density & Community Connectivity**	1
		1	Credit 3	**Brownfield Redevelopment**	1
1			Credit 4.1	**Alternative Transportation**, Public Transportation Access	1
1			Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	1
	1		Credit 4.3	**Alternative Transportation**, Low-Emitting and Fuel-Efficient Vehicles	1
1			Credit 4.4	**Alternative Transportation**, Parking Capacity	1
		1	Credit 5.1	**Site Development,** Protect of Restore Habitat	1
		1	Credit 5.2	**Site Development,** Maximize Open Space	1
1			Credit 6.1	**Stormwater Design,** Quantity Control	1
	1		Credit 6.2	**Stormwater Design,** Quality Control	1
1			Credit 7.1	**Heat Island Effect,** Non-Roof	1
1			Credit 7.2	**Heat Island Effect,** Roof	1
	1		Credit 8	**Light Pollution Reduction**	1

Yes	?	No			
2	2	1	**Water Efficiency**		**5** Points
1			Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%	1
1			Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1
		1	Credit 2	**Innovative Wastewater Technologies**	1
	1		Credit 3.1	**Water Use Reduction**, 20% Reduction	1
	1		Credit 3.2	**Water Use Reduction**, 30% Reduction	1

Yes	?	No			
4	2	2	**Energy & Atmosphere**		**17** Points
Y			Prereq 1	**Fundamental Commissioning of the Building Energy Systems**	Required
Y			Prereq 2	**Minimum Energy Performance**	Required
Y			Prereq 3	**Fundamental Refrigerant Management**	Required
2	1		Credit 1	**Optimize Energy Performance**	1 to 10
		1	Credit 2	**On-Site Renewable Energy**	1 to 3
1			Credit 3	**Enhanced Commissioning**	1
1			Credit 4	**Enhanced Refrigerant Management**	1
	1		Credit 5	**Measurement & Verification**	1
		1	Credit 6	**Green Power**	1

continued…

Yes	?	No			
2	4	7	**Materials & Resources**		**13** Points
Y			Prereq 1	**Storage & Collection of Recyclables**	Required
		1	Credit 1.1	**Building Reuse**, Maintain 75% of Existing Walls, Floors & Roof	1
		1	Credit 1.2	**Building Reuse**, Maintain 100% of Existing Walls, Floors & Roof	1
		1	Credit 1.3	**Building Reuse**, Maintain 50% of Interior Non-Structural Elements	1
1			Credit 2.1	**Construction Waste Management**, Divert 50% from Disposal	1
	1		Credit 2.2	**Construction Waste Management**, Divert 75% from Disposal	1
		1	Credit 3.1	**Materials Reuse**, 5%	1
		1	Credit 3.2	**Materials Reuse**,10%	1
1			Credit 4.1	**Recycled Content**, 10% (post-consumer + ½ pre-consumer)	1
	1		Credit 4.2	**Recycled Content**, 20% (post-consumer + ½ pre-consumer)	1
	1		Credit 5.1	**Regional Materials**, 10% Extracted, Processed & Manufactured Regic	1
	1		Credit 5.2	**Regional Materials**, 20% Extracted, Processed & Manufactured Regic	1
		1	Credit 6	**Rapidly Renewable Materials**	1
		1	Credit 7	**Certified Wood**	1

Yes	?	No			
9	6		**Indoor Environmental Quality**		**15** Points
Y			Prereq 1	**Minimum IAQ Performance**	Required
Y			Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	Required
1			Credit 1	**Outdoor Air Delivery Monitoring**	1
	1		Credit 2	**Increased Ventilation**	1
1			Credit 3.1	**Construction IAQ Management Plan**, During Construction	1
	1		Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy	1
1			Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1
1			Credit 4.2	**Low-Emitting Materials**, Paints & Coatings	1
1			Credit 4.3	**Low-Emitting Materials**, Carpet Systems	1
	1		Credit 4.4	**Low-Emitting Materials**, Composite Wood & Agrifiber Products	1
1			Credit 5	**Indoor Chemical & Pollutant Source Control**	1
1			Credit 6.1	**Controllability of Systems**, Lighting	1
1			Credit 6.2	**Controllability of Systems**, Thermal Comfort	1
1			Credit 7.1	**Thermal Comfort**, Design	1
	1		Credit 7.2	**Thermal Comfort**, Verification	1
	1		Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces	1
	1		Credit 8.2	**Daylight & Views**, Views for 90% of Spaces	1

Yes	?	No			
1			**Innovation & Design Process**		**5** Points
			Credit 1.1	**Innovation in Design**: Provide Specific Title	1
			Credit 1.2	**Innovation in Design**: Provide Specific Title	1
			Credit 1.3	**Innovation in Design**: Provide Specific Title	1
			Credit 1.4	**Innovation in Design**: Provide Specific Title	1
1			Credit 2	**LEED® Accredited Professional**	1

Yes	?	No			
26	17		**Project Totals (pre-certification estimates)**		**69** Points

Certified 26-32 points **Silver** 33-38 points **Gold** 39-51 points **Platinum** 52-69 points

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888 Boylston Street
Boston MA

Yes	?	No			
7	5	3	**Sustainable Sites**		**15** Points
Y			Prereq 1	**Construction Activity Pollution Prevention**	Required
1			Credit 1	**Site Selection**	1
1			Credit 2	**Development Density & Community Connectivity**	1
	1		Credit 3	**Brownfield Redevelopment**	1
1			Credit 4.1	**Alternative Transportation**, Public Transportation Access	1
	1		Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	1
	1		Credit 4.3	**Alternative Transportation**, Low-Emitting and Fuel-Efficient Vehicles	1
		1	Credit 4.4	**Alternative Transportation**, Parking Capacity	1
		1	Credit 5.1	**Site Development,** Protect of Restore Habitat	1
	1		Credit 5.2	**Site Development,** Maximize Open Space	1
		1	Credit 6.1	**Stormwater Design,** Quantity Control	1
1			Credit 6.2	**Stormwater Design,** Quality Control	1
1			Credit 7.1	**Heat Island Effect,** Non-Roof	1
1			Credit 7.2	**Heat Island Effect,** Roof	1
	1		Credit 8	**Light Pollution Reduction**	1
1			Credit 9	**Tenant Design and Construction Guidelines**	1

Yes	?	No			
2	1	2	**Water Efficiency**		**5** Points
1			Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%	1
	1		Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1
		1	Credit 2	**Innovative Wastewater Technologies**	1
1			Credit 3.1	**Water Use Reduction**, 20% Reduction	1
		1	Credit 3.2	**Water Use Reduction**, 30% Reduction	1

Yes	?	No			
7		7	**Energy & Atmosphere**		**14** Points
Y			Prereq 1	**Fundamental Commissioning of the Building Energy Systems**	Required
Y			Prereq 2	**Minimum Energy Performance**	Required
Y			Prereq 3	**Fundamental Refrigerant Management**	Required
3		5	Credit 1	**Optimize Energy Performance**	1 to 8
		1	Credit 2	**On-Site Renewable Energy**	1
1			Credit 3	**Enhanced Commissioning**	1
1			Credit 4	**Enhanced Refrigerant Management**	1
1			Credit 5.1	**Measurement & Verification - Base Building**	1
1			Credit 5.2	**Measurement & Verification - Tenant Sub-metering**	1
		1	Credit 6	**Green Power**	1

continued…

Yes	?	No			
4	3	4	**Materials & Resources**		**11** Points
Y			Prereq 1	**Storage & Collection of Recyclables**	Required
		1	Credit 1.1	**Building Reuse**, Maintain 25% of Existing Walls, Floors & Roof	1
		1	Credit 1.2	**Building Reuse**, Maintain 50% of Existing Walls, Floors & Roof	1
		1	Credit 1.3	**Building Reuse**, Maintain 75% of Existing Walls, Floors & Roof	1
1			Credit 2.1	**Construction Waste Management**, Divert 50% from Disposal	1
	1		Credit 2.2	**Construction Waste Management**, Divert 75% from Disposal	1
		1	Credit 3	**Materials Reuse**, 1%	1
1			Credit 4.1	**Recycled Content**, 10% (post-consumer + ½ pre-consumer)	1
	1		Credit 4.2	**Recycled Content**, 20% (post-consumer + ½ pre-consumer)	1
1			Credit 5.1	**Regional Materials**, 10% Extracted, Processed & Manufactured Regi	1
1			Credit 5.2	**Regional Materials**, 20% Extracted, Processed & Manufactured Regi	1
	1		Credit 6	**Certified Wood**	1

Yes	?	No			
5	4	2	**Indoor Environmental Quality**		**11** Points
Y			Prereq 1	**Minimum IAQ Performance**	Required
Y			Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	Required
1			Credit 1	**Outdoor Air Delivery Monitoring**	1
	1		Credit 2	**Increased Ventilation**	1
1			Credit 3	**Construction IAQ Management Plan**, During Construction	1
1			Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1 pt for 2
1			Credit 4.2	**Low-Emitting Materials**, Paints & Coatings	2 pts for 3
1			Credit 4.3	**Low-Emitting Materials**, Carpet Systems	3 pts for 4
			Credit 4.4	**Low-Emitting Materials**, Composite Wood & Agrifiber Products	
		1	Credit 5	**Indoor Chemical & Pollutant Source Control**	1
		1	Credit 6	**Controllability of Systems**, Thermal Comfort	1
	1		Credit 7	**Thermal Comfort**, Design	1
	1		Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces	1
	1		Credit 8.2	**Daylight & Views**, Views for 90% of Spaces	1

Yes	?	No			
1	4		**Innovation & Design Process**		**5** Points
	1		Credit 1.1	**Innovation in Design**: Provide Specific Title	1
	1		Credit 1.2	**Innovation in Design**: Provide Specific Title	1
	1		Credit 1.3	**Innovation in Design**: Provide Specific Title	1
	1		Credit 1.4	**Innovation in Design**: Provide Specific Title	1
1			Credit 2	**LEED® Accredited Professional**	1

Yes	?	No		
26	17	18	**Project Totals (pre-certification estimates)**	**61** Points

Certified 23-27 points **Silver** 28-33 points **Gold** 34-44 points **Platinum** 45-61 points