Project Notification Form

TREMONT CROSSING

WHERE COMMERCE AND CULTURE CONNECT

Submitted to:

BOSTON REDEVELOPMENT AUTHORITY
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TREMONT CROSSING

WHERE COMMERCE AND CULTURE CONNECT

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1.0 SUMMARY

1.1 Project Identification

Project Name:	Tremont Crossing: *Where Commerce and Culture Connect*
Location:	The Project is located at the southeast corner of Tremont Street and Whittier Street in Roxbury, Massachusetts.
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1.2 Project Summary

1.2.1 Project Site

The Tremont Crossing development (the "Project") will be located at Parcel P-3 (consisting of Parcel P-3 and a portion of Parcel P3-h in the Campus High School Urban Renewal Area) in Boston's Roxbury neighborhood. The Project Site consists of approximately 7.86 acres of land area and is bounded by Tremont Street to the northwest, Whittier Street to the northeast, Downing Street to the southeast, the Reggie Lewis Track and Athletic Center to the southwest, and the Madison Park Technical Vocational High School and the John D. O'Bryant School of Mathematics and Science to the southwest (the "Project Site"). The Figures 1-1 and 1-2 set forth the location of the Project Site.

Figure 1-1: Arial Locus Map

Figure 1-2: Arial Locus Map

1.2.2 Proposed Development

The Project's mix of uses will include approximately 500,000 square feet of large format retail, which could also have entertainment and recreational uses, 50,000 square feet of smaller shops and boutiques fronting along Tremont Street, 200,000 square feet of office space, 240 units of multifamily residential (approximately 200,000 square feet) made up of studios, one bedroom and two bedroom rental apartments (of which any requisite affordable units will be provided), and 58,000 square feet of cultural facilities that will primarily house a new museum for the National Center for Afro-American Artists ("NCAAA"). The development will also include a large public plaza and an adjacent, multi-level parking structure to accommodate the requirements of its tenants. As currently contemplated, the proposed parking structure would consist of approximately 1,700 spaces that will also include a specific number of parking spaces for the Whittier Street Health Center and the Boston Public Schools, but could increase in size subject to potential demand from other Project abutters and/or its mix of uses.

1.2.3 Design Objectives

The Project, which is being jointly designed by the Gund Partnership and Stull and Lee Incorporated, seeks to harmoniously integrate its mix of uses in a highly-functional, urban context creating a vibrant, pedestrian-friendly environment that is conducive to the success of its commercial and cultural tenants, as well as enhancing the quality of life in the neighborhood of which it will become a part. The large-format retail portion of the Project will be a departure from the typical, sprawling nature of this use by being designed in a vertical context that stacks large retail footprints over four levels. The museum and cultural space will be at the center of the development by fronting a large public plaza to be adorned with sculptures and outdoor seating space. The office tower will rise above this cultural facility, but maintain its pedestrian access on Tremont Street and offer great, unobstructed views of the City. Additionally, the 11 story, multifamily, residential tower will sit atop the small retail tenants such as restaurants and service stores whose frontage will be along Tremont Street. The placement of the residential and small retail along Tremont Street will create a sense of transparency and light to the Project's massing. On the east side of the plaza, in between the retail/residential building and the large-format retail building, and on the west side of the plaza, in between the cultural/office tower and garage structure, will be a forty (40) foot wide pedestrian way meant to literally bring people into the Site and create further vibrancy within this large parcel. The large, multi-level parking garage, which will be accessible to all of the Project uses, will be situated toward the rear of the Site and thus be hidden from view. The Proponent believes that this design concept will define the character of the Project and create a lively, user-friendly environment not usually found in large commercial developments.

The Proponent is designing all aspects of the Project with a sense of "transparency" that establishes a connectivity with pedestrians and with the wider, surrounding public realm. Creating a sense of light and openness is a goal incorporated into the design of all of the Project's mix of uses, including the large-format retail.

Further, the Proponent recognizes that due to the Project's density, geographic location and importance to the community that the architecture is of paramount importance. To that end, the elements of its design, including façade, building orientation, urban design and streetscape, have been planned in a manner which is cognizant of the aforementioned significance.

Figure 1-3: Massing Diagram / Mix of Uses

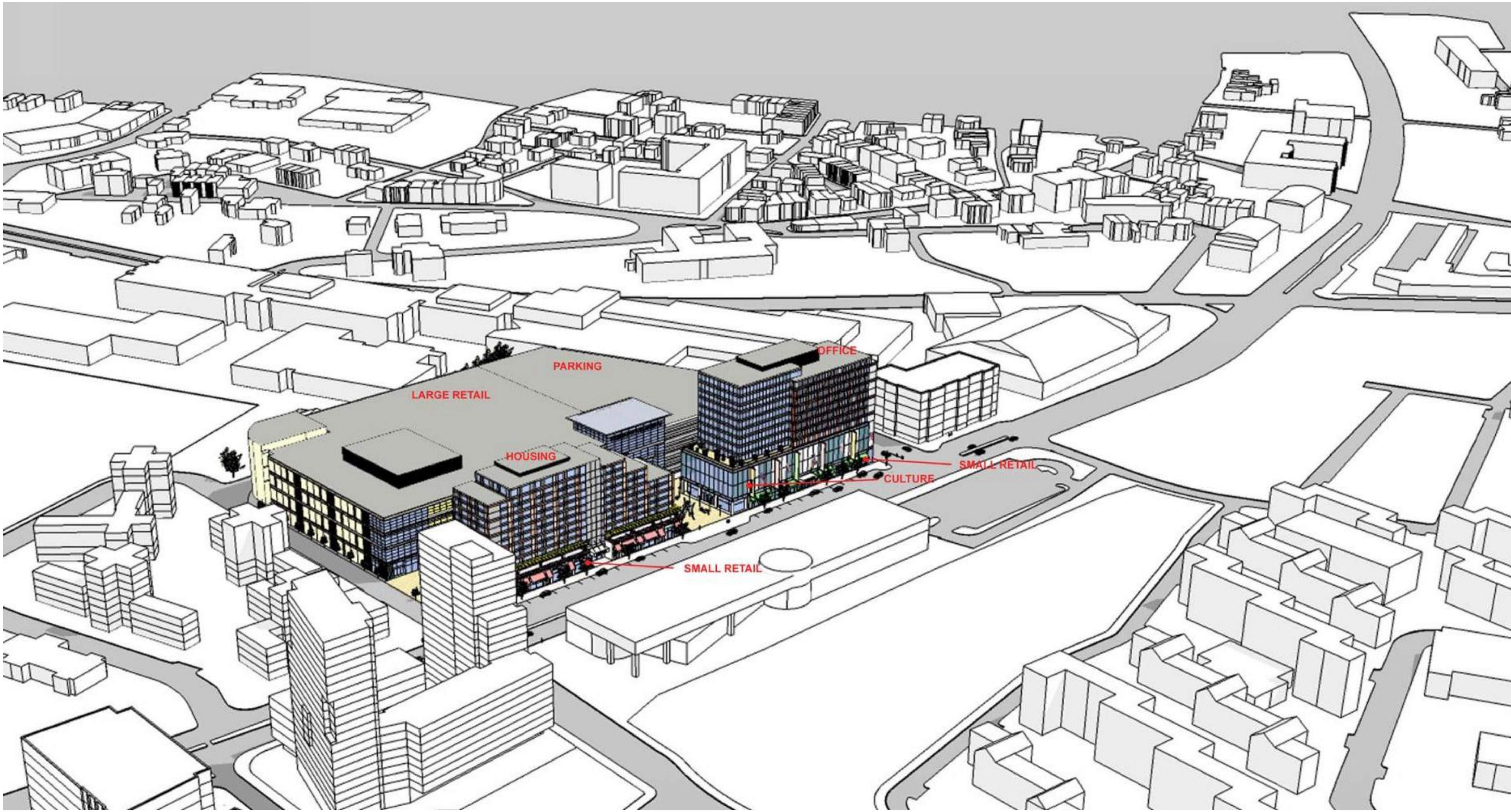
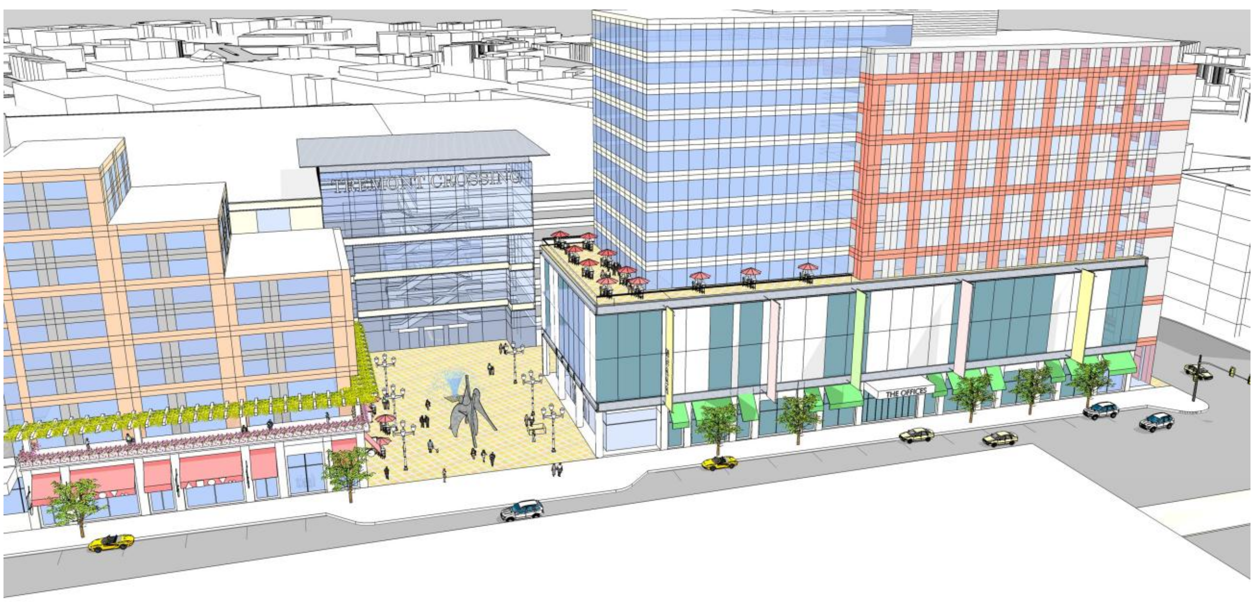


Figure 1-4: Massing Diagram- Tremont Street

Figure 1-5: Massing Diagram- Looking East

Figure 1-6: Massing Diagram- Plaza View



1.2.4 Project Proponent

The Project Proponent, P-3 Partners LLC (the "Proponent"), is a collaboration between Elma Lewis Partners, LLC ("ELP") and Feldco Boston, LLC an affiliate of Feldco Development Corp ("Feldco").

ELP is an entity created by the NCAAA for the purpose of this development effort. The mission of the NCAAA, a 501 (c) (3) organization, is to preserve and foster the cultural arts heritage of African-Americans worldwide through arts teaching, and the presentation of professional works in all fine arts disciplines. For more than half a century, the NCAAA has striven towards this bold and expansive vision, and remains the largest independent black cultural arts institution in New England. In furtherance of this mission, since 1969 the NCAAA has operated the Museum for the National Center of Afro-American Artists in Roxbury, Massachusetts, which has been its principal operating activity. The Museum presents a wide range of historical and contemporary exhibitions in many media, including painting, sculpture, graphics, photography and decorative arts. It has presented hundreds of exhibitions, including many that it co-presented with the Museum of Fine Arts, an institution with which it has enjoyed a long-standing collaboration.

Feldco has been active in developing, owning and managing realty investments for over forty-two years. Starting in July 1969 on Long Island's North Shore, the Company has extensive experience in all property types.

In that time frame, Feldco has developed or renovated through acquisition over 100 major shopping centers, aggregating millions of square feet of retail space throughout New York, New Jersey, the six New England states and as far away as Ohio, Michigan, Wisconsin, Illinois, Indiana, Texas and Florida. In the particular niche of supermarket-anchored community centers, it is one of the most respected developers in the Northeast.

Over those years, the Company has also developed many office buildings from New York to Florida for such tenants as the N.Y. Telephone Co., AT&T, the Veteran's Administration, N.Y. Life Insurance Company and many other major corporations.

In the last decade, Feldco has embarked on the creation of large-scale, urban, mixed-use developments, unifying its years of experience in the retail, office and residential sectors. In this regard, it is widely recognized for its ability to turn challenging locations into popular destinations.

As a family-owned and operated business, Feldco is a hands-on development firm whose principals personally participate in every project. With each one, the Company "builds to own" and forges long-term relationships with communities by including them in the development process and then, upon completion, sponsoring regular events or charitable causes in the spirit of creating a richer environment for its neighbors. Feldco works closely with local leaders to ensure that all projects foster both construction and full/part time jobs for local residents, and designs them for sustainability to achieve healthier, more responsible environments.

1.2.5 Public Review

The Project will exceed 50,000 square feet of gross floor area which is the threshold for developments being subject to Large Project Review under Article 80 of the Boston Zoning Code (the "Code"). This Project Notification Form ("PNF") has been submitted to begin that review, and the Proponent expects that it will facilitate a comprehensive, public process.

1.2.6 Public Benefits

Museum/Cultural Facilities

At the center of the Project's design will be a multi-use cultural center that will primarily consist of the new principal facilities of the Museum of the NCAAA (the "Museum"), which currently operates at 300 Walnut Ave in Roxbury, Massachusetts. The new space will greatly enlarge the scope and variety of the Museum's work, as well as the elegance of presentations and exhibits. The Museum, however, will not just display works of art, but also house educational and performance spaces for the fine and visual arts.

The Museum will continue as a central component of Roxbury's cultural contribution to the City of Boston. It will serve as the artistic centerpiece of the community, becoming an architectural landmark in the neighborhood and serving to highlight the important role of the African-American community in the City.

Additionally, the Museum and the adjacent public plaza, which will be adorned with sculptures, park benches and lush landscaping, will command an architectural significance and sense of purpose that will transcend that of a purely commercial project. The Project's tagline, "Where Commerce and Culture Connect", highlights the elevated roll that the Museum will serve in its contribution to the development and underscores the important way in which it will contribute to defining the unique "energy" of the Project and the vital role that the Project will have in the community and within the City at large.

Employment

The Project is estimated to create approximately 670 construction jobs and approximately 1,738 permanent jobs. The permanent jobs that will be created will be generated primarily by both the Project's retail and office uses and it is anticipated that they will be split approximately evenly between these uses. The combination of the core office and retail aspects of the development will serve to create a broad mix of jobs for the community with varying skill sets. Many opportunities along the career ladder will be available, from immediate employment needs to long-term job placement, including service industry opportunities in addition to professional-oriented positions that will provide for upward mobility and wealth creation.

Job Training Initiatives / Office of Collaboration and Partnership

A significant factor influencing the original selection of ELP and subsequently the Proponent as Tentative Redeveloper of Parcel P-3 was the continued adherence to Miss Elma Lewis' vision to make the Project Site an engine of broad social change. The Proponent is committed to creating cultural and educational opportunities along with job and career paths that would benefit the whole community and dovetail with the employment needs of potential tenants and/or other institutions and employers. Guiding the formulation of P-3 Partners specific program design and its underlying mission of the development is the belief that through ordinary economic development, significant social and cultural benefits can be achieved.

In order to facilitate the realization of these goals, the Proponent has budgeted for the creation of an Office of Collaboration and Partnership (the "OCP") that will structure cooperative opportunities between tenants and nearby educational, cultural and medical institutions.

The OCP's near-term goals would be to increase short, intermediate and long-term employment opportunities for individuals and companies in greater Roxbury through programs that match tenant-employee and/or service needs. The OCP may meet this goal by creating career paths, internships, work-study programs and similar vehicles for youth from secondary school upwards, as well as for adults through continuing education. By identifying tenant service needs, the OCP, where feasible, will match them with existing, locally-based business resources. Whereas medical and health-related careers will be the initial focus of the OCP's efforts, the Proponent also anticipates that OCP's efforts will expand over time to address the needs of other industries where it is important to develop human resources in a collaborative fashion.

Over the long term, the OCP hopes to achieve outcomes that reach beyond job placement. The OCP hopes its initiatives will uplift and enhance the entire community by developing an empowered group of residents who have the sustained financial stability, knowledge, relationships, civic support, and commitment to pursue positive changes in the community and the City at large.

Although the aforementioned jobs program currently contemplated by the Proponent is wide ranging, it is anticipated to be weighted more towards opportunities in the fields of healthcare and medicine because of the proximity to the health-related institutions of the Longwood Medical Area (LMA). The emphasis on healthcare and medical careers arise from the recognition that these are expanding fields that will continue to grow in the regional economy, and that the Proponent might play a role in preparing young people and adults for such job opportunities.

In this context, the Proponent hopes to develop collaborative programs between medical and health-related institutions and neighbors, including the Health Careers Academy, John O'Bryant High School for Mathematics and Science, Roxbury Community College, Northeastern University, Whittier Street Health Center and Partners Healthcare. Of particular significance is the manner in which the aforementioned collaborative programs might integrate with the City of Boston's new emphasis on structuring the curriculum of Madison Park High School for Vocational Education to incorporate vocational internships. [Get more on this form ELP].

Transit Oriented Development

In keeping with the City's objectives of sustainable design and Transit Oriented Development ("TOD"), the Project benefits from its direct proximity to one of the City's busiest transportation hubs. The Project Site is diagonally adjacent to the Ruggles Train Station, which contains an Orange Line subway stop, three Commuter Rail lines (Needham Line, Franklin Line and Providence Line), fourteen bus routes and is also on the MASCO/LMA shuttle route. Additionally, the Project is within a few minutes walk from both the Northeastern campus and Museum of Fine Arts Green Line MBTA stops.

Due to these multimodal transportation choices that are in direct proximity to the Project Site, it will be able to sustain a development of significant density that would ordinarily be located in a less urban setting where there is less existing traffic and more readily available land. However, as is discussed further in Section 3.1.9, “Future Build Traffic Conditions”, the number of vehicular trips to the Project will be greatly reduced by virtue of the many other transportation choices that are available to its visitors. Many of the attributes of the Tremont Crossing project that are beneficial to the community and the City of Boston, including the aforementioned employment opportunities, job training programs and cultural facilities, are directly related to the Project’s size and are only possible as a result of its density. The Proponent believes that it is of great importance that the Project Site’s status as a TOD be leveraged in a way to bring the most substantial benefits possible.

Since the Project will draw visitors from all over the City, the Project’s direct proximity to mass transit will enable people to easily travel and access the destination without reliance on a motor vehicle.

Furthermore, because of the Project’s complementary mix of uses and geographic proximity to the many educational and medical institutions in the area, Tremont Crossing will promote reduced dependency on the automobile and in many cases be conducive to walking as a means of transportation to and from the Project’s retail establishments.

With the Project Site across the street from the Southwest Corridor Park, many Bostonians will also be able to visit the Site by bicycle. To promote such a use, the Project will contain bicycle racks, as the Proponent wishes to support alternative means of transportation to offset pollution and traffic congestion.

Improved Street and Pedestrian Environment

With nearly a million square feet of commercial and cultural uses, the Tremont Crossing Project will become a transformative element that allows Lower Roxbury to further facilitate its integration into the urban fabric of the City. With an anticipated 50,000 square feet of smaller shops, boutiques and/or restaurants situated along Tremont Street, the Project endeavors to create a vibrant pedestrian experience that will energize the neighborhood and unify it with the activity of Northeastern and the LMA to the north, the South End to the east and Dudley Square to the southwest.

In addition to the ground-level retail, the Project will include a large public plaza that will be at the center of the development and be adorned with sculptures, park benches and lush landscaping. This outdoor, public space will also be conducive to alfresco dining, art exhibits and community functions when the weather permits. The public plaza will serve as the unifying amenity of the Project, and act as the physical connection of all of the mix of uses by establishing a single, easily-identifiable point of entry for customers and visitors.

At the rear of the plaza will be an 80 foot high glass atrium with elevators and escalators that will carry shoppers and visitors to the various retail and garage levels and be visible to the streetscape below. A similar, albeit smaller version of this glass multi-level atrium, will also exist on the northeast corner of the pedestrian way, at Whittier Street, to allow more immediate access to the upper floors of retail for customers arriving by mass transit at Ruggles Station and the residents of the Whittier Street Housing Complex. At this same highly-visible corner, the multifamily, residential building will be setback approximately seventy (70) feet from Whittier Street, thereby creating a secondary plaza and an unobstructed view corridor of the large retail building from Tremont Street.

In addition, the public plaza will act as the central, pedestrian connection to a forty (40) foot wide pedestrian way that will run parallel to Tremont Street. As noted, this pedestrian way will separate the large-format retail building and parking structure from the Project's other uses and serves to enhance the pedestrian activity and energy throughout the Project Site by providing access to the small, ground floor retail fronting on Tremont Street through double-sided storefronts or even unique stores with frontage only on this interior walking street. Many of the same amenities present in the public plaza, such as benches, artwork and landscaping, will be provided in this pedestrian way. Access to the cultural facilities will also be off this central, public plaza, but the office and residential facilities, which are more restricted to the general public, will have direct access with lobbies that front both Tremont Street and the pedestrian way, bringing apartment and office tenants directly in and out of the urban fabric of the City.

The Proponent also anticipates that it will make significant improvements to the length of the streetscape along Tremont Street between the Whittier Street Health Center and Whittier Street. These will include a widened sidewalk, improved lighting and landscaping and parallel parking spaces made possible on land that is part of the Project Site. Additionally, it is anticipated that the length of Whittier Street that is adjacent to the Whittier Street Housing Development will be widened to two lanes, permitting two way traffic and thus allowing circulation around the entire Site to ease traffic congestion and increase vehicular flow. The sidewalks adjacent to this street will be adorned with new trees and ample decorative street lighting, creating a much improved aesthetic to what currently exists.

Figure 1-7: View From Tremont Street

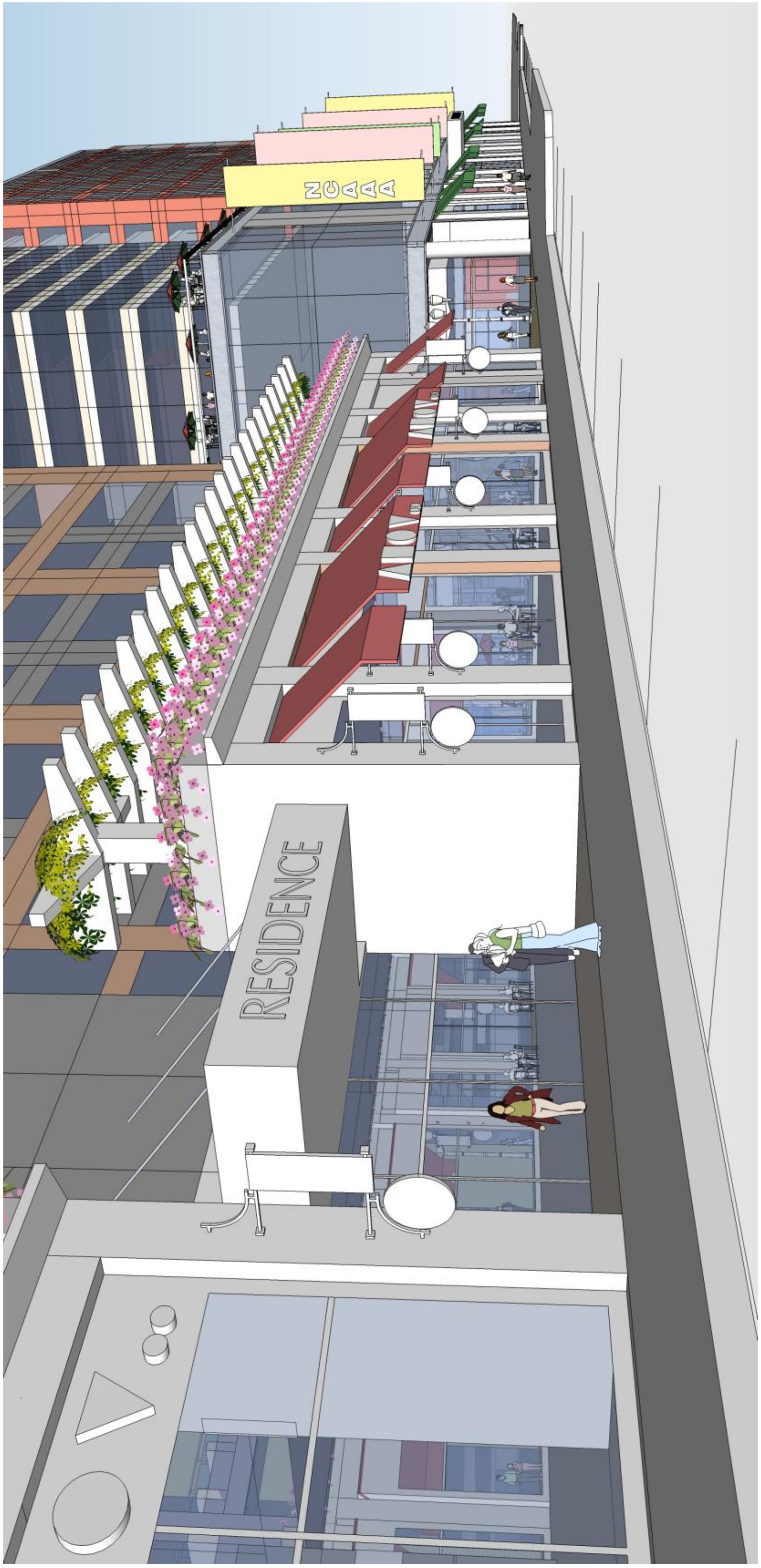


Figure 1-8: View From Whittier Street

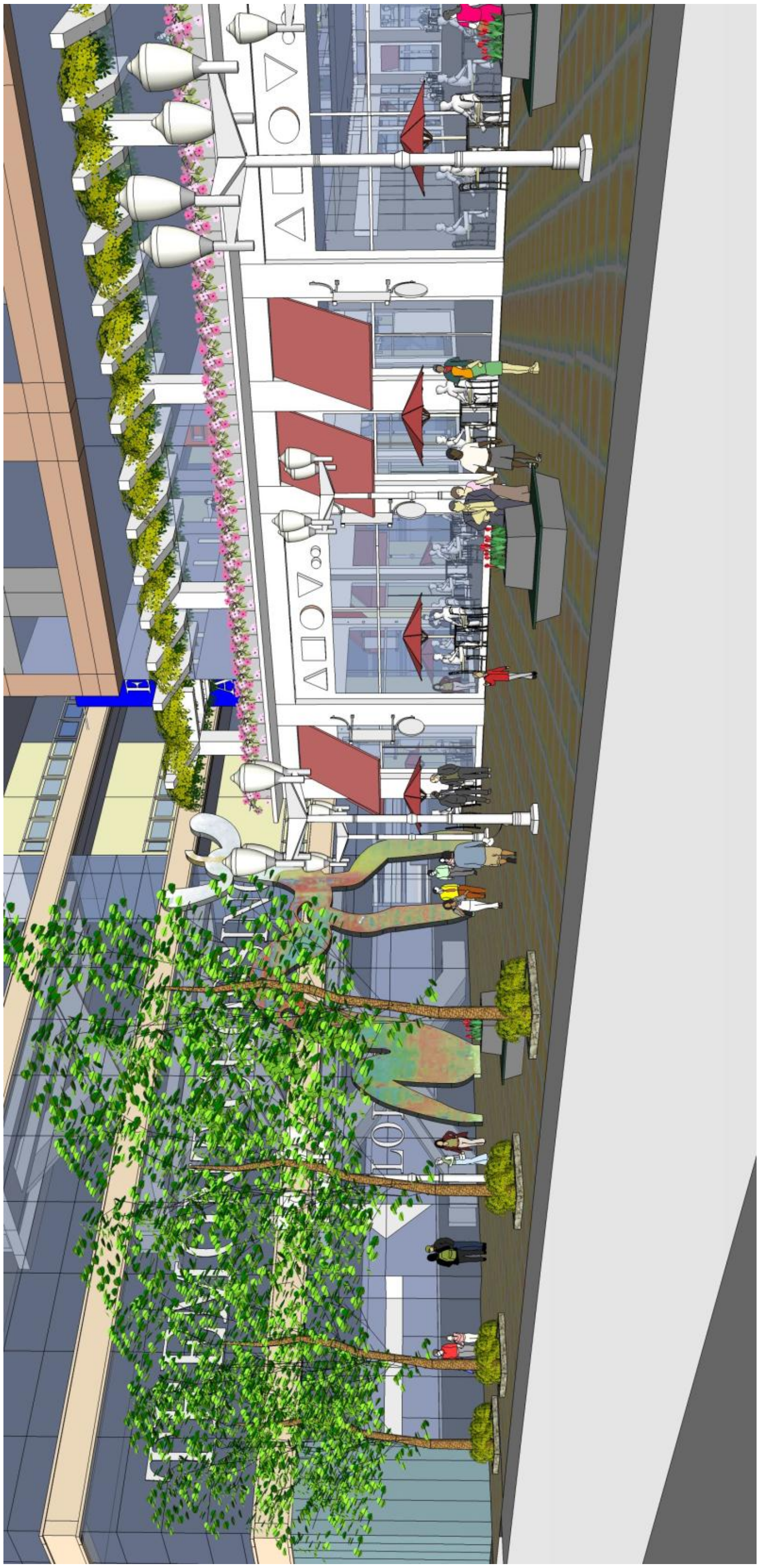
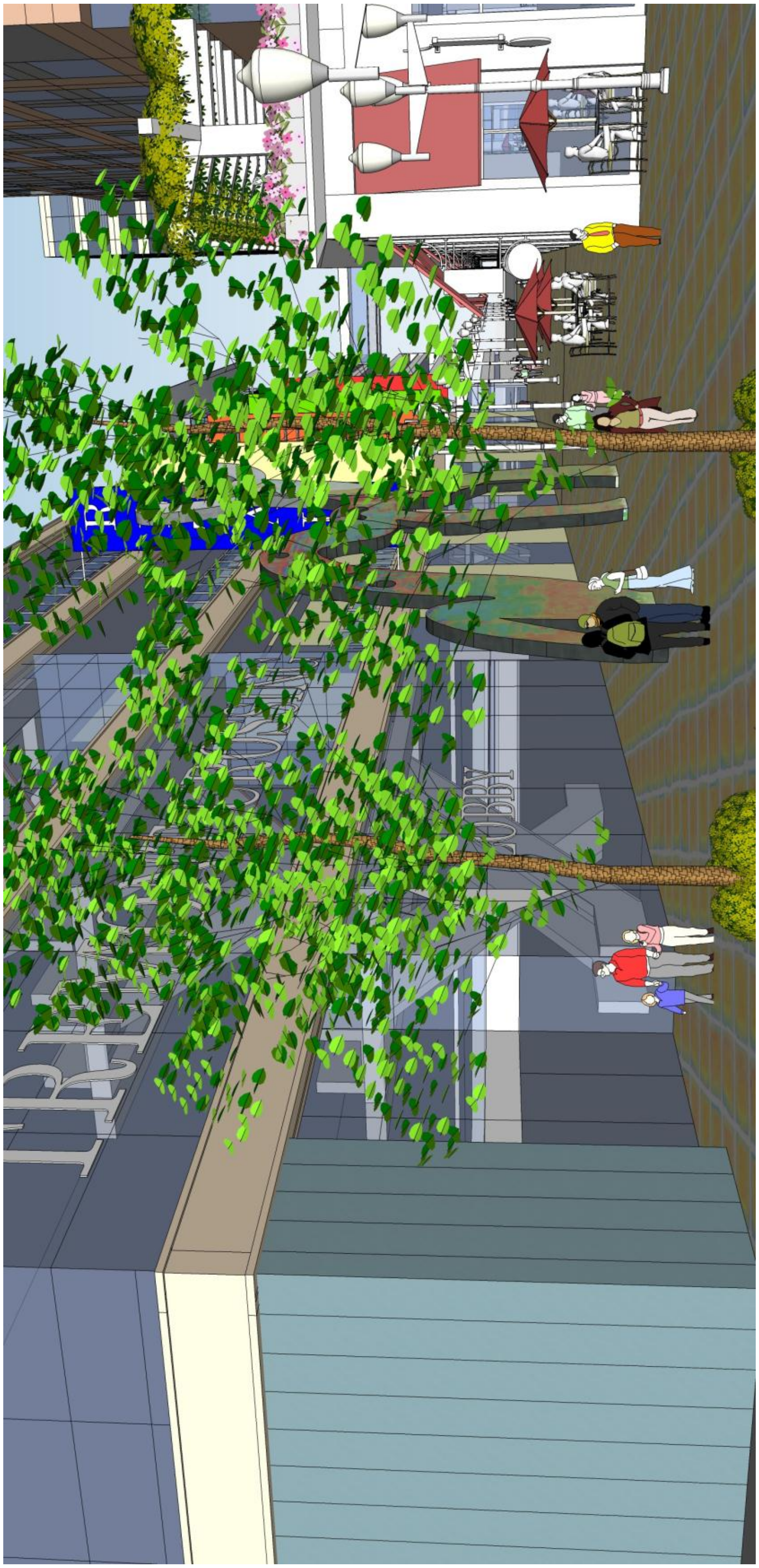


Figure 1-9: Public Plaza

Figure 1-10: Pedestrian Way



New Revenue for the City of Boston

The Project Site is owned by the BRA and since it has long been a vacant parcel, it does not currently generate any property tax revenue for the City of Boston. Given that the Site will be leased to the Proponent, it is anticipated that Tremont Crossing will generate significant new annual revenue for the City.

1.3 Consistency with Zoning

The Project Site is located in the Roxbury Neighborhood District and is, therefore, subject to Article 50 of the Boston Zoning Code, in addition to the regulations of the Greater Roxbury Economic Development Area and the Campus High School Urban Renewal Plan. Zoning relief (as defined in Article 2A of the Code) will be required by the Boston Zoning Commission and/or the BRA as the Proponent has determined that the Project exceeds current floor area ratio, height and yard parameters set forth in the Code. The Proponent will continue to consult and coordinate with the BRA and its counsel as to the most appropriate form of zoning relief to pursue for the Project.

1.4 Preliminary DIP Information

The Project will be a Development Impact Project within the meaning of Section 80B-7 (Development Impact Extractions). In that regard, the approximate, preliminary measurement of the aggregate gross floor area required for calculating Development Impact Extractions is 1,005,197 square feet. This calculation does not include the Project's parking structure.

1.5 Legal Information

1.5.1 Legal Judgments Adverse to the Proposed Project

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

1.5.2 History of Tax Arrears on Property

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

1.5.3 Evidence of Site Control/Nature of Public Easements

The entire Project Site is owned by the Boston Redevelopment Authority with the Proponent being awarded a Tentative Designation for eighteen (18) months from January 13, 2011. The Proponent is currently in negotiations with the BRA to enter into a conditional Ground Lease Agreement in order that it attains the necessary Site control to embark on the proposed development.

1.6 Public Agencies

Table 1-1 below sets forth a list of federal, state and city agencies from which permits or other actions are expected to be required:

Table 1-1: Anticipated Permits and Approvals

Agency Name	Permit / Approval
FEDERAL	
Federal Aviation Administration	Determination of No Hazard Navigation
STATE	
Department of Environmental Protection, Division of Water Pollution Control	Sewer Connection and Extension Permit
Department of Environmental Protection, Division of Air Quality Control	Air Plans Approval; Pre-Construction Notice
Massachusetts Water Resources Authority	Sewer Use Discharge Permit; Construction Dewatering Permit
Massachusetts Historical Commission	State Register Review
CITY OF BOSTON	
Boston Civic Design Commission	Review and Approval
Boston Redevelopment Authority	Article 80, Large Project Review
Boston Water and Sewer Commission	Sewer Use Discharge Permit; Site Plan Approval; Construction Dewatering Permit; Sewer Extension/Connection Permit; Stormwater Connection
City of Boston Committee on Licenses	Parking Garage Permit
City of Boston Inspectional Services Department	Building and Occupancy Permits
Boston Public Improvement Commission	Street and Sidewalk Occupation Permits; Tieback/Earth Retention Permit; Specific Repair Plan; Paper Street Discontinuation Approval
Boston Transportation Department	Transportation Access Plan Agreement Construction Management Plan
Boston Zoning Commission	Zoning Relief

2.0 PROJECT DESCRIPTION

2.1 Existing Site

The Project will be located at Parcel P-3 (consisting of Parcel P-3 and a portion of Parcel P3-h in the Campus High School Urban Renewal Area) in Boston's Roxbury neighborhood. The Project Site consists of approximately 7.86 acres of land area and is bounded by Tremont Street to the northwest, Whittier Street to the northeast, Downing Street to the Southeast, the Reggie Lewis Track and Athletic Center to the Southwest, and the Madison Park Technical Vocational High School and the John D. O'Bryant School of Mathematics and Science to the southwest.

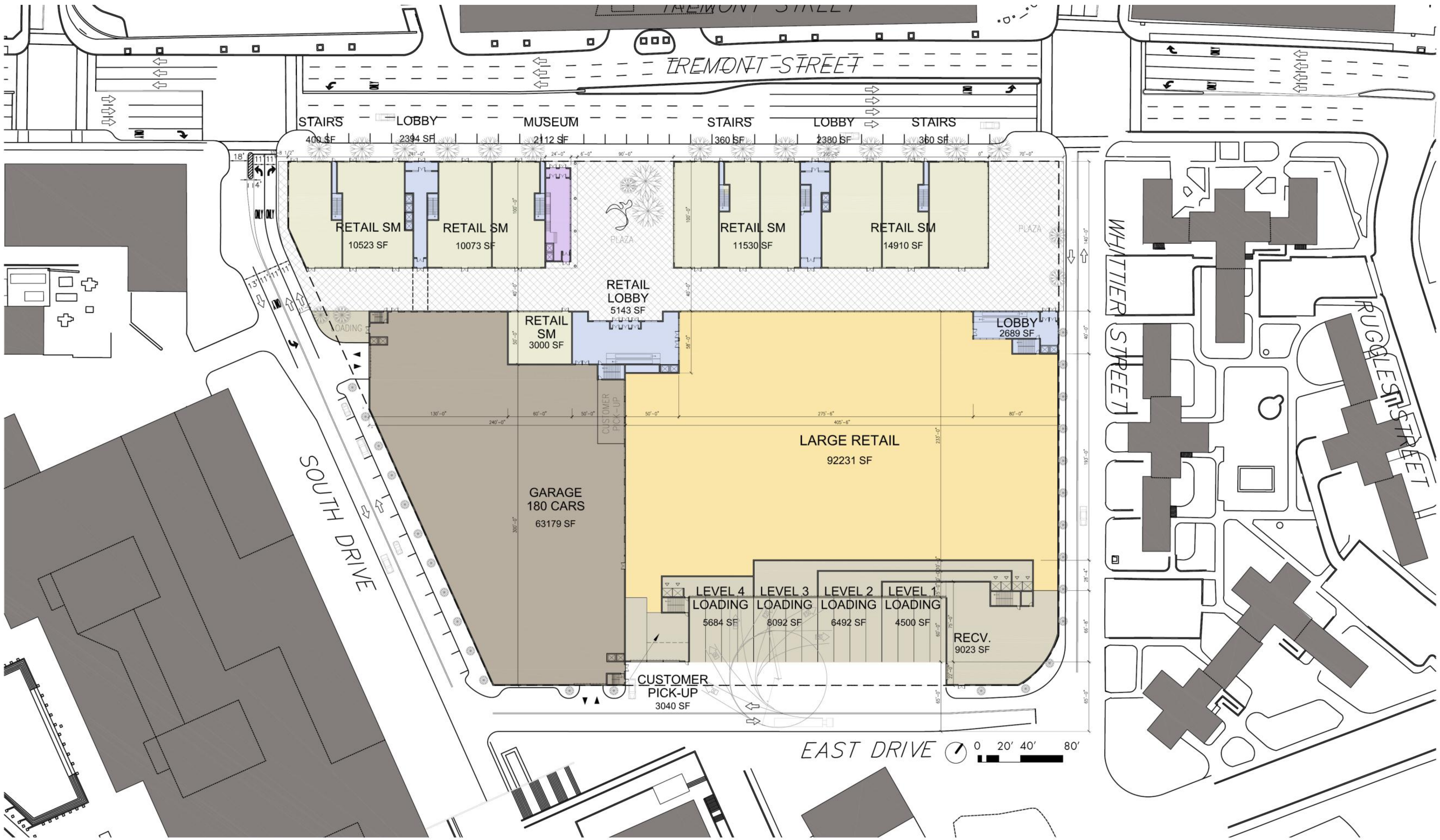
The Project Site is currently vacant and is being used as ancillary parking for some of the abutting institutional and City agencies.

2.2 Proposed Development Program

2.2.1 Building Program

The Project's mix of uses will include approximately 500,000 square feet of large format retail, which could also have entertainment and recreational uses, such as a movie theater or performing arts theater, 50,000 square feet of smaller shops and boutiques fronting along Tremont Street, 200,000 square feet of office space, 240 units of multifamily residential (approximately 200,000 square feet) made up of studios, one bedroom and two bedroom rental apartments (of which the necessary affordable units will be provided), and 58,000 square feet of cultural facilities that will primarily house a new museum for the National Center for Afro-American Artists ("NCAAA"). The development will also include a large public plaza and an adjacent, multi-level parking structure to accommodate the requirements of its tenants. As currently contemplated, the proposed parking structure would consist of approximately 1,700 spaces that will include parking for the Whittier Street Health Center and the Boston Public Schools, but could increase in size subject to potential demand from other Project abutters and/or its mix of uses. Figure 2-1 and 2-2, below, depict the Project's Ground Floor plan in addition to its upper levels.

Figure 2-1: Ground Floor Plan



TREMONT CROSSING
A PARCEL 3 DEVELOPMENT PROJECT

P3 Partners, LLC

Stull and Lee Incorporated
architecture + planning

GUND PARTNERSHIP
ARCHITECTURE | PLANNING

Figure 2-2: Upper Floor Plans

2.2.2 Approximate Sizes

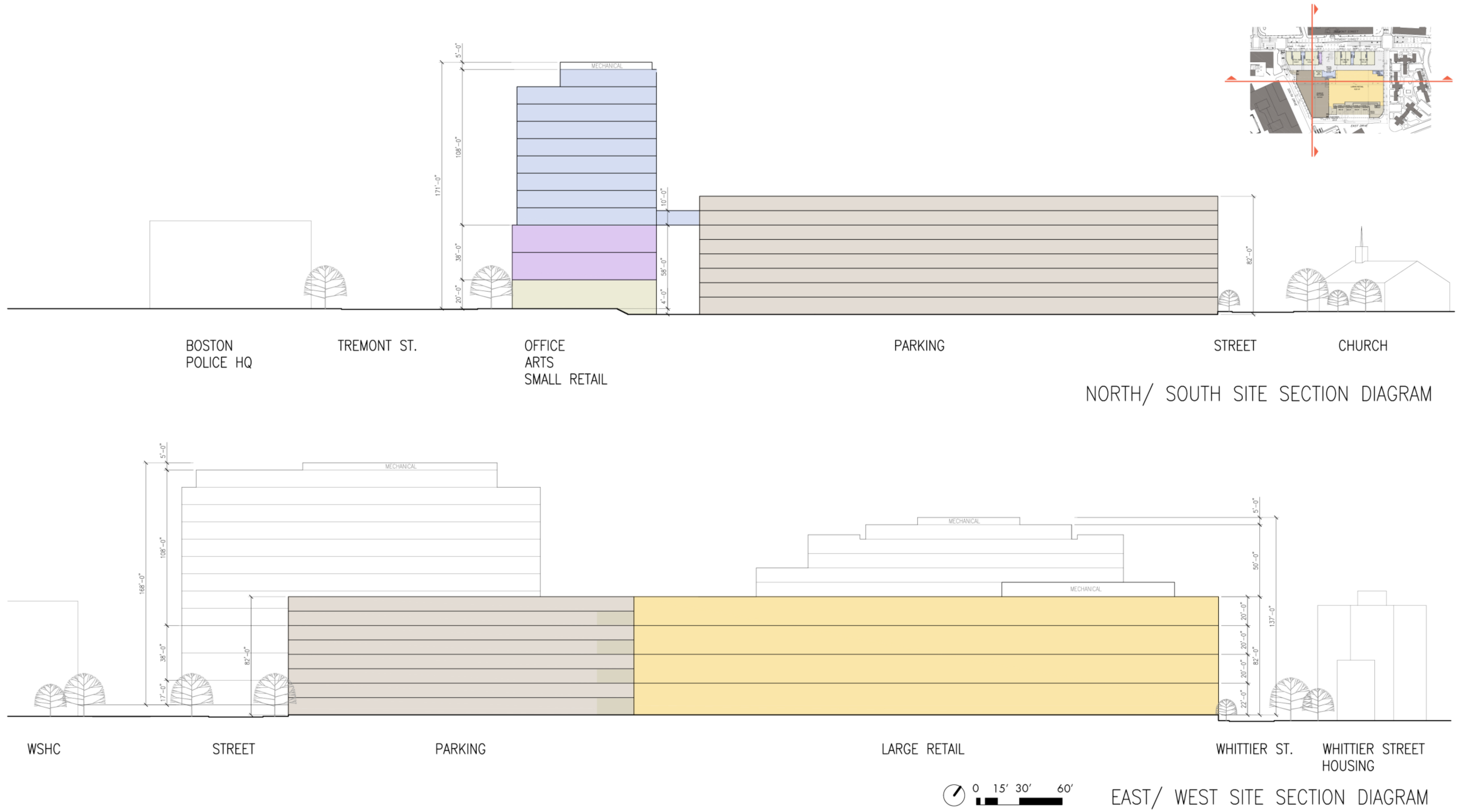
Table 2-1 presents the approximate sizes of the Project:

Table 2-1: Approximate Sizes and Uses

Element	Square Feet	Building Levels
Large-Format Retail	500,000 s/f	4 Levels
Smaller Retail (Fronting Tremont Street)	50,000 s/f	1 Level (two building structures)
Office	200,000 s/f	9 Levels
Multifamily, Residential	200,000 s/f (240 units)	11 Levels
Museum / Cultural Center	58,000 s/f	3 Levels
Parking	592,000 s/f	8 Levels (plus one partially underground)

The layout of the Project will be designed around a large public plaza, which will have significant frontage along Tremont Street. The small retail will separated from the large retail and be on the ground level of the residential and cultural/office buildings. The office use will sit atop the Museum, so that structure will have a total of 12 floors. The multifamily, residential tower will consist of fourteen floors and front Tremont Street to the north and the large-format retail building to the south. Additionally, all of the various uses will connect to the parking structure either by a network of walk bridges or via the pedestrian way that bisects the Project. The Project Site consists of approximately 7.86 acres (342,382 square feet) of land area with approximately 1.6 million square feet of structures built upon it. This equates to a proposed project FAR of 4.86.

Figure 2-3: Building Sections



2.3 Schedule

The Proponent anticipates that the Article 80 approvals process will last approximately twelve (12) months. Construction is expected to last approximately twenty-four (24) months.

3.0 ASSESSMENT OF DEVELOPMENT REVIEW COMPONENTS

Article 80 of the Code specifies that the BRA may require in its Scoping Determination that the Proponent conduct studies to determine the direct or indirect impact on its surroundings that are reasonably attributed to a proposed project. Where potential for direct or indirect impacts exist, measures may be required to mitigate the impacts. Some of the areas for which studies and mitigation may be required are addressed in this section.

3.1 Transportation

3.1.1 Introduction

The following sections set forth the transportation considerations that are specific to the Tremont Crossing project. Included in this section is a comprehensive traffic and parking analysis which will examine traffic, parking, public transportation, and pedestrian access and loading activities in the vicinity of the Project. Trip generation estimates, transportation impacts, and transportation demand management measures associated with the Project are also included in this section. A locus of the Project is displayed in Figure 3-1.

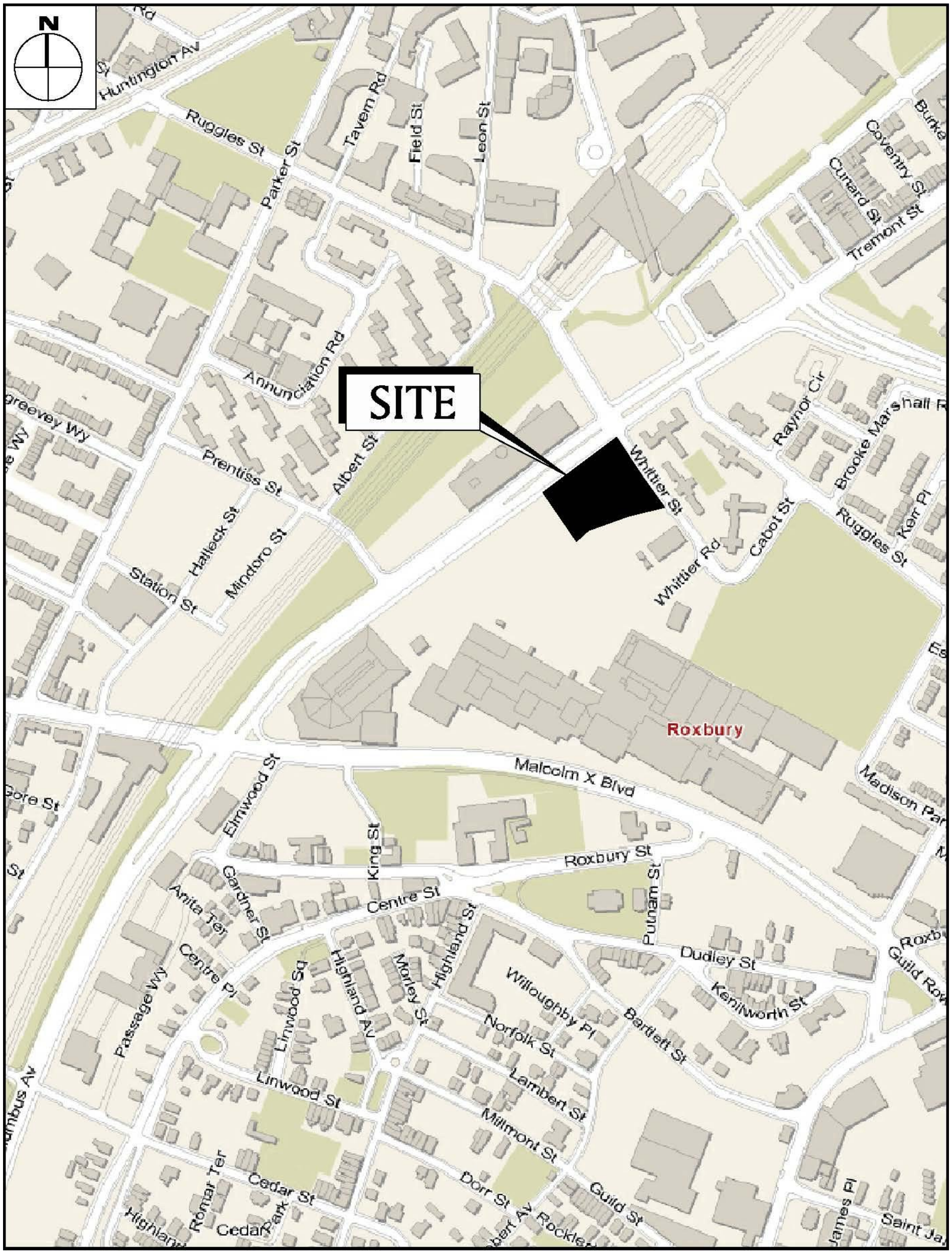
3.1.2 Project Description

The proposed Project's mix of uses includes approximately 500,000 square feet of large format retail, 50,000 square feet of smaller shops and boutiques fronting along Tremont Street, 200,000 square feet of office space, 240 units of multifamily residential (approximately 200,000 square feet) and approximately 58,000 square feet of cultural facilities that will primarily house a new museum for the NCAAA. The development will also include a large public plaza and an adjacent, multi-level parking structure to accommodate the requirements of its tenants. As currently contemplated, the proposed parking structure would consist of approximately 1,700 spaces, but could increase in size subject to potential demand from the Project's abutters and/or its mix of uses.

3.1.3 Site Access and Circulation

The primary vehicular access to the Project will be off of Tremont Street at the northwest corner of the Project Site, adjacent to the office/museum building and to be shared with the Whittier Street Health Center (WSHC). Currently, the WSHC Drive consists of one ingress lane and one right-turn only egress lane. Under future conditions, this drive will be widened to accommodate two egress lanes (one left-turn and one right-turn) and one 18-foot wide ingress lane. The intersection of the Site Drive with Tremont Street will be signalized, and the Jersey barrier median on Tremont Street will be removed at the intersection to allow a stacking pocket for left turns into and left turns out of the Site. Parking on the west side of Tremont Street will be prohibited between Prentiss Street and Ruggles Street. Pedestrian access ramps and pedestrian signals will be provided to enhance pedestrian access to the Site.

Figure 3-1: Project Locus



The Project Site driveway (South Drive), in addition to being shared with WSHC, will provide access to the parking garage which is currently used by the Boston Public School (BPS). Figure 3-2 below shows the Site access and circulation, including pedestrian and vehicular access.

Figure 3-2: Proposed Site Access and Circulation

A secondary means of access/egress to the Project Site is proposed at the end of Whittier Street, where it meets Downing Street (East Drive), to allow for full circulation around the Project Site. This will be accomplished by widening the section of Whittier Street between Tremont Street and Downing Street from one lane to two lanes and making it a two-way street. A left-turn lane with approximately 175 feet of storage will be provided on Tremont Street southbound for vehicles turning onto Whittier Street eastbound. All delivery vehicles, in particular all trucks, will be prohibited from using Whittier Street and will enter and depart the Site only through the primary site drive (South Drive). Main access to the parking garage will be off of South drive, with a secondary access off of East Drive.

3.1.4 Summary of Findings

The proposed Tremont Crossing Project will provide a vibrant and diverse mix of uses to the Roxbury neighborhood of Boston, located along Tremont Street adjacent to Whittier Street and Vernon Street. The Project's mix of uses will include approximately 500,000 square feet of large format retail, 50,000 square feet of smaller shops and boutiques fronting along Tremont Street, 200,000 square feet of office space, 240 units of multifamily residential (approximately 200,000 square feet) and approximately 58,000 square feet of cultural facilities. The development will also include a large public plaza and an adjacent, 1,700-car multi-level parking structure.

The Project proposes the following roadway and intersection modifications intended to improve the transportation network in the vicinity of the Project:

- Convert Whittier Street from one-way to two-way between Tremont Street and Downing Street.
- Remove the currently allowed on-street parking along Tremont Street southbound in front of the Boston Police Department Building.
- Signalize the intersection of the site Driveway at Tremont Street. The proposed traffic signal will include an exclusive pedestrian signal with crosswalks, accessible ramps, and pedestrian push buttons and signals.
- Remove the Jersey barrier dividing Tremont Street in front of the site Driveway in order to allow left-turns into and out of the Site.
- Provide a right-turn pocket on Tremont Street northbound at South Drive for access into the Site.
- Provide a left-hand turn pocket on Tremont Street southbound at Whittier Street for access into the Site.

There are four existing parking facilities located within a one-quarter mile radius of the Site that provide publicly available off-street parking. On-street spaces exist in the vicinity of the Site in the form of time restricted, unregulated, police vehicle, taxi, handicapped, and resident parking spaces. The Project proposes to create an additional thirty-one (31) on-street parking spaces on Tremont Street in front of the Project Site, including a drop-off area for the Museum and a time-regulated loading zone within a portion of the on-street spaces. Approximately 25 of the existing unregulated spaces on the south side of Whittier Street will be removed due to the conversion of Whittier Street from one-way to two way traffic flow.

In keeping with the Transit-Oriented Development nature of the Project, a large percentage of trips to the Site will be made as pedestrian, bicycle, and transit trips. The area is adjacent to fourteen (14) bus routes, two MBTA Orange Line stations, and a commuter rail station serving three branches that terminate at South Station or Downtown Boston. In addition, the area is well served by sidewalks measuring 7-10 feet in most locations. Both the Southwest Corridor Park and the South Bay Harbor Trail provide pedestrian and bicycle access between the Project Site and surrounding areas, including South End, Roxbury, Back Bay, Chinatown, Jamaica Plain, South Boston, and the Fort Point Channel. The Project proposes to provide bicycle racks and/or indoor bicycle storage on Site, as well.

The proposed Project is expected to generate:

- 5,831 vehicle trips during the average weekday, with 240 vehicle trips occurring during the weekday morning peak hour, 529 vehicle trips occurring during the weekday afternoon peak hour, and 632 vehicle trips occurring during the Saturday midday peak hour;
- 7,081 transit trips during the average weekday, with 305 transit trips occurring during the weekday morning peak hour, 742 transit trips occurring during the weekday afternoon peak hour, and 799 transit trips occurring during the Saturday midday peak hour;
- 659 pedestrian trips occurring during the weekday morning peak hour, 2,317 pedestrian trips occurring during the weekday afternoon peak hour, and 2,665 pedestrian trips occurring during the Saturday midday peak hour.

The results of the analysis indicate that, with the proposed improvements, there will not be a significant increase in delay due to the new vehicle trips generated by the Project.

3.1.5 Study Methodology

This Project is subject to Article 80 of the City of Boston's Zoning Code and as such, this transportation study has been prepared in accordance with the Boston Transportation Department (BTD) Transportation Access Plan guidelines. This study also conforms to guidelines set forth by the Institute of Transportation Engineers (ITE) and the Massachusetts Environmental Policy Act (MEPA). All analyses are conducted using the Synchro 8 software, based on methods defined in the Highway Capacity Manual 2000 (TRB, 2000).

This study includes a review of existing transportation, roadway, and parking conditions in the vicinity of the Project, as well as an analysis of traffic operations at study area intersections. This study identifies background traffic growth for study area roadways, including traffic associated with other proposed projects in the vicinity of the Project Site. This study estimates additional traffic generated by the proposed development and evaluates impacts on the transportation network due to project-generated trips. Finally, this study proposes mitigation measures, including geometric improvements, signalization, and Traffic Demand Management (TDM).

Based on discussions with BTD, the following intersections are evaluated in this study in order to identify any potential project-related impacts on operating conditions at these locations:

- Tremont Street at Malcolm X Boulevard / Columbus Avenue;
- Tremont Street at Prentiss Street;
- Tremont Street at Whittier Street / Ruggles Street;
- Tremont Street at Ruggles Street;
- Tremont Street at Melnea Cass Boulevard;
- Tremont Street at Site Driveway.

This study evaluates the impacts on the aforementioned study area intersections, based on three conditions:

- 2012 Existing Conditions – to evaluate the traffic conditions that exist today. The 2012 condition was based on the year 2010 Existing Condition Synchro network provided by BTD. Baseline 2012 Existing Condition traffic volumes were obtained by growing the provided 2010 volumes by 0.25 percent annually for two years;
- 2017 Future No Build Conditions – based on a 5-year planning horizon. This condition assumes that the proposed Project has not been built;

- 2017 Future Build Conditions – based on the same 5-year planning horizon, assuming the Project has been built.

3.1.6 Existing Transportation Conditions

This section presents the existing transportation conditions, including an overview of the roadway network, public transportation system, crash data, pedestrian and bicycle access, and parking supply.

3.1.6.1 Roadways

Tremont Street

Tremont Street is classified as an Urban Principal Arterial that generally runs in a northeast-southwest direction from Malcolm X Boulevard / Columbus Avenue in the southwest to Charles Street in the northeast. In the vicinity of the study area, Tremont Street has three travel lanes northbound and three travel lanes southbound. Sidewalks exist on both sides of the roadway, with land uses along the corridor composing of a mixture of commercial, residential, institutional, and recreational uses. Parking currently occurs along the northwest side of Tremont Street in front of the Boston Police Department in the vicinity of the study area, thereby reducing the number of usable travel lanes from three to two in the southbound direction.

Malcolm X Boulevard

Malcolm X Boulevard is classified as an Urban Minor Arterial and generally runs in an east-west direction from Tremont Street / Columbus Avenue in the east to Dudley Square (Dudley Street / Washington Street intersection) in the west. Malcolm X Boulevard generally consists of two travel lanes in each direction with sidewalks on both sides.

Columbus Avenue

Columbus Avenue is classified as an Urban Principal Arterial and generally runs in a north-south direction. Columbus Avenue begins in the north at its intersection with Eliot Street in Park Plaza and continues south to Melnea Cass Boulevard. There it breaks until it begins again at Tremont Street / Malcolm X Boulevard, continuing south to its intersection with Seaver Street / Walnut Avenue. Columbus Avenue south of its intersection with Tremont Street / Malcolm X Boulevard generally provides three travel lanes in each direction with sidewalks on both sides of the roadway.

Prentiss Street

Prentiss Street is a local roadway that runs in a northwest-southeast direction from Parker Street to its intersection with Tremont Street. There are existing sidewalks along both sides of Prentiss Street.

Ruggles Street

Ruggles Street is classified as an Urban Minor Arterial that generally runs in a northwest-southeast direction. Ruggles Street begins at Huntington Avenue in the west and travels in the southeasterly direction to Tremont Street. Ruggles Street then shifts one block north on Tremont Street and continues as a one-way street away from Tremont Street until its intersection with Washington Street. A sidewalk is provided on both sides of Ruggles Street along its entire length.

Whittier Street

Whittier Street is a local roadway that runs in a northwest-southeast direction from Tremont Street to Cabot Street. Whittier Street is a one-way roadway westbound. A sidewalk is provided on both sides of the roadway.

Melnea Cass Boulevard

Melnea Cass Boulevard is classified as an Urban Principal Arterial and generally travels in an east-west direction from Columbus Avenue in the west to Massachusetts Avenue / Mass Ave Connector in the east. Melnea Cass Boulevard is a median divided roadway that generally provides two lanes in each direction. Sidewalks are provided on both sides of the roadway. A section of the South Bay Harbor Trail runs along the north side of Melnea Cass Boulevard.

3.1.6.2 Intersections

Tremont Street at Malcolm X Boulevard / Columbus Avenue

Malcolm X Boulevard and Columbus Avenue intersect Tremont Street to form a four-way signalized intersection. Tremont Street eastbound provides one wide travel lane, which acts as two lanes, one left-through lane and one through-right lane. Malcolm X Boulevard westbound provides one left-through lane, one through lane, and one channelized right-turn lane onto Tremont Street. Both Columbus Avenue northbound and Tremont Street southbound provide one left turn storage lane, two through lanes, and one through-right turn lane. An exclusive pedestrian phase is provided at this intersection, with crosswalks across all four legs of the intersection.

Tremont Street at Prentiss Street

Prentiss Street intersects Tremont Street to form a three-legged signalized intersection. Prentiss Street eastbound provides one general purpose travel lane. Tremont Street northbound provides one through-left lane and two through lanes, while Tremont Street southbound provides two through lanes and one through-right lane. Due to the use of the curbside lane for parking on the west side of Tremont Street, Tremont Street southbound acts as a two-lane roadway, providing one through lane and one through-right lane.

An exclusive pedestrian phase is provided at this intersection, with crosswalks across all three legs of the intersection.

Tremont Street at Whittier Street / Ruggles Street

Ruggles Street and Whittier Street intersect Tremont Street to provide a four-legged signalized intersection. Ruggles Street eastbound provides two left-turn lanes and one right-turn lane. Whittier Street, a one-way roadway westbound, provides one general use travel lane. At this intersection, each direction of Tremont Street is divided by a median. Tremont Street northbound provides one left-turn lane and three through lanes. Tremont Street southbound provides two through lanes and one right-turn-only lane. Crosswalks are provided across each leg of the intersection and the signal provides a concurrent pedestrian phase.

Tremont Street at Ruggles Street / Renaissance Park Drive

At this signalized intersection, each direction of Tremont Street is divided by a median, and Ruggles Street is a one-way roadway eastbound. Tremont Street provides three travel lanes in each direction. On the west side of Tremont Street, Columbus Avenue approaches the intersection as a one-way eastbound roadway.

Crosswalks are provided across both the Ruggles Street and Columbus Avenue legs, as well as the north leg of Tremont Street. The crosswalk across Tremont Street provides pedestrian access to MBTA Ruggles Station.

Tremont Street at Melnea Cass Boulevard

Melnea Cass Boulevard intersects Tremont Street to form a four-way signalized intersection. Melnea Cass Boulevard eastbound provides one left-through lane and one through-right lane. Melnea Cass Boulevard westbound provides one left-turn lane, one left-through lane, and one through-right lane. Tremont Street northbound provides one left-through lane, one through lane, and one channelized right-turn lane. Tremont Street southbound provides one left-through lane and one through-right lane. Crosswalks are provided across each leg of the intersection.

3.1.6.3 Data Collection

The Boston Transportation Department (BTD) provided BSC with the most recent Synchro traffic model for the Roxbury area. This model includes weekday morning and evening peak hour traffic data for the Project study area, which was utilized for this study. The existing data provided includes traffic counts from the year 2010. In order to represent existing traffic volumes for 2012, the 2010 volumes were grown by a rate of 0.25 percent per year for two years.

Per BTD guidelines, Saturday midday analysis is required for projects with a retail component. Therefore, additional turning movement counts were conducted at each of the study area intersections on Saturday January 21, 2012 between 11AM – 1PM. Figure 3-3 displays the 2012 Existing Condition traffic volumes on the roadway network. Traffic count data is contained in the Appendix.

3.1.6.4 Existing Pedestrian Access and Bicycle Accommodation

In the vicinity of the Project, sidewalks are provided along both sides of Tremont Street, Columbus Avenue, Malcolm X Boulevard, Ruggles Street, Whittier Street, and Melnea Cass Boulevard. Crosswalks are located across most legs of each intersection, in addition to pedestrian push buttons, pedestrian signals, and accessible ramps. Along Tremont Street, all sidewalks measure 7-10 feet wide.

On the west side of Tremont Street, a multi-use path provides pedestrian and bicycle access within Southwest Corridor Park. This 52-acre Park, owned by the Massachusetts Department of Conservation and Recreation (DCR), connects the neighborhoods of South End, Back Bay, Roxbury, and Jamaica Plain. This path provides both pedestrian and bicycle access to the area.

A section of the South Bay Harbor Trail currently exists on the north side of Melnea Cass Boulevard. This 3.5-mile trail is intended to connect several Boston neighborhoods with Boston Harbor and the Emerald Necklace. Upon completion, the trail will connect five Boston neighborhoods: South End, Roxbury, Chinatown, South Boston, and the Fort Point Channel. This trail will provide access for pedestrians and bicyclists alike.

An exclusive bicycle lane is provided on the north leg of Ruggles Street between Tremont Street and Leon Street.

3.1.6.5 Public Transportation

Many public transit facilities are provided by the Massachusetts Bay Transportation Authority (MBTA) in the vicinity of the study area. Ruggles Station and Roxbury Crossing Station, both serving MBTA busses and the MBTA Orange Line, are located within approximately one-third of a mile from the Site. Ruggles Station also serves three (3) Commuter Rail routes: the Needham, Franklin, and Providence / Stoughton Lines. A bus terminal is located at Dudley Square, approximately one-half mile radius southeast of the Project Site and provides access to buses and trackless trolley routes.

Fourteen bus routes, listed below, are within walking distance from the Project Site. A bus stop located on the east side of Tremont Street, across from Prentiss Street, provides access to eight (8) of these fourteen (14) routes. Table 3-1 and Figure 3-4 show the available public transit routes in more detail.

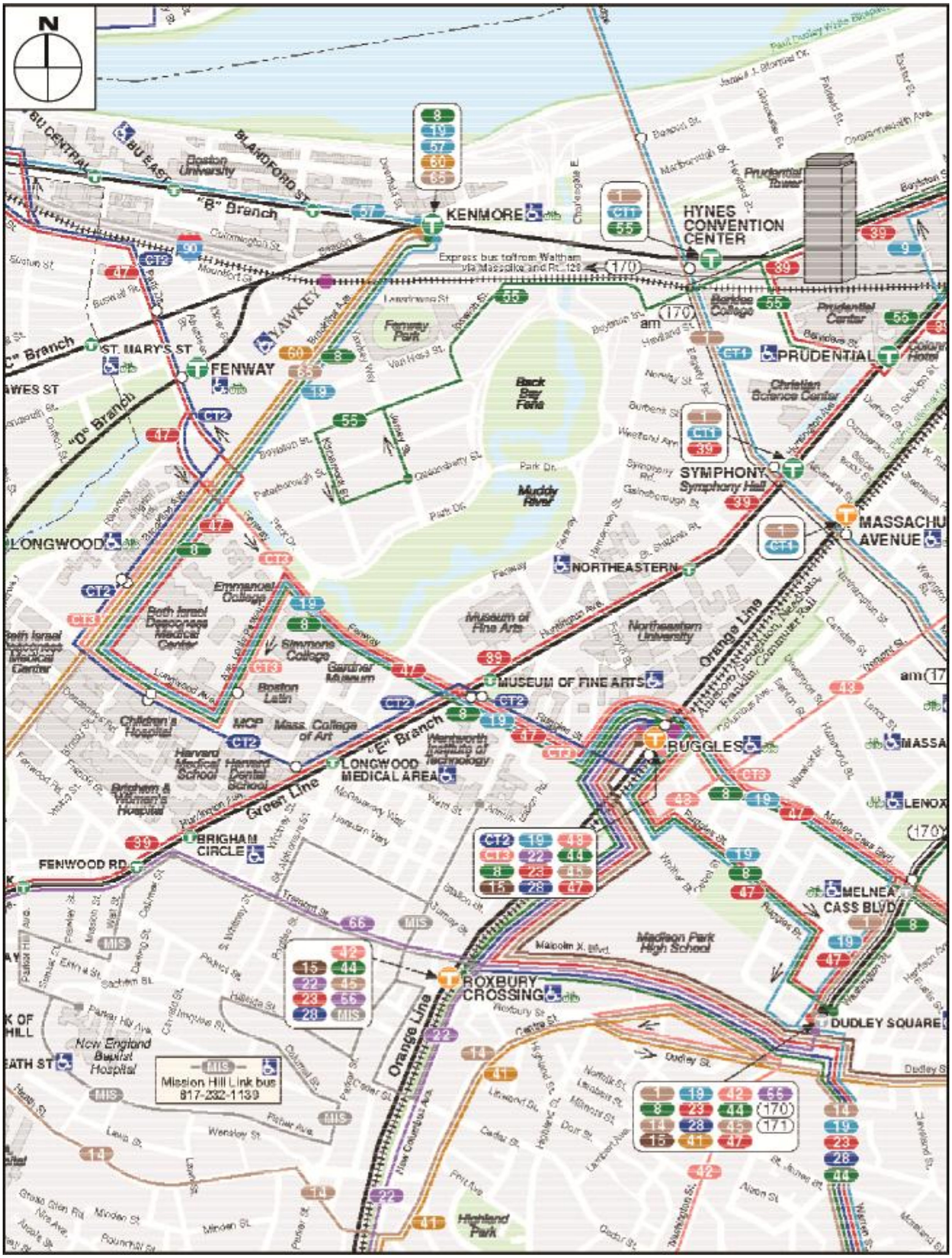
Table 3-1: Bus Routes near the Project Site

Route Number	Travel Route	Headways[a]	Ridership[b]
CT2	Sullivan Station – Ruggles Station	15	2,110
CT3	Beth Israel Deaconess Medical Center – Andrew Station	15	1,086
8	Harbor Point / UMass – Kenmore Station	14	3,217
15	Kane Square or Fields Corner Station – Ruggles Station	6	6,951
19	Fields Corner – Kenmore or Ruggles Station	14	3,376
22	Ashmont Station – Ruggles Station	8	7,047
23	Ashmont Station – Ruggles Station	5	11,142
28	Mattapan Station – Ruggles Station	7	10,607
42	Forest Hills Station – Dudley or Ruggles Station	12	2,818
43	Ruggles Station – Park & Tremont Streets	12	2,217
44	Jackson Square Station – Ruggles Station	12	3,791
45	Franklin Park Zoo – Ruggles Station	10	3,600
47	Central Square, Cambridge – Broadway Station	8	4,341
66	Harvard Square – Dudley Station	7	14,676

[a]*Minutes between busses during the weekday morning and evening peak hours*

[b]*Typical weekday boarding, based on data provided by the Massachusetts Bay Transportation Authority (MBTA) Ridership and Service Statistics (2010)*

Figure 3-3: Public Transportation Map



3.1.6.6 Crash Data

Crash data for the study area intersections were obtained from MassDOT – Highway Division for the most recent three years on record (2007 – 2009). Crash rates were calculated for each study area intersection. These rates represent the number of reported crashes per million vehicles entering the intersection and are used as a means to measure the "relative safety at a particular location". To calculate the crash rates, BSC applied the K-factor based on 2009 MassDOT count stations, shown in the Expanded Project Notification Form for the Whittier Street Health Center. Traffic volumes used to calculate crash rates were based on the year 2012 existing crash data, developed from the Synchro files provided by BTD.

MassDOT has determined the average crash rates in 2011 in the State to be 0.81 for signalized intersections and 0.61 for unsignalized intersections. The average crash rates in 2011 in District 6 (which includes the Roxbury neighborhood in the City of Boston) are 0.77 for signalized intersections and 0.57 for unsignalized intersections.

Table 3-2: Crash Rate Summary

	Number of Crashes				
Intersection	**2007**	**2008**	**2009**	**Average**	**Crash Rate***
Tremont St at Malcolm X Blvd / Columbus Ave	8	8	6	7.33	0.37
Tremont St at Prentiss St	3	3	0	2.00	0.14
Tremont St at Whittier St	1	1	0	0.67	0.03
Tremont St at Ruggles St	9	4	2	5.00	0.30
Tremont St at Melnea Cass Blvd	7	8	2	5.67	0.28

**per million entering vehicles, as defined by the Massachusetts Department of Transportation (MassDOT)*

As indicated in Table 3-2, all of the five study area intersections exhibited a crash rate significantly lower than the MassDOT averages.

Classifications of the crashes are summarized below in Table 3-3. Crash rate worksheets are contained in the Appendix.

Table 3-3: Summary of Crash Data

	Tremont Street at Malcolm X Boulevard / Columbus Avenue			Tremont Street at Prentiss Street			Tremont Street at Whittier Street		
	2007	2008	2009	2007	2008	2009	2007	2008	2009
Severity									
Property Damage	1	2		1					
Injury	4	4	4		3		1		
Hit and Run									
Fatality									
Other	3	2	2	2				1	
Collision Type									
Rear End	1	5	1	1	1			1	
Angle	4			1			1		
Head On									
Other	3	3	5	1	2				
Time									
6am-10am	2	2	3	2					
10am-4pm	3	1	2		1		1	1	
4pm-7pm	1			1					
7pm-6am	2	5	1		2				
Road Conditions									
Dry	7	5	3	2	2			1	
Wet	1	2		1	1				
Snow/Ice		1					1		
Other			3						
Season									
Dec-Feb	2	3		2	1		1	1	
Mar-May	1	2							
Jun-Aug	4		3		1				
Sep-Nov	1	3	3	1	1				
Light									
Daylight	5	5	2	1	3		1	1	
Dawn/Dusk	1	1							
Dark (Unlit)									
Dark (Lit)	2	2	1	1					
Unknown			3						
Total	**8**	**8**	**6**	**3**	**3**	**0**	**1**	**1**	**0**
Average	**7.33**			**2.00**			**0.67**		
MassDOT Crash Rate [a]	**0.37**			**0.14**			**0.03**		

[a]*per million entering vehicles, as defined by the Massachusetts Department of Transportation – Highway Division*

Summary of Crash Data cont'd

	Tremont Street at Ruggles Street			Tremont Street at Melnea Cass Boulevard		
	2007	2008	2009	2007	2008	2009
Severity						
Property Damage	3	1	1	3	6	2
Injury	4	2	1	1		
Hit and Run						
Fatality						
Other	2	1		3	2	
Collision Type						
Rear End	3	2	2	2	1	1
Angle	1			3	1	
Head On						
Other	5	2		2	6	1
Time						
6am-10am		1	1	6	5	1
10am-4pm	5	1			1	1
4pm-7pm	2				1	
7pm-6am	2	2	1	1	1	
Road Conditions						
Dry	6	3	2	6	6	1
Wet	2	1			2	
Snow/Ice						
Other	1			1		1
Season						
Dec-Feb	5			3	1	
Mar-May	1	3			3	1
Jun-Aug		1	1	1	2	
Sep-Nov	3		1	3	2	1
Light						
Daylight	8	3	2	4	7	2
Dawn/Dusk						
Dark (Unlit)						
Dark (Lit)	1	1		3	1	
Unknown						
Total	**9**	**4**	**2**	**7**	**8**	**2**
Average	**5.00**			**5.67**		
MassDOT Crash Rate [a]	**0.30**			**0.28**		

[a] *per million entering vehicles, as defined by the Massachusetts Department of Transportation – Highway Division*

3.1.6.7 Existing Parking

Off-Street Parking

Per BTD guidelines, existing public parking facilities located within one-quarter mile of the Project Site have been identified. Within this area, four facilities have been identified, as shown below in Table 3-4. The locations of these facilities are shown in Figure 3-4.

Table 3-4: Existing Public Parking within One Quarter-Mile of the Site

Map ID	Facility Name	Public Parking Spaces
A	Parcel P3 Main Lot	235 marked 72 unmarked
B	Madison Park High School	N/A
C	Boston Police Headquarters	93
D	Renaissance Parking Garage	930

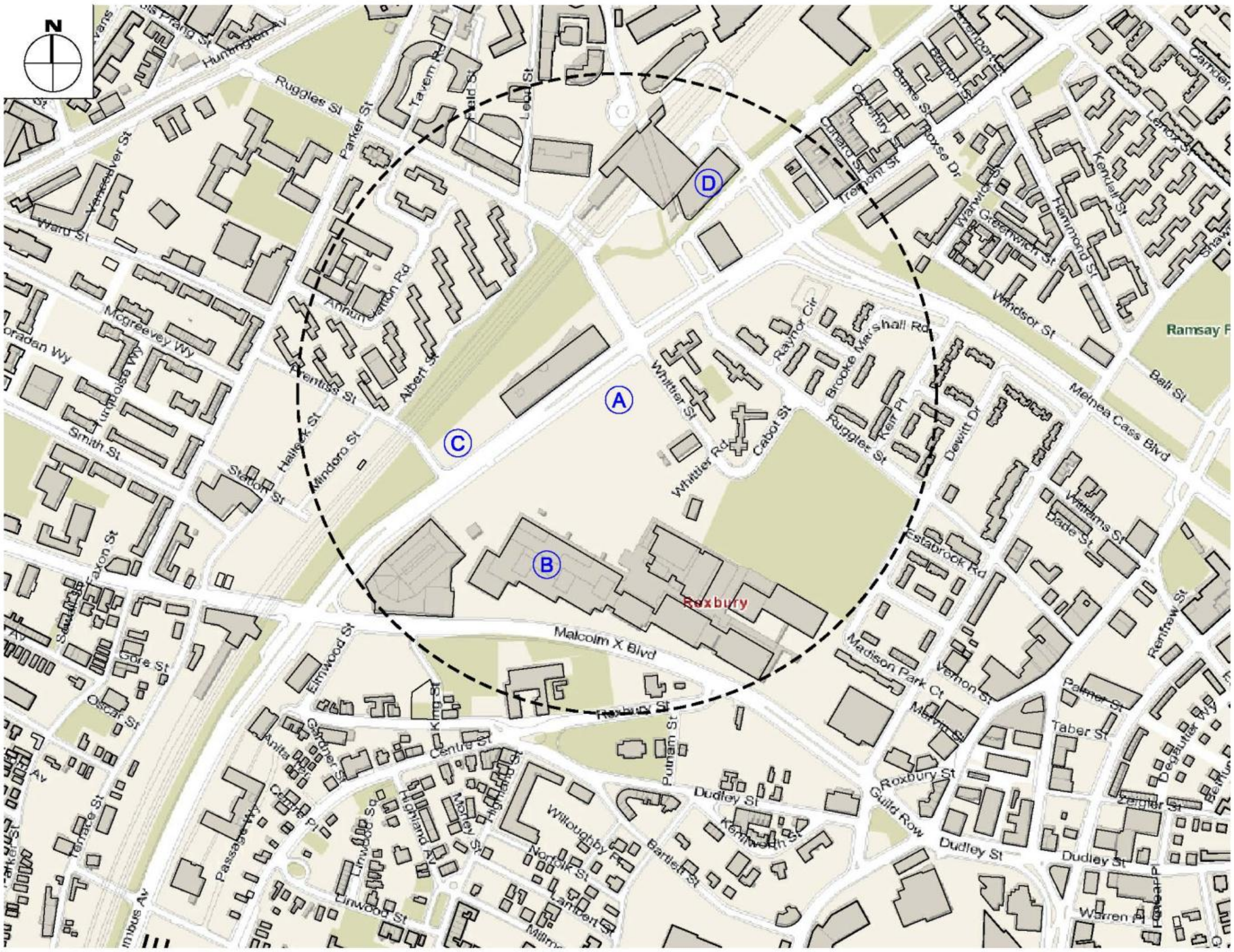
The Project Site is currently utilized as ancillary parking for both the Boston Police Department and the Boston Public Schools, both of which have adjacent facilities. According to information provided by the Boston Redevelopment Authority, the main parking lot of Parcel P-3 currently provides 235 marked parking spaces, with an additional 72 informal parking spaces.

The Proponent understands that the ancillary police parking will temporarily be moved to a site that is commonly referred to as the “Crescent Parcel”, located at the corner of Tremont Street and Melnea Cass Boulevard, until a more permanent solution is identified. In addition, an arrangement with the Boston Public Schools for the relocation of its parking is presently in progress. In this regard, a Letter of Cooperation is included herein (Appendix 1), which memorializes an understanding in concept between the Proponent and BPS.

In addition, the Project Site is utilized by the Whittier Street Health Center (WSHC) for parking at its new facility. As per an existing agreement between the Whittier Street Health Center and the Proponent, during construction of the Tremont Crossing project, seventy-five (75) parking spaces will be made available by the Proponent for use by the WSHC facility. Once construction of the Project has been completed, the

Proponent will lease seventy-five (75) permanent parking spaces to the WSHC in the parking structure to be a part of the Project.

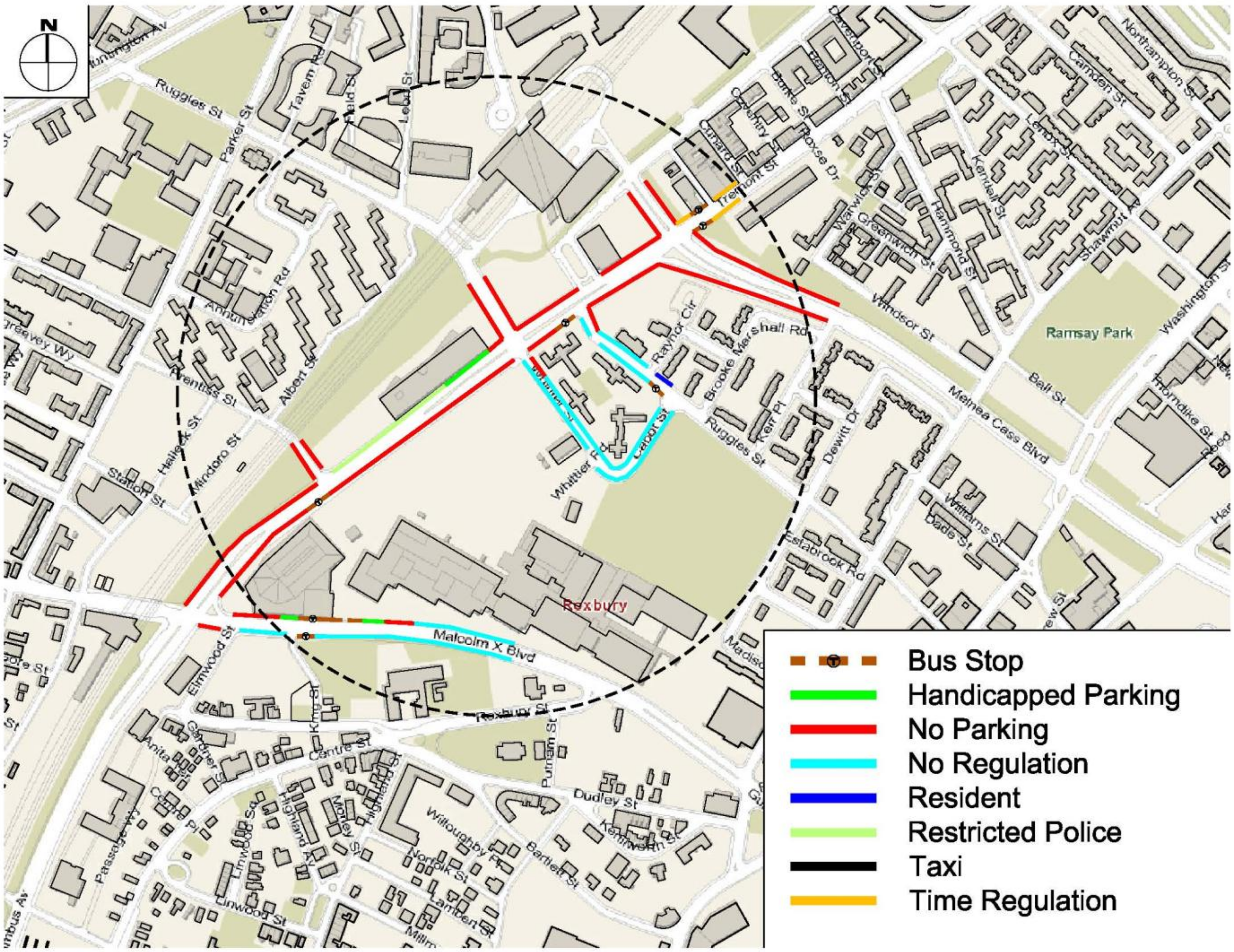
Figure 3-4: Map of Public Parking Within Quarter-Mile of the Site



On-Street Parking

Existing on-street parking availability was inventoried in January 2012 to determine the locations and types of on-street parking regulation available on Tremont Street and side streets within the one-quarter mile radius of the Site. The results of the inventory are shown below in Figure 3-5. As can be seen in this figure, parking is restricted along large portions of Tremont Street, while the remaining areas are used as parking for police vehicles, emergency vehicles, taxi stands, and handicapped spaces. Additional uses within the area include various time regulated areas, resident permit locations, and several areas where parking is not regulated, including most of Whittier Street. In addition, there are seven (7) bus stops within the quarter-mile radius, including four (4) on Tremont Street, two (2) on Malcolm X Boulevard, and one (1) on the eastern leg of Ruggles Street., two (2) on Malcolm X Boulevard, and one (1) on the eastern leg of Ruggles Street.

Figure 3-5: Map of On-Street Parking Within Quarter-Mile of the Site



3.1.7 Long-Term Transportation Impacts

Future traffic conditions within the study area were projected to gain an understanding of the impact on the adjacent transportation network due to the Project. Traffic growth within the study area is a function of the expected land development, economic activity, changes in demographics, and changes in travel patterns.

Two future scenarios were evaluated in order to determine future traffic conditions under a five-year planning time horizon. This timeline is consistent with BTD guidelines for evaluating a project's long-term transportation impacts. The first alternative, the future No Build condition, examines vehicular traffic conditions five years into the future (2017) assuming that the proposed Project is not constructed. The second alternative, the future Build condition, examines the impact that the proposed development will have on all transportation modes within the study area.

3.1.8 Future No Build Traffic Conditions

In order to evaluate traffic impacts associated with the proposed Project, the future No Build condition is analyzed to provide a baseline condition for comparison. Future No Build condition vehicular traffic volumes are those that are expected to use the roadway network in the future, assuming the proposed Project is not constructed. BTD guidelines recommend the evaluation of traffic conditions five years into the future, resulting in an analysis for the year 2017.

Growth Rate

As stated previously, the 2012 Existing condition traffic volumes were obtained by growing the 2010 Existing WSHC volumes by 0.25 percent per year for two years. Future No Build condition traffic volumes consist of background growth and traffic generated from specific proposed development projects in the study area added to the Existing volumes. Typically, background growth is a function of future land development, increased economic activity, and changes in travel patterns. Based on discussions with BTD, a 0.5 percent annual growth rate was used to determine background growth.

Specific Projects

Traffic volumes generated by specific proposed projects in the study area were obtained from the WSHC Expanded Project Notification Form. The projects included in these volumes are listed below in Table 3-5.

Table 3-5: Specific Projects

• 5-10 St. George Street	• Basilica Court
• 35-36 Newton Street	• Central Boston Elder Services
• 121 Brookline Avenue	• Highland Park Phase II
• 275 Albany Street	• Islamic Cultural Center (Elementary School Component)
• 454 Brookline Avenue	• Jackson Square Phase I
• 601 Albany Street	• Juniper Terrace
• 1486 Tremont Street	• Northeastern University – Huntington Avenue Residence Hall
• 2451 Washington Street	• Northeastern University – Residence Hall
• Alexandra Hotel Rehab	

In addition, trips were estimated for the proposed developments at Parcels 9 & 10. Trips from the proposed programs presented by the selected teams were generated using ITE trip generation rates. The resulting trips were distributed onto the study area roadway network. Trip generation worksheets are contained in Appendix 3. Table 3-6 below outlines the proposed programs for Parcels 9 & 10.

Table 3-6: Parcels 9 & 10

PARCEL 9	
Use	Size
Hotel	87,200 SF
Residential	52 Units
Retail	20,390 SF
PARCEL 10	
Office	11,200 SF
Supermarket	40,000 SF
Retail	25,600 SF
Residential	66 Units

The 2017 Future No Build Condition peak hour vehicular traffic volumes at study area intersections were developed by applying the 0.5 percent annual growth rate for a five year period to existing peak hour vehicle traffic volumes, then adding traffic volumes anticipated to be generated by specific planned developments. No Build vehicular traffic volumes are displayed in Figure 3-7. Background traffic data is contained in Appendix 3.

3.1.9 Future Build Traffic Conditions

In order to evaluate the effect of the Project on traffic conditions in the study area, Site-generated trips were projected, distributed, and assigned to the adjacent transportation network. In the case of vehicular traffic, these vehicle-trips are added to future No Build conditions traffic volumes to form the Build condition traffic volume networks for the weekday morning, weekday afternoon, and Saturday midday peak hours.

3.1.9.1 Trip Generation Analysis

The proposed building program for the Tremont Crossing development involves the construction of 500,000 square feet of large-format retail space on four levels, 50,000 square feet of smaller shops, restaurants, and boutiques along Tremont Street, 200,000 square feet of office space, 240 units of multifamily, residential (approximately 200,000 square feet) and 58,000 square feet of museum / cultural space. In order to estimate the number of trips associated with the proposed development, the Institute of Transportation Engineers (ITE) Trip Generation Manual (8th Edition, 2008) was employed. This manual provides vehicle-trip generation projections for a number of land uses.

ITE does not currently have any trip rates for museums, but has data available for parking generation for museums. This parking data was extrapolated in order to develop trip generation rates for the weekday afternoon, weekday daily, and Saturday peak hours. Weekday morning peak hour rates for the museum / cultural space were generated assuming 50% of the weekday afternoon peak rates. Table 3-7 below outlines the breakdown of the trips associated with the proposed uses on the Site.

Table 3-7: Trip Generation

	Total Daily Trips	Weekday Morning Peak Hour (vehicle-trips)			Weekday Afternoon Peak Hour (vehicle-trips)			Saturday Midday Peak Hour (vehicle-trips)		
	Weekday	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total
522,584 SF Retail [a]	19,895	249	159	408	944	982	1,926	1,305	1,205	2,510
209,283 SF Office [b]	2,356	298	41	339	53	260	313	36	31	67
53,936 SF Museum/Cultural [c]	300	15	15	30	30	30	60	40	40	80
240 Apartment Units [d]	1,578	24	97	121	97	52	149	59	59	118
Total ITE Vehicle-Trips	24,129	586	312	898	1,124	1,324	2,448	1,440	1,335	2,775

[a]*based on ITE Land Use Code 820 – Shopping Center*
[b]*based on ITE Land Use Code 710 – General Office Building*
[c]*based on ITE parking rates for museums*
[d]*based on ITE Land Use Code 220 – Apartments*

3.1.9.2 Modal Split / Vehicle Occupancy Ratio

The City of Boston benefits from widely accessible public transportation, bicycle, and pedestrian facilities, and mode split data is used to account for the different modes of travel available in the City.

Mode share data was obtained from the Boston Transportation Department (BTD) and has been applied to the total trips by mode. The mode share data was developed as part of the Access Boston Citywide Transportation Study using the Central Transportation Planning Staff's (CTPS) regional traffic model, Journey-to-Work data, and other data.

The area in which the Project is located is along the border between Zone 15 and Zone 4. Given the Project Site's proximity to Zone 4 and with over 14 bus routes, two Orange line rapid transit stations, and three commuter rail lines in the immediate vicinity of the Site, BTD agreed that the modal split characteristics of the Site were more represented by Zone 4 than by Zone 15. Table 3-8 displays the modal split percentages based on Zone 4.

Table 3-8: Modal Split

		Weekday						
		Daily	Morning Peak		Afternoon Peak		Saturday Peak	
			Entering[a]	Exiting[b]	Entering	Exiting	Entering	Exiting
Office	Auto	44%	37%	43%	43%	37%	44%	44%
	Transit	32%	38%	28%	28%	38%	32%	32%
	Walk	24%	25%	29%	29%	25%	24%	24%
Retail	Auto	29%	24%	26%	26%	24%	29%	29%
	Transit	16%	19%	13%	13%	19%	16%	16%
	Walk	55%	57%	61%	61%	57%	55%	55%
Museum/ Cultural	Auto	29%	24%	26%	26%	24%	29%	29%
	Transit	16%	19%	13%	13%	19%	16%	16%
	Walk	55%	57%	61%	61%	57%	55%	55%
Resi- dential	Auto	24%	19%	21%	21%	19%	24%	24%
	Transit	19%	22%	15%	15%	22%	19%	19%
	Walk	57%	59%	64%	64%	59%	57%	57%

Source: Boston Transportation Department, Policy and Planning Division
[a]*Entering = trips ending in Zone 4*
[b]*Exiting = trips beginning in Zone 4*

Average vehicle occupancy rates (VOR) were provided by ITE and local rates were obtained from the Boston Redevelopment Authority (BRA) report entitled "Fenway Neighborhood Transportation Plan" (November 2001). These rates, which have also been used in recent traffic reports in the area, are as follows: a VOR of 1.2 persons per vehicle was used for trips associated with office and residential use and a VOR of 1.8 persons per vehicle was used for the retail and museum/cultural trips. It must be noted that it is expected that most of the Museum / Cultural trips would consist of school busses carrying school children. Therefore the VOR for that use may be higher; a rate of 1.8 may be a conservative estimate. Table 3-9 displays the person-trips by mode based on the percentages shown above.

Table 3-9: Total Person-Trips by Mode

		Weekday						
			Morning Peak		Afternoon Peak		Saturday Peak	
		Daily	Entering	Exiting	Entering	Exiting	Entering	Exiting
Office	Auto	1,244	132	22	28	115	19	17
	Transit	905	136	14	18	119	14	12
	Walk	679	90	15	19	78	11	9
Retail	Auto	10,385	108	75	442	424	681	629
	Transit	5,730	85	37	221	336	376	347
	Walk	19,696	256	175	1,037	1,008	1,292	1,193
Museum/ Cultural	Auto	157	6	7	14	13	21	21
	Transit	86	5	4	7	10	12	12
	Walk	297	15	16	33	31	40	40
Resi-dential	Auto	455	6	25	25	12	17	17
	Transit	360	6	18	18	14	13	13
	Walk	1,080	17	75	75	37	40	40

Table 3-10, below, displays the combined person-trips generated by automobile, and then converted into vehicle-trips based on the previously mentioned VORs of 1.2 for office and 1.8 for retail and Museum/cultural.

Table 3-10: Total Project Vehicle Trips

	Weekday						
		Morning Peak		Afternoon Peak		Saturday Peak	
	Daily	Entering	Exiting	Entering	Exiting	Entering	Exiting
Office (Person-Trips)	1,244	132	22	28	115	19	17
Retail (Person-Trips)	10,385	108	75	442	424	681	629
Museum / Cultural (Person-Trips)	157	6	7	14	13	21	21
Residential (Person-Trips)	455	6	25	25	12	17	17
Total Person-Trips by Auto	12,241	252	128	508	565	738	684
Total Vehicle-Trips	7,273	180	85	298	351	423	391

3.1.9.3 Pass-By Trips

It is expected that a portion of the trips generated by the retail facilities will come from the existing vehicle traffic streams along Tremont Street. These trips are referred to as "Pass-By" trips and do not contribute to the new vehicle trips generated by the development. Per MassDOT guidelines, a 25% pass-by rate was applied to the retail portion of the vehicle trips. Table 3-11 shows the incremental vehicle trips, minus the pass-by trips, to result in the total net new trips generated by the proposed Project.

Table 3-11: Net New Vehicle Trips

	Weekday						
		Morning Peak		Afternoon Peak		Saturday Peak	
	Daily	Entering	Exiting	Entering	Exiting	Entering	Exiting
Office, Museum / Cultural, and Residential Vehicle-Trips	1,503	120	43	52	115	44	41
Retail Vehicle Trips	5,770	60	42	246	236	379	350
LESS Retail Pass-By Vehicle Trips (25%)	1,443	15	11	62	59	95	88
Net New Vehicle-Trips	5,831	165	75	237	292	328	304

As can be seen in Table 3-11, the proposed Tremont Crossing Development is expected to generate 240 net new vehicle-trips during the weekday morning peak hour (165 entering, 75 exiting), 529 net new vehicle-trips during the weekday afternoon peak hour (237 entering, 292 exiting), and 632 net new vehicle-trips during the Saturday midday peak hour (328 entering, 304 exiting). On a weekday daily basis, the Project is expected to generate a total of 5,831 net new vehicle trips.

3.1.9.4 Vehicle Trip Distribution and Assignment

Trip generation results quantify additional trips associated with a proposed development. In order to assess the impacts related to these additional traffic volumes, trips must be distributed on to the local transportation network. For this analysis, only the vehicle-trips were distributed and assigned to the roadway network.

Vehicle-trips generated to and from the proposed Tremont Crossing project were distributed regionally, based on origin-destination data provided by the BTD. The data consist of an established distribution of vehicle-trip origins and destinations for vehicle-trips ending and beginning (respectively) in the trip zone in which the project is located (Zone 4, as discussed above). Table 3-12 shows the projected vehicle-trip distribution to and from the Project for the weekday morning, weekday afternoon, and Saturday midday peak periods.

Table 3-12: Vehicle-Trip Distribution Summary

		Percent of Site Trips			
Route	Direction (To/From)	AM Enter	AM Exit	PM/SAT Enter	PM/SAT Exit
Tremont Street	West	19%	15%	17%	19%
Columbus Ave	South	21%	16%	17%	20%
Malcolm X Boulevard	East	6%	5%	5%	5%
Ruggles Street	West	15%	18%	19%	17%
Tremont Street	North	23%	31%	28%	24%
Melnea Cass Boulevard	East	15%	16%	14%	14%
TOTAL		100%	100%	100%	100%

3.1.9.5 Future Build Condition – Roadway Network

Using the formulated trip distribution, the new Project vehicle-trips were assigned to the local roadway network based on expected travel patterns. Vehicle trip distribution patterns are illustrated on Figures 3-9 and 3-10. Vehicular traffic volumes expected to be generated by the Project have been distributed and assigned according to the traffic patterns developed in this report and are presented on Figure 3-11.

The traffic patterns reflect the removal of the Jersey barrier at the site drive to permit full access, thereby eliminating southbound U-turns at Prentiss Street and reducing northbound U-turns at Ruggles Street. The traffic patterns also reflect the conversion of Whittier Street from one-way to two-way between Tremont Street and Downing Street. It is assumed that 50% of the existing site traffic is associated with the Boston Police Department using the Site for parking. This accounts for approximately 105 trips during the weekday morning peak hour (100 entering, 5 exiting) and approximately 56 trips during the weekday afternoon peak hour (12 entering, 44 exiting). In the future, these trips will be relocated from the Site to the Crescent Parcel at the corner of Melnea Cass Boulevard / Tremont Street.

The future Build network volumes account for the above changes. Year 2011 Build Condition vehicular traffic volumes, which consist of the addition of project-generated vehicle-trips to previously identified No-Build Condition traffic volumes, are displayed in Figure 3-12.

3.1.10 Traffic Operations Analysis

Intersection capacity analyses of study area intersections for the Existing, No-Build and Build Conditions have been performed. An evaluation of these analyses reveals the impact of the Project on vehicular traffic operations.

Measuring existing traffic volumes and projecting future traffic volumes quantifies traffic flow within a study area. To assess quality of flow, capacity analyses were conducted for study area intersections for the Existing, Future No-Build, and Future Build Conditions. The capacity analyses provide a standardized indication of the ability of the intersections to accommodate traffic demands placed upon them.

Capacity analyses were performed at each of the study area intersections. The Synchro traffic analysis software package (Version 8) was employed to evaluate operating conditions at the study area intersections.

3.1.10.1 Levels of Service Criteria

A primary result of capacity analyses is the assignment of Levels of Service (LOS) to traffic facilities under various traffic flow conditions. Analyses were conducted using methods defined in the Highway Capacity Manual 2000 (TRB, 2000) for signalized and unsignalized intersections. The concept of Level of Service is defined as a qualitative measure describing operational conditions within a traffic stream and their perception by motorists.

A Level of Service definition generally describes these conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety. In so doing, Level of Service provides an index to quality of traffic flow.

Six Levels of Service are defined for each type of facility. They are given letter designations, from A to F, with LOS A representing the best operating conditions and LOS F representing the worst. Since the Level of Service of a traffic facility is a function of traffic flows placed upon it, an intersection may operate at a wide range of Levels of Service, depending on time of day, day of week, or period of year.

The average delay per vehicle approaching an intersection is used to quantify the Level of Service at a particular intersection. This is discussed briefly below, and LOS designations are defined in Table 3-13. Average delay measures the mean stopped delay experienced by vehicles entering an intersection during the design period. Average delay is measured for each individual turning movement that must yield the right of way, and for the intersection as a whole (including through vehicles that experience no delay).

Table 3-13: Level of Service Designations

Category	Delay (Sec/Veh) Unsignalized	Signalized
LOS A	0.0 - 10.0	0.0 - 10.0
LOS B	10.1 - 15.0	10.1 - 20.0
LOS C	15.1 - 25.0	20.1 - 35.0
LOS D	25.1 - 35.0	35.1 - 55.0
LOS E	35.1 - 50.0	55.1 - 80.0
LOS F	50.1 +	80.1 +

Source: Transportation Research Board, Highway Capacity Manual, National Research Council, 2000

3.1.10.2 Operating Conditions

The results of the capacity analysis for the intersections under evaluation are summarized below. Table 3-14 summarizes the analyses for the signalized intersections, and Table 3-15 summarizes the unsignalized intersection at Tremont Street / Site Drive.

Existing, Future No-Build, and Future Build volume scenarios are evaluated. Full capacity analysis results are tabulated at the end of this section. Capacity analysis worksheets are contained in the Appendix.

Table 3-14: Capacity Analysis Summary- Signalized Intersections

Intersection	Time Period	2012 Existing			2017 No Build			2017 Build		
		Delay (sec)	LOS	v/c Ratio	Delay (sec)	LOS	v/c Ratio	Delay (sec)	LOS	v/c Ratio
Tremont St / Melnea Cass Blvd	Weekday AM	66.0	E	1.08	>120	F	>1.20	>120	F	>1.20
	Weekday PM	55.8	E	0.97	>120	F	>1.20	>120	F	>1.20
	Saturday	23.6	C	0.63	52.4	D	0.81	59.5	E	0.92
Tremont St /Ruggles St / Renaissance Park	Weekday AM	7.6	A	0.51	4.8	A	0.59	7.0	A	0.63
	Weekday PM	3.5	A	0.51	3.4	A	0.72	10.7	B	0.76
	Saturday	1.5	A	0.36	2.4	A	0.43	3.9	A	0.54
Tremont St / Ruggles St / Whittier St	Weekday AM	>120	F	>1.20	>120	F	>1.20	73.0	E	1.11
	Weekday PM	>120	F	>1.20	>120	F	>1.20	>120	F	>1.20
	Saturday	67.6	E	0.87	88.5	F	0.99	70.6	E	0.87
Tremont St / Prentiss St	Weekday AM	36.9	D	0.92	>120	F	>1.20	85.7	F	1.12
	Weekday PM	31.3	C	0.88	>120	F	>1.20	43.3	D	0.99
	Saturday	12.9	B	0.62	16.3	B	0.76	14.5	B	0.72
Tremont St / Malcolm X Blvd / Columbus Ave	Weekday AM	75.6	E	1.07	>120	F	>1.20	>120	F	>1.20
	Weekday PM	70.4	E	1.01	>120	F	>1.20	>120	F	>1.20
	Saturday	38.8	D	0.80	55.4	E	1.00	91.9	F	1.17
Tremont St / Site Drive	Weekday AM							5.9	A	0.54
	Weekday PM	Unsignalized			Unsignalized			15.9	B	0.88
	Saturday							9.6	A	0.73

Table 3-15: Capacity Analysis Summary- Unsignalized Intersections

Intersection	Time Period	2012 Existing			2017 No Build			2017 Build		
		Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS	v/c
Tremont St / Site Drive	Weekday AM	9.5	A	0.01	10.9	B	0.05			
	Weekday PM	9.5	A	0.11	11.1	B	0.25	Signalized		
	Saturday MID	9.2	A	0.12	9.4	A	0.13			

*Results displayed for Site Drive westbound right-turn movement.

Under existing conditions, the intersection at Tremont Street / Melnea Cass Boulevard currently operates at LOS E during the weekday morning and afternoon peak hours, and at LOS C during the Saturday midday peak hours. Under both future conditions, the intersection is expected to operate at LOS F during the weekday morning and afternoon peak hours. During the Saturday midday peak hour, the intersection will operate at LOS D under No Build conditions and LOS E under Build conditions.

The intersection at Tremont Street / Ruggles Street / Renaissance Park currently operated at LOS A during all three peak hours. Under future No Build condition, this intersection will operate at LOS A during all three peak hours. Under the future Build condition, it is expected that this intersection will continue to operate at LOS A during the weekday morning and Saturday midday peak hour, while it will operate at LOS B during the weekday afternoon peak hour.

Currently, the intersection at Tremont Street / Ruggles Street / Whittier Street operates at LOS F during the weekday peak periods and at LOS E during the Saturday midday peak hour. Under future No Build conditions, this intersection will operate at LOS F during all three peak periods. Under future Build conditions, the intersection will continue to operate at LOS F during the weekday afternoon peak hour and improve to operate at LOS E during the weekday morning and Saturday midday peak hours.

Tremont Street / Prentiss Street currently operates at LOS D, C, and B during the weekday morning, weekday afternoon, and Saturday midday peak hours, respectively. During the weekday morning peak hour, the intersection will operate at LOS F under No Build conditions and remain at LOS F under future Build conditions. During the weekday afternoon peak hour, the intersection will change to LOS F under the No Build conditions and improve to LOS D under Build conditions. During the Saturday midday peak hour, the intersection is expected to continue to operate at LOS B under both future conditions. The improvements under the Build condition are due to the return of Tremont Street to three lanes southbound.

Currently, Tremont Street / Malcolm X Boulevard / Columbus Avenue operates at LOS E during the weekday peak hours and LOS D during the Saturday midday peak hour. Under future No Build conditions, this intersection is expected to operate at LOS F during the weekday peak hours and LOS E during the Saturday midday peak hour. Under future Build conditions, the intersection will operate at LOS F during all three peak periods.

The intersection at Tremont Street / Site Drive is currently unsignalized, with the Site Drive westbound right-turn movement operating at LOS B or better under Existing and future No Build conditions during all three peak periods. Under future Build conditions, the intersection is expected to become signalized, with the entire intersection operating at LOS A during the weekday morning and Saturday midday peak hours, and at LOS B during the weekday afternoon peak hour.

3.1.10.3 Future Build Condition – Other Impacts

Off-Street Parking

The Proponent anticipates that the Project will include a multi-level, above-grade parking structure that will accommodate the parking needs of all of its mix of uses. As currently contemplated, the parking facility would consist of approximately 1,700 spaces, representing an approximate parking ratio of 1.64 spaces for every 1,000 square feet of gross leasable space. Through a process of market due diligence and a polling of potential tenants for the Project, the Proponent believes that the parking ratios set forth in Table 3-16 below are the minimum required for the feasibility of the Project. Further, the large-format retail tenants will require a more significant parking ratio during their peak hours over the weekend. Since the Project's office component will have very limited use over this same period, those parking spaces that will be allocated to them during the weekdays can be utilized by the large retail tenants over the weekend. As a result, it is anticipated that the large-format retail will achieve a parking ratio of 2.62 per 1,000 square feet of gross leasable area over the weekend due to the sharing of spaces in the parking structure. Typically large format retail tenants require a significantly higher parking ratio, approximating 5.00 spaces per 1,000 square feet of gross leasable area for both the weekdays and the weekend. However, due to the Project's proximity to public transportation and its viability as a TOD, the Proponent has determined that the parking ratios, as set forth in Table 3-16 below, will be sufficient for the parking requirements of prospective tenants. However, any reduction in the total number of parking spaces in the Project's parking facility will have a significant impact on the ability of the Proponent to attract tenants to the Project and on its future economic viability.

Table 3-16: Parking Ratio Analysis

Weekday		Allocation of Spaces	Corresponding Parking Ratio (a)
Large Retail		1,000	2.00
Small Retail		31	0.62
Office		310	1.55
Residential		120	0.50
Museum		145	2.50
Other		119	n/a
	Total	1,725	
Weekend			
Large Retail		1,310	2.62
Small Retail		31	0.62
Residential		100	0.50
Museum		145	2.50
Other		102	n/a
	Total	1,725	

(a) Represents number of spaces per 1,000 square feet of gross floor area except for residential which represents spaces per number of units.

The parking structure will connect all of the Project's mix of uses and will be situated behind and between them. This will shield the parking structure from view from both Tremont Street and Whittier Street. The parking structure has also been designed in a manner that will provide covered access directly to all of the Project's mix of uses (except for the street level shops and restaurants fronting Tremont Street, as well as the residential building). Access to the parking structure will either be from the primary access off Tremont Street, with an entrance directly behind the office building, or via Whittier Street, with an entrance at the rear of the parking structure facing the playing fields of the Madison Park High School.

The large-format retail building will sit adjacent to the parking structure and will have its primary access via a central, multi-level lobby area adjacent to the public plaza area. Tenants on each floor of the retail building will be allocated spaces on their respective levels of the parking structure that will bring their customers directly to their main store entrances. In that regard, shoppers will be able to park their cars and access the store of their choice in a manner very similar to a traditional, at-grade, suburban format, without having to use an elevator or escalator.

The office and Museum building will sit “in front” of the parking structure and shield it from view from Tremont Street. The lobby of the office building will be situated adjacent to the parking structure and permit office tenants and visitors to have direct, sheltered access to the structure. The Museum/cultural facilities will also have connected access to the parking structure.

The residential tower, being on the east side of the Project Site, will not have covered access to the parking facility. However, with its lobby entrance facing both Tremont Street and the pedestrian way, renters and visitors alike will have a very short walk to the parking structure.

On-Street Parking

Besides the parking structure, the Project anticipates the inclusion of approximately thirty-one (31), short-term, on-street, parallel parking spaces along Tremont Street. These spaces will be primarily used by patrons of the small format retail that will be part of the Project’s mix of uses. It should be noted that these street level spaces will be constructed on the Project Site, and in no way will impact the existing traffic lanes traveling easterly into downtown Boston. A portion of these spaces will be designated as an on-street loading zone for specified times during low parking demand periods. Although the patrons of these small retail stores will predominantly use these on-street parking spaces, since many of these stores will also face into the interior pedestrian way, patrons will also have the ability to park in the garage with just a short walk to these same stores.

Currently, Whittier Street is one-way street providing unregulated parking on both sides of the roadway. The Proponent proposes to convert Whittier Street to a two-way roadway between Tremont Street and Downing Street, and eliminate parking on one side of the street. This will result in the loss of approximately 25 unregulated on-street parking spaces on the south side of Whittier Street. However, according to due diligence done by the Proponent, most of the parking spaces on Whittier Street are being utilized by commuters. The Proponent recommends to regulate the parking on the north side of Whittier Street as “Residential Permit Only”.

In order to allow for the proposed left/through lane and two exclusive through lanes on Tremont Street southbound at its intersection with the Site Drive, it is proposed that parking be prohibited on the west side of Tremont Street between Prentiss Street and Ruggles Street.

Traffic Signal Warrant Analysis

A traffic signal warrant analysis was conducted in order to justify the installation of a traffic signal at the intersection of Tremont Street and the Project Site Drive.

Traffic volumes were utilized from the 2017 future Build condition, assuming the construction of the proposed Tremont Crossing. Hourly non-retail traffic volumes were determined by taking the weekday morning and afternoon project trip volumes and extrapolating them based on hourly traffic volume data obtained from a nearby MassDOT count location on Tremont Street. Hourly retail-based traffic volumes were determined by extrapolating weekday morning and afternoon project trip volumes based on "hourly variation in shopping center traffic" data contained in the ITE Trip Generation Manual.

The current *Manual on Uniform Traffic Control Devices* (MUTCD) contains nine traffic signal warrants, at least one of which must be satisfied in order to justify the installation of traffic signals at a particular location. Satisfying one or more warrants, however, does not necessarily justify the installation or continuous operation of a traffic signal. The traffic signal warrants are listed below.

- Warrant 1: Eight-Hour Vehicular Volume;
- Warrant 2: Four-Hour Vehicular Volume;
- Warrant 3: Peak Hour;
- Warrant 4: Pedestrian Volume;
- Warrant 5: School Crossing;
- Warrant 6: Coordinated Signal System;
- Warrant 7: Crash Experience;
- Warrant 8: Roadway Network;
- Warrant 9: Intersection Near a Grade Crossing.

Using the procedure contained in the MUTCD, four of the nine warrants that were evaluated were satisfied: Warrants 1, 2, 3, and 6. Signal warrant analysis worksheets are contained in the Appendix.

Transit Impacts

Table 3-17 below summarizes the person-trips that are expected to be generated by the Project that will use transit services.

Table 3-17: Total Person-Trips for Transit Use

	Daily	Weekday Morning Peak Entering	Weekday Morning Peak Exiting	Weekday Afternoon Peak Entering	Weekday Afternoon Peak Exiting	Saturday Peak Entering	Saturday Peak Exiting
Office	905	136	14	18	119	14	12
Retail	5,730	85	37	221	336	376	347
Museum / Cultural	86	5	4	7	10	12	12
Residential	360	6	18	18	14	13	13
TOTAL	7,081	233	72	263	479	415	384

As can be seen in the table above, the number of person-trips expected to use public transit is 305 during the weekday morning peak hour (233 entering, 72 exiting), 742 during the weekday afternoon peak hour (263 entering, 479 exiting), and 799 during the Saturday midday peak hour (415 entering, 384 exiting). On a daily basis, the Project is expected to generate 7,081 person-trips using transit services.

As outlined in the section entitled "Public Transit", there are a large number of transit facilities in the vicinity of the Site, including 14 bus routes, two MBTA subway stations, and three Commuter Rail lines. Based on information provided in the 2010 MBTA Ridership and Service Statistics, the breakdown of public transit services, it is assumed that approximately 30 percent of the public transit trips will occur via MBTA busses, 59 percent will occur via MBTA rapid transit (subway), and 11 percent will occur via MBTA commuter rail. Table 3-18 below displays the breakdown of trips per each type of transit use, based on these percentages, followed by further discussions for each option.

Table 3-18: Breakdown of Person-Trips for Transit Use

	Daily	Weekday Morning Peak Entering	Weekday Morning Peak Exiting	Weekday Afternoon Peak Entering	Weekday Afternoon Peak Exiting	Saturday Peak Entering	Saturday Peak Exiting
Total Transit Trips	7,081	233	72	263	479	415	384
Bus (30%)	2,124	70	22	79	144	124	115
Rapid Transit (59%)	4,178	137	42	155	282	245	227
Commuter Rail (11%)	779	26	8	29	53	46	42

MBTA Bus

The Project is expected to generate approximately 2,124 trips on the MBTA bus system on a daily basis, with 92 bus trips during the weekday morning peak hour (70 entering, 22 exiting), 223 bus trips during the weekday afternoon peak hour (79 entering, 144 exiting), and 239 bus trips during the Saturday midday peak hour (124 entering, 115 exiting). These trips are distributed over the fourteen (14) bus routes that service the study area, eight (8) of which have routes that travel on Tremont Street. A bus stop is located on the east side of Tremont Street across from Prentiss Street, within a short walk to the Project Site.

It should be noted that with this Project, there is the potential for private shuttle service for tenants of the respective buildings.

Rapid Transit (Subway)

Based on the data outlined above in Table 3-18, it is expected that the Project will generate 4,178 person-trips on a daily basis that will use the MBTA rapid transit system (subway). The Project will generate 179 rapid transit trips (137 entering, 42 exiting) during the weekday morning peak hour, 437 rapid transit trips (155 entering, 282 exiting) during the weekday afternoon peak hour, and 472 rapid transit trips (245 entering, 227 exiting) during the Saturday midday peak hour.

During the weekday morning and afternoon peak hours, the headways between trains are 4 to 5 minutes, resulting in approximately 12 trains per hour. This results in an additional project-related ridership of up to 12 persons per train during the weekday morning peak hour, and 24 persons per train during the weekday afternoon peak hour. During the Saturday midday peak hour, the headway on the Orange line is approximately 8 minutes, resulting in approximately 8 trains per hour. This results in an additional project-related ridership of up to 31 persons per train on a Saturday midday peak hour.

Commuter Rail

On a daily basis, the Project will generate 779 person-trips that are expected to use the commuter rail lines available near the Project site. The Project will generate 34 commuter rail trips (26 entering, 8 exiting) during the weekday morning peak hour, 82 commuter rail trips (29 entering, 53 exiting) during the weekday afternoon peak hour, and 88 commuter rail trips (46 entering, 42 exiting) during the Saturday midday peak hour.

It is anticipated that the additional transit trips would be accommodated by the existing public transportation network.

Pedestrian Impacts

As shown in Table 3-9, it is expected that the Project will generate 659 pedestrian trips during the weekday morning peak hour, 2,317 pedestrian trips during the weekday afternoon peak hour, and 2,665 pedestrian trips during the Saturday midday peak hour.

The expected new pedestrian trips will be well served by the existing 7-10 foot sidewalks along Tremont Street, as well as by the two multi-use paths in the area (Southwest Corridor Park and South Bay Harbor Trail). The sidewalks along the Project frontage will be rebuilt and widened to support street-level retail.

In addition, several crosswalks exist across Tremont Street in the vicinity of the Project, all of which provide pedestrian signals, push buttons, and accessible ramps. Particularly of note is the pedestrian crossing located on Tremont Street between Ruggles Street and Renaissance Park. This mid-block pedestrian crossing provides access to Ruggles Station with the newly constructed promenade, expected to encourage pedestrian activity in the area and provide a safer route across Tremont Street. In addition, the proposed traffic signal at the Project Site drive (South Drive) will provide crosswalks, pedestrian signals, and push buttons, with an exclusive pedestrian signal phase.

Bicycle Accommodations

The Project proposes to install bicycle racks on the Site for use of trips made by bicyclists. As stated previously, a bicycle lane currently exists on the north leg of Ruggles Street. In addition, the two multi use paths in the area – Southwest Corridor Park and South Bay Harbor Trail – provide bicycle access to the Project Site from the surrounding areas, including South End, Roxbury, Back Bay, Chinatown, Jamaica Plain, South Boston, and the Fort Point Channel.

Services and Loading

All delivery vehicles will both enter and exit the site via the Project site drive on Tremont Street. There will be no loading or delivery circulation on Whittier Street. Further, all loading bays for the Project's retail tenants will be located in the rear of the Project off of East Drive, enclosed in the retail building and shielded from view without noise to the local environment.

A portion of the 22 on-street parking spaces along Tremont Street will be used as a loading zone during low-demand parking times. In addition, a bus drop-off area for the Museum will be located in front of the Site on Tremont Street. Parking spaces will be reserved, as necessary, for this drop-off area prior to the arrival of the busses. A bus waiting area is designated in the rear of the Site on East Drive.

Figure 3-6: View from South Depicting Enclosed Loading Area

3.1.11 Recommended Improvements

As part of this study, several improvements are being proposed along the Tremont Street corridor. These improvements are intended to improve traffic operations and help improve pedestrian safety at the study area intersections and throughout the corridor. The improvements are outlined below.

<u>Signalized Site Drive</u>

Currently, the intersection of the Site Drive with Tremont Street is unsignalized. A median divides Tremont Street at the intersection, restricting the movements at the intersection to right turn only entering and exiting.

The proposed plan calls for the removal of the median and the signalization of the intersection. Left turns into and out of the site would be allowed, thereby reducing the number of U-turns being made at the nearby intersections of Tremont Street with both Prentiss Street and Ruggles Street/Whittier Street. A right-turn pocket will be provided on Tremont Street northbound for vehicle accessing the site.

On-Street Parking

Tremont Street will be widened between the Site Drive and Whittier Street to provide on-street parking and loading on the east side of the roadway. Parking on the west side of Tremont Street is to be removed to return Tremont Street southbound to the full three lane operation to increase capacity and thereby improving traffic flow along the corridor.

The Proponent also recommends to regulate the parking on the north side of Whittier Street as “Residential Permit Only”.

Whittier Street Two-Way Circulation

Currently, Whittier Street is one-way westbound, providing one general use lane and parking on both sides of the roadway. Under future conditions, Whittier Street would be widened between Tremont Street and Downing Street to provide two 11-foot wide travel lanes for travel in both directions. An 8-foot parking lane would be provided on the north side of Whittier Street, with a 7-foot sidewalk on the south side (on the project site). The existing 7.5 foot sidewalk on the north side would remain. The eastern section of Whittier Street from Downing Street to Ruggles Street will remain one-way south-westbound to prevent cut-through traffic on Whittier Street.

Left-Turn Lane on Tremont Street Southbound at Whittier Street / Ruggles Street

An exclusive left-turn lane will be provided on Tremont Street southbound at the intersection of Tremont Street at Whittier Street / Ruggles Street. This lane will provide approximately 175 feet of storage for vehicles turning left onto Whittier Street eastbound.

Pedestrian Accommodations

Minimum 10-foot wide sidewalks will be provided along Tremont Street, with two crosswalks at the intersection of Tremont Street and the Site Drive: one across the Tremont Street north leg, another across the Site Drive east leg. Pedestrian signals, push buttons, and accessible ramps will be provided at the newly-signalized intersection.

The Project will provide a 40-foot wide pedestrian plaza running parallel to Tremont Street, located east of the set of buildings lining Tremont Street. This plaza will provide a walking route between buildings on the site, as well as provide a potential area for restaurant outdoor seating or additional outdoor space for the small retail shops.

3.1.12 Transportation Demand Management (TDM)

In line with the City's commitment to reduce auto-dependent trips, especially single occupancy vehicles (SOV), the Proponent will implement the following Transportation Demand Management (TDM) measures:

- <u>Public Transportation Information</u> - Provide information on public transportation options including bus, rapid transit (subway), and commuter rail schedules and pricing. This information should be posted in an easily accessible area for all residents, tenants, employees, and visitors.
- <u>Car Sharing</u> - Allocate a designated number of parking spaces for car sharing programs, such as Zipcar™.
- <u>Transportation Coordinator</u> - Designate an on-site Transportation Coordinator to manage all TDM matters and serve as a liaison with the City.
- <u>Transit Pass</u> - Encourage employees (and tenants) to offer transit-pass programs.
- <u>Parking Fees</u> - Charge the market rate for parking garage fees.
- <u>Bicycle Storage</u> - Provide secure bicycle storage, to be located in the form of outdoor bicycle racks or indoor storage facilities.

3.1.13 Conclusions

The proposed Tremont Crossing project is expected to provide a lively and diverse mix of uses along Tremont Street in the Roxbury neighborhood of Boston. The Project will construct a mixed-use facility including retail, office, residential, and cultural space that will attract a number of users to the area.

The proposed project is expected to generate:

- 5,831 vehicle trips during the average weekday, with 240 vehicle trips occurring during the weekday morning peak hour, 529 vehicle trips occurring during the weekday afternoon peak hour, and 632 vehicle trips occurring during the Saturday midday peak hour
- 7,081 transit trips during the average weekday, with 305 transit trips occurring during the weekday morning peak hour, 742 transit trips occurring during the weekday afternoon peak hour, and 799 transit trips occurring during the Saturday midday peak hour
- 659 pedestrian trips occurring during the weekday morning peak hour, 2,317 pedestrian trips occurring during the weekday afternoon peak hour, and 2,665 pedestrian trips occurring during the Saturday midday peak hour

The additional traffic generated by the proposed project is not expected to have a significant impact on the nearby transportation infrastructure, assuming the proposed improvements are implemented. In addition, this project is expected to generate a larger portion of bicycle, pedestrian, and transit trips, in comparison to vehicle trips.

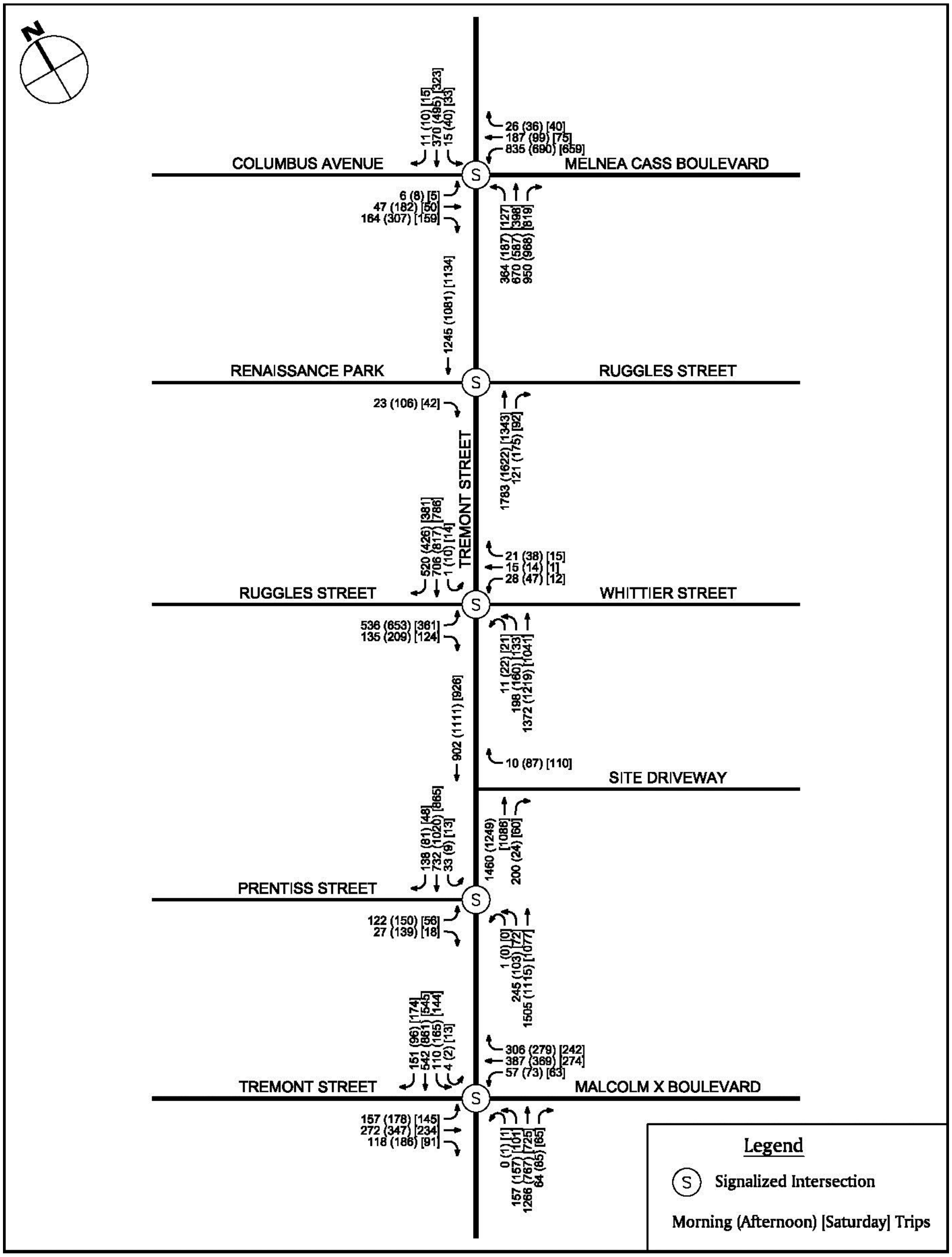
The results of the analysis indicate that, for the majority of the intersections, the average delay and overall LOS will not significantly reduce under the future Build condition. Traffic operations will improve at the intersections of Tremont Street with the Project Site Drive and Prentiss Street due to the proposed implementation of three full lanes on Tremont Street southbound, the proposed redistribution of trips, geometric and intersection modifications, and signal timing changes.

In summary, the project will seek to complete the following actions:

- Implement Traffic Demand Management (TDM) measures.
- Convert Whittier Street from one-way to two-way between Tremont Street and Downing Street.
- Implement “Residential Permit Only” parking on Whittier Street between Tremont Street and East Drive.
- Modify current traffic signal timings at the study area intersections to improve traffic flow and safety.
- Remove parking and provide three full southbound travel lanes on Tremont Street
- Allow left turns into and out of the Project Site Drive
- Provide a right-turn pocket on Tremont Street northbound at the Site Drive into the Project site.

- Provide a left-turn pocket on Tremont Street southbound at Whittier Street into the Project Site.
- Signalize the intersection of Tremont Street with the Site Drive, and provide left-turns into and out of the site. Provide crosswalks, pedestrian push buttons, accessible ramps, and an exclusive pedestrian phase at this intersection.

Figure 3-7: 2012 Existing Conditions Peak Hour Traffic Volumes

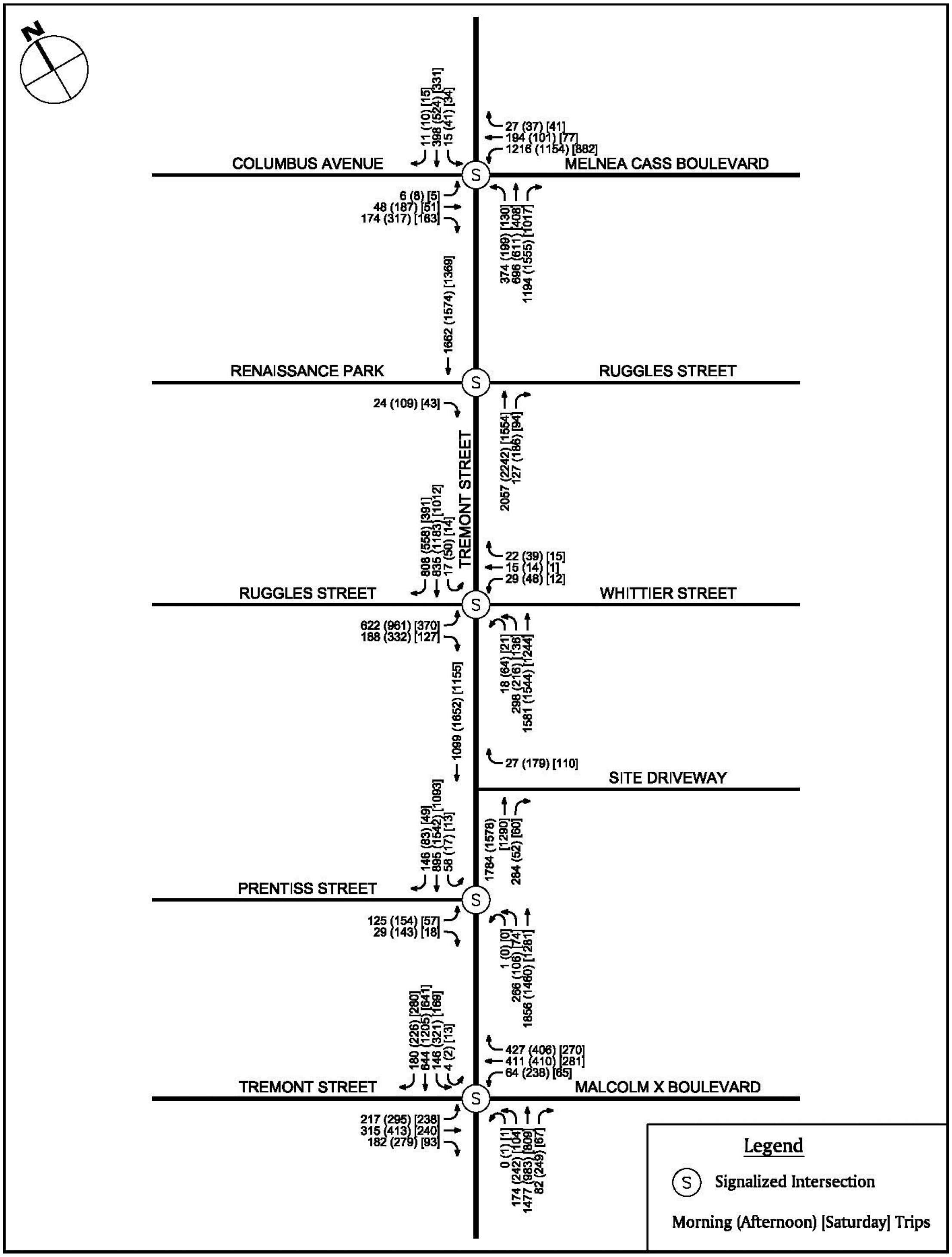


Tremont Crossing
Boston, Massachusetts

Not to Scale

BSC GROUP

Figure 3-8: 2017 Future No Build Conditions Peak Hour Traffic Volumes

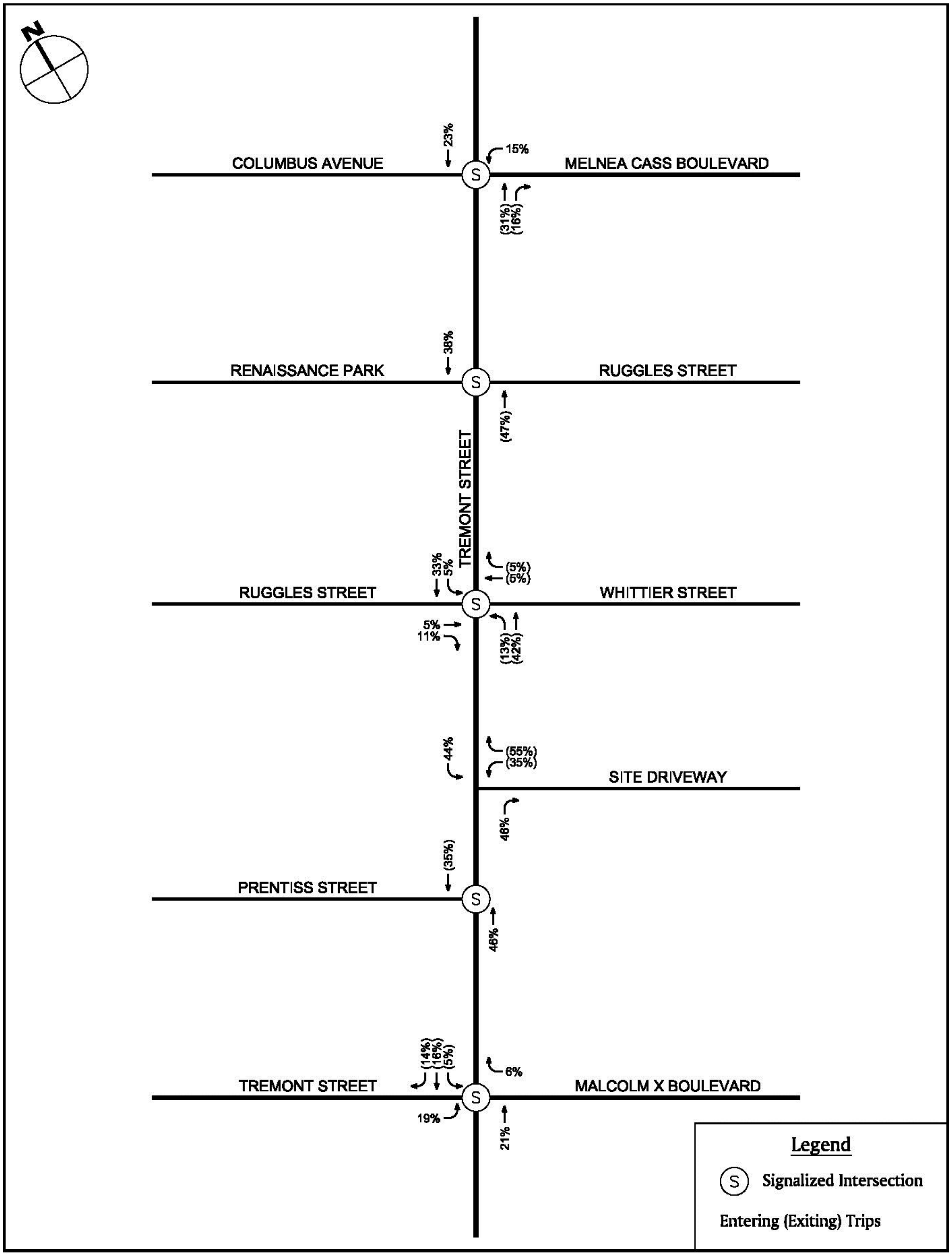


Tremont Crossing
Boston, Massachusetts

Not to Scale

BSC GROUP

Figure 3-9: Project Trip Distribution – Weekday Morning Peak Hour

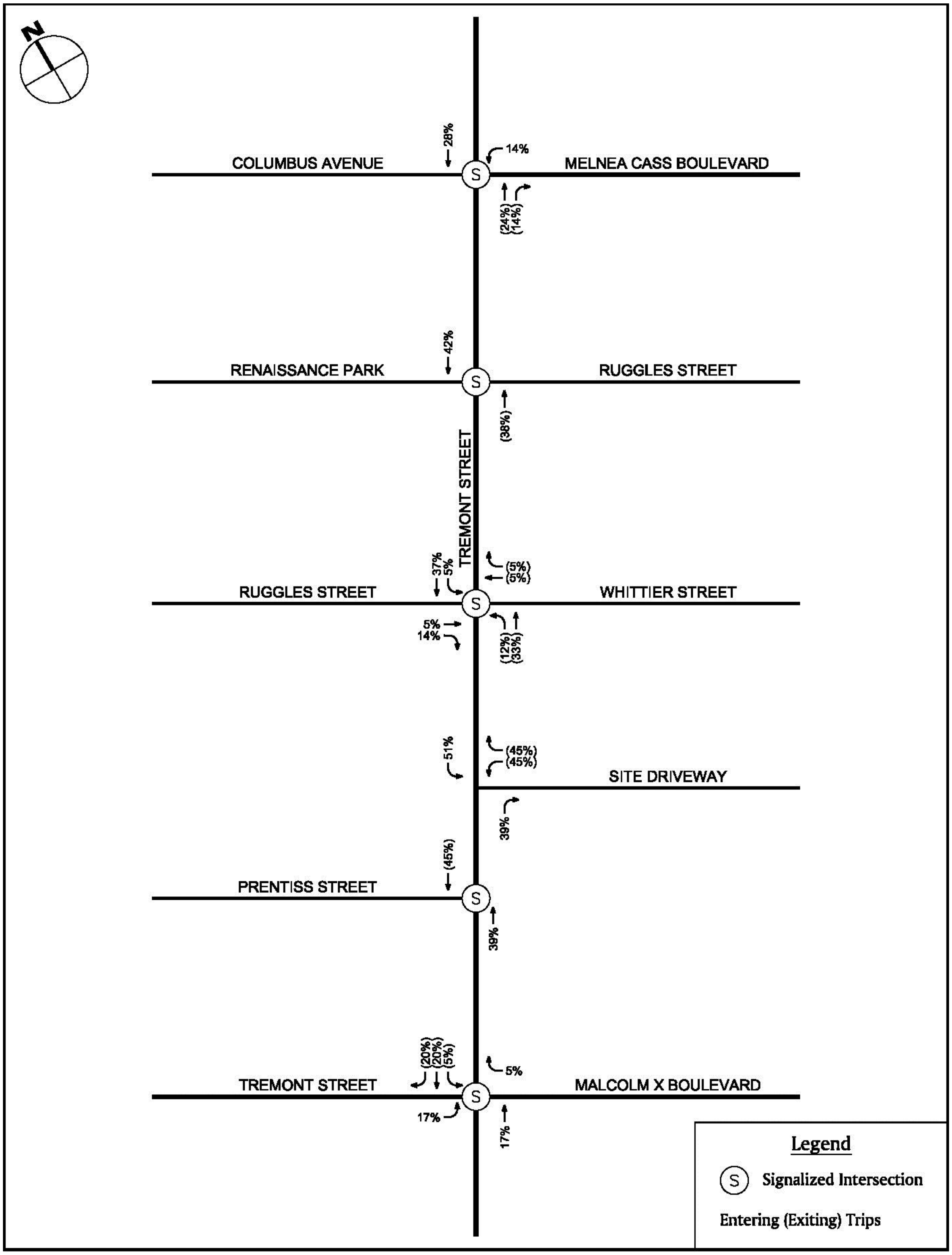


Tremont Crossing
Boston, Massachusetts

Not to Scale

BSC GROUP

Figure 3-10: Project Trip Distribution – Weekday Afternoon & Saturday Midday Peak Hours

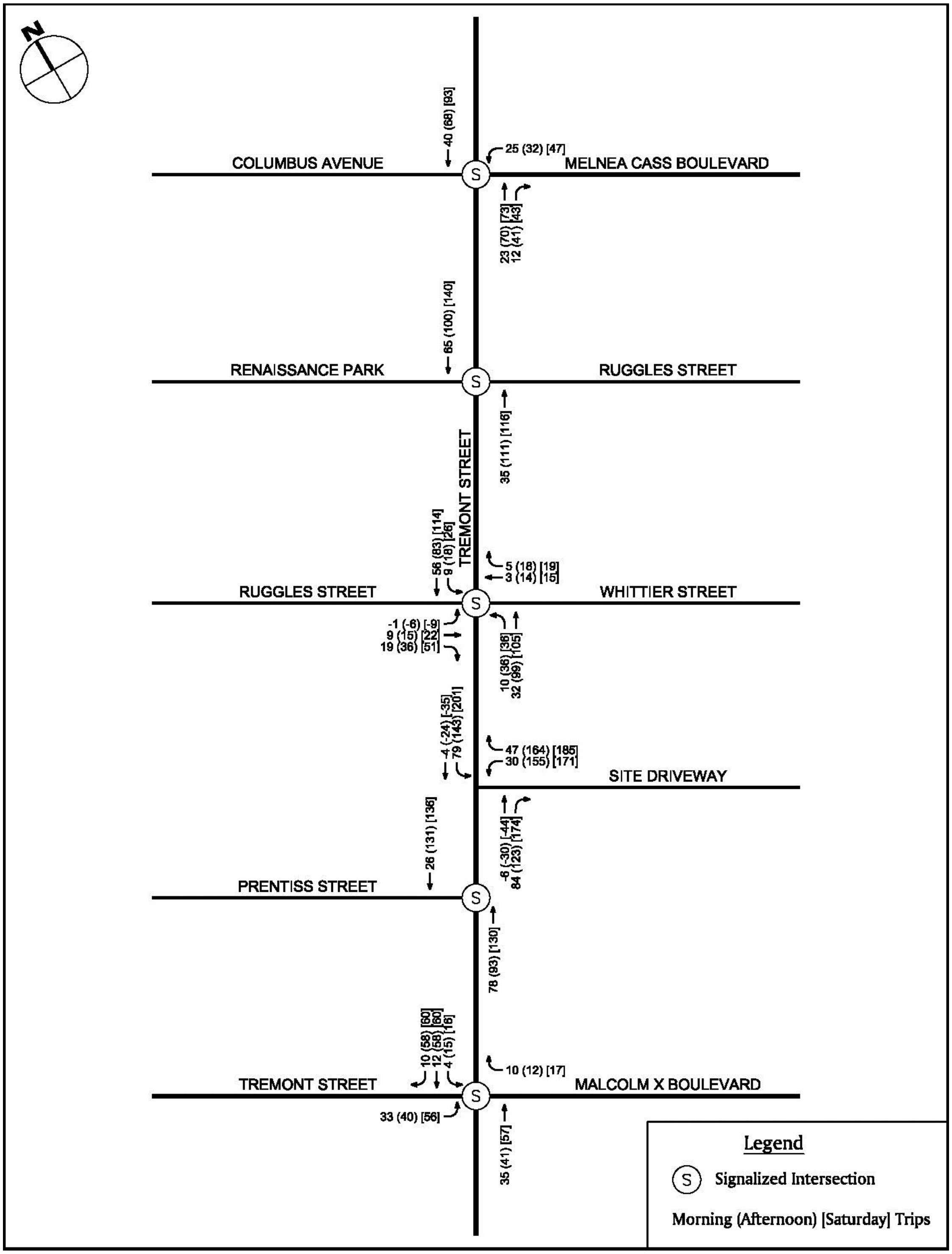


Tremont Crossing
Boston, Massachusetts

Not to Scale

BSC GROUP

Figure 3-11: Site-Generated Project and Pass-By Trips

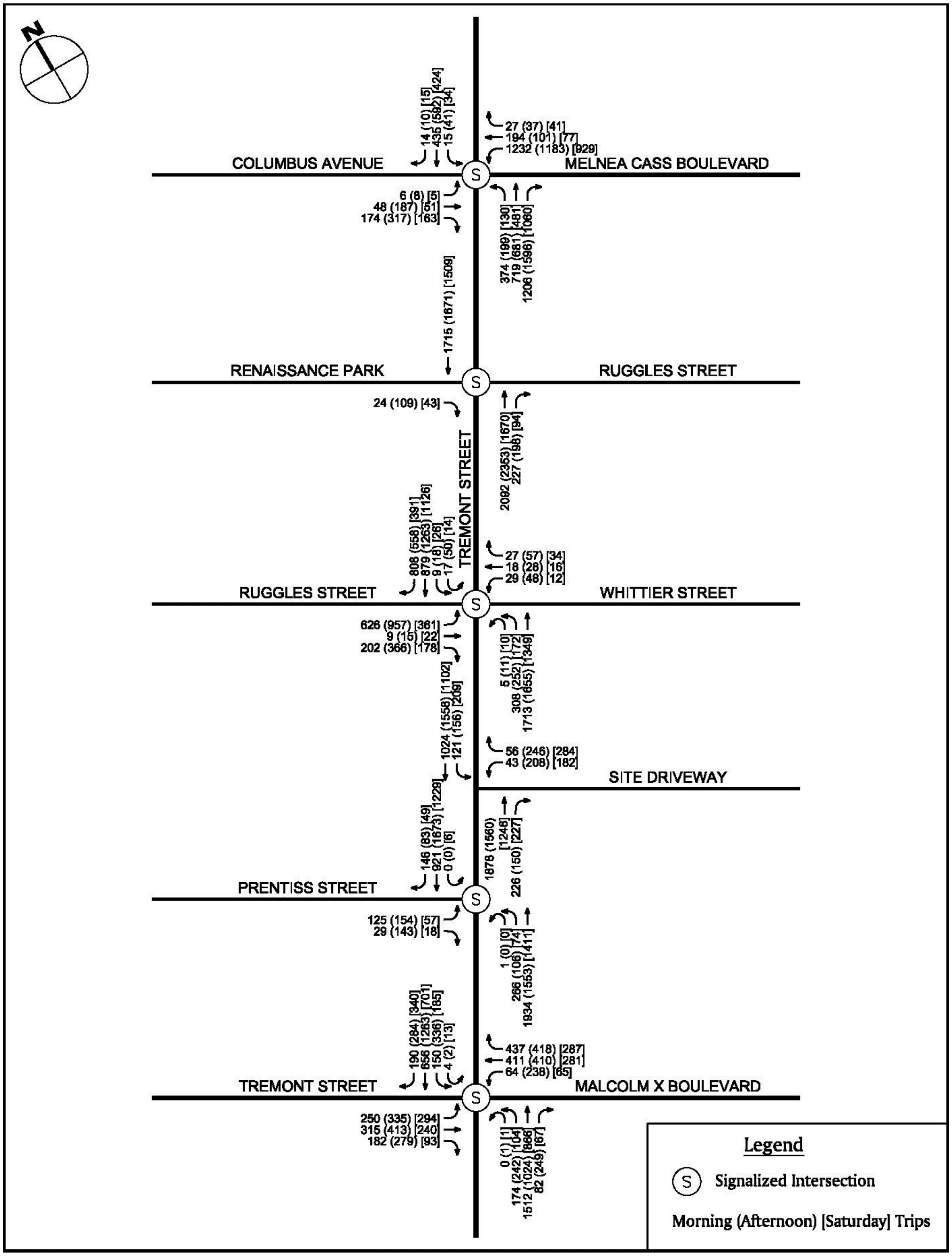


Tremont Crossing
Boston, Massachusetts

Not to Scale

BSC GROUP

Figure 3-12: 2017 Future Build Conditions Peak Hour Traffic Volumes



Tremont Crossing
Boston, Massachusetts

Not to Scale

BSC GROUP

3.2 Urban Design

3.2.1 Building Design

The Project's mix of uses will include approximately 500,000 square feet of large format retail, which could also have entertainment and recreational uses, such as a movie theater or performing arts theater, 50,000 square feet of smaller shops and boutiques fronting along Tremont Street, 200,000 square feet of office space, 240 units of multifamily residential (approximately 200,000 square feet) made up of studios, one bedroom and two bedroom rental apartments (of which the necessary affordable units will be provided), and 58,000 square feet of cultural facilities that will primarily house a new museum for the National Center for Afro-American Artists ("NCAAA"). The development will also include a large public plaza and an adjacent, multi-level parking structure to accommodate the requirements of its tenants. As currently contemplated, the proposed parking structure would consist of approximately 1,700 spaces that will include parking for the Whittier Street Health Center and the Boston Public Schools, but could increase in size subject to potential demand from other Project abutters and/or its mix of uses.

3.2.1.1 Design Concept

The architectural composition for the Project is guided by several objectives. The overarching objective is to create a coherent whole, while at the same time differentiating elements that clarify the projects multi-use character, break down its scale and promote urban life. First, the urban plazas and the pedestrian passage waythat runs east west through the middle of the site divide the project into three manageably scaled blocks. This, and an extensive program of planting and hardscape amenities, will invite passersby into the site to experience its varied offering of uses. The rich multi-use character is further highlighted by a marked differentiation of functional elements.

Another objective is to create legible expressions for each use on the site while maintaining an appropriate respect for the urban and neighborhood fabric. The largest massing on the site is pushed to Tremont Street, where the retail and museum plinth is in good company with the Boston Police Headquarters across the street and where higher tower elements speak to the Northeastern University International Village sited diagonally across the intersection with Whittier Street. Large retail is expressed realistically, but with a playfully composed figure ground of solid and transparent elements that works with a pattern of building scale decorative lighting and tasteful commercial graphics to denote a vibrant destination in the neighborhood. The location of small retail at grade for the full length of the Tremont frontage makes this promise an immediate reality. The housing and office functions are set back from the street providing roof level terraces and a more pedestrian scale along Tremont. And the museum is clearly the heart of the project. Its preeminence is expressed through the use of the largest scale elements of the composition.

Figure 3-13: North Elevation- Tremont Street

Figure 3-14: West Elevation

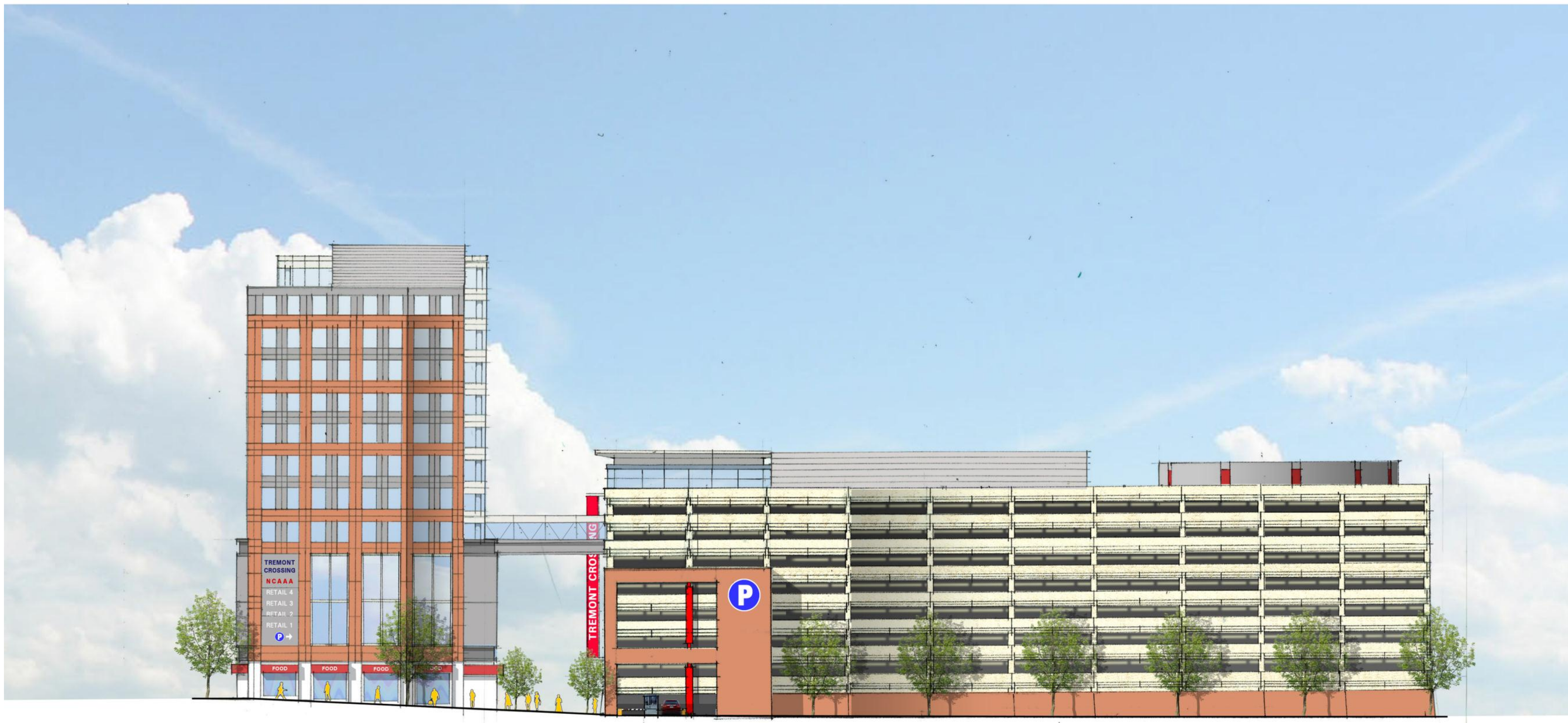


Figure 3-15: East Elevation- Whittier Street

Figure 3-16: South Elevation

3.2.1.2 Height and Massing

Table 3-19: Approximate Sizes and Uses

Element	Square Feet	Building Levels
Large-Format Retail	500,000 s/f	4 Levels
Smaller Retail (Fronting Tremont Street)	50,000 s/f	1 Level (two building structures)
Office	200,000 s/f	9 Levels
Multifamily, Residential	200,000 s/f (240 units)	11 Levels
Museum / Cultural Center	58,000 s/f	3 Levels
Parking	592,000 s/f	8 Levels (plus one partially underground)

The layout of the Project will be designed around a large public plaza, which will have significant frontage along Tremont Street. The small retail will be separated from the large retail and be on the ground level of the residential and cultural/office buildings. The office use will sit atop the Museum, so that structure will have a total of 12 floors. The multifamily, residential tower will consist of fourteen floors and front Tremont Street to the north and the large-format retail building to the south. Additionally, all of the various uses will connect to the parking structure either by a network of walk bridges or via the pedestrian way that bisects the Project.

3.2.1.3 Façade Design, Fenestration and Building Materials

A varied pallet of colors and materials is used to delineate the functional elements of the project, while the repetition of intermediately scaled patterns is used to mediate large to small scale and to create harmony between different components. For instance, housing and office facades have similar double story precast panel compositional elements, but have use-specific fenestration. The retail and the museum both have large scale banding and pre-cast panel façade compositions, but they are executed at different scales. Other materials used include larger areas of fenestration and signage at the retail lobbies, open-air corridors between parking and retail, and a metal and glass window wall system used at the office building and housing cores.

3.2.1.4 Pedestrian Circulation

With nearly a million square feet of commercial and cultural uses, the Tremont Crossing Project will become a transformative element that allows Lower Roxbury to further facilitate its integration into the urban fabric of the City. With an anticipated 50,000 square feet of smaller shops, boutiques and/or restaurants situated along Tremont Street, the Project endeavors to create a vibrant pedestrian experience that will energize the neighborhood and unify it with the activity of Northeastern and the LMA to the north, the South End to the east and Dudley Square to the southwest.

In addition to the ground-level retail, the Project will include a large public plaza that will be at the center of the development and be adorned with sculptures, park benches and lush landscaping. This outdoor, public space will also be conducive to alfresco dining, art exhibits and community functions when the weather permits. The public plaza will serve as the unifying amenity of the Project, and act as the physical connection of all of the mix of uses by establishing a single, easily-identifiable point of entry for customers and visitors.

At the rear of the plaza will be an 80 foot high glass atrium with elevators and escalators that will carry shoppers and visitors to the various retail and garage levels and be visible to the streetscape below. A similar, albeit smaller version of this glass multi-level atrium, will also exist on the northeast corner of the pedestrian way, at Whittier Street, to allow more immediate access to the upper floors of retail for customers arriving by mass transit at Ruggles Station and the tenants of the Whittier Street Housing Complex. At this same highly-visible corner, the multifamily, residential building will be setback approximately seventy (70) feet from Whittier Street, thereby creating a secondary plaza and an unobstructed view corridor of the large retail building from Tremont Street.

In addition, the public plaza will act as the central, pedestrian connection to a forty (40) foot wide pedestrian way that will run parallel to Tremont Street. As noted, this pedestrian way will separate the large-format retail building and parking structure from the Project's other uses and serves to enhance the pedestrian activity and energy throughout the Project Site by providing access to the small, ground floor retail fronting on Tremont Street through double-sided storefronts or even unique stores with frontage only on this interior walking street. Many of the same amenities present in the public plaza, such as benches, artwork and landscaping, will be provided in this pedestrian way. Access to the cultural facilities will also be off this central, public plaza, but the office and residential facilities, which are more restricted to the general public, will have direct access with lobbies that front both Tremont Street and the pedestrian way, bringing apartment and office tenants directly in and out of the urban fabric of the City.

The Proponent also anticipates that it will make significant improvements to the length of the streetscape along Tremont Street between the Whittier Street Health Center and Whittier Street. These will include a widened sidewalk, improved lighting and landscaping and parallel parking spaces made possible on land that is part of the Project Site. Additionally, it is anticipated that the length of Whittier Street that is adjacent to the Whittier Street Housing Development will be widened to two lanes, permitting two way traffic and thus allowing circulation around the entire Site to ease traffic congestion and increase vehicular flow. The sidewalks adjacent to this street will be adorned with new trees and ample decorative street lighting, creating a much improved aesthetic to what currently exists.

3.3 Signage

The Tremont Crossing project will consist of a dynamic and complementary mix of uses that will add to the vibrancy and energy of the Roxbury community and the City of Boston at large. In that regard, it will be vital to the ongoing success of the Project that tenants have the means to establish their presence and create a necessary "sense of place" that could well serve as the catalyst for further commercial revitalization along Tremont Street. In order to do so, a well thought out signage program that balances the aforementioned considerations with sensible urban design parameters is essential.

With regard to the office building and Museum, the Proponent envisions signage prototypical of these uses that allow for distinct but appropriate recognition of these institutions on the façade of their respective facilities. The office building would recognize anchor and/or key tenants with lighted signage above the entryway at an appropriate height on the building, which could be seen be passing vehicles to provide an emanating and clear presence onto Tremont Street.

In order to further enhance the presence and vitality of the cultural facilities, the Proponent would like to include an LCD screen in the interior areas of the pedestrian way and the public plaza. Such a screen could display slideshows of art, as well as tastefully promote the goods and services being offered by the various retail stores. Additionally, the Proponent would like the ability to have such a screen or series of smaller screens displayed in a setback manner from the interior of the Museum's ground floor or the ground floor of the main pedestrian entryway, facing the public plaza or Tremont Street to be visible to passersby. This has proven to be an effective means of creating energy and vitality in other locations in the Greater Boston area, such as the Museum at the Broad Institute which faces Main Street in Kendall Square, Cambridge. Such a display would create interest and excitement relative to the important cultural uses of the Project and do so in a manner unobtrusive to the Project's neighbors.

Relative to the large-format retail building, the Proponent hopes to offer potential tenants a comprehensive signage package that includes tenant name recognition at five distinct places on the Project Site, especially with the current design scheme of placing the large retail "behind" the residential building and thus eliminating the building's street presence. The proposed locations of signage include:

- Tremont Street / Whittier Street Corner: On the side of the residential building;
- Tremont Street/ Whittier Street Corner: On the side of the large-format retail building, integrated with the secondary retail lobby of escalators and elevators;
- Central Plaza: At the main retail lobby/atrium, integrated with the circulation of elevators and escalators;
- Central Plaza: At the western interior of the residential building, so cars traveling toward downtown can see the names of the retailers;
- Tremont Street/Access Drive: At the western side of the office building, so cars traveling toward downtown can see the names of the retailers and the identification of the office tenants, cultural facilities and parking structure. Without such signage at this corner, vehicles would not know where to enter the Project Site.

The Proponent believes that having much of this signage be back-lit is vital, so that it can be seen at night. Not only will this signage provide further vibrancy and a sense-of-place to the Project, but many of these retail tenants will stay open after dark and it would be crucial for them to maintain visibility during these hours. Furthermore, as is typical and necessary for visitor navigation to the Site, the Proponent foresees including a pylon sign at the primary vehicular access point, listing all the major tenants of the Project, as well as providing for parking structure signage to help organize traffic along Tremont Street. If such a sign could be accommodated, then it would eliminate the signage package suggested above at the "Tremont Street/Access Drive."

The residential component of the Project, whose lobby entrance would be demarcated by an elegant awning, would likely have the name of the building on the awning itself. In this way, visitors approaching the building could identify its access from the other uses.

Figure 3-17: Signage- Tremont Street

Figure 3-18: Signage at Corner of Whittier Street

Figure 3-19: Signage at Main Entrance

3.4 Project Phasing

At this time, the Proponent does not anticipate that it will need to construct the Project in multiple phases and currently intends to build all of the constituent uses in a single, simultaneous construction process. However, in the future, market and/or other prevailing conditions may dictate that the construction of certain uses be started and possibly completed before others. If the Proponent deems that such a scenario is likely, it will present an appropriate plan of construction phasing in a subsequent Article 80 filing (“Phasing Plan”). If needed, the Phasing Plan will set forth the sequence and timing for constructing the Project’s building structures and the specific associated uses and the manner in which the phasing will integrate with the Project’s infrastructure, traffic circulation and parking program.

3.5 Sewer Relocation

The Stony Brook Interceptor (Interceptor) combined sewer runs through the Project Site within the paper street, Hampshire Street. The Interceptor is a 4-foot by 4.5-foot combined sewer that carries the flow from the West Roxbury Low Level Sewer as well as the system in Malcolm X Boulevard. The Interceptor flows towards the northeast to the intersection of Hampshire and Whittier Streets and then continues beneath the Boston Housing Authority's Whittier Street Apartments. To avoid constructing the Project on top of the Interceptor, and the maintenance issues that come with that, the Proponent is planning to reroute a portion of the Interceptor around the Project Site. At an initial meeting with the Boston Water and Sewer Commission (BWSC), the relocation concept was discussed with the chief Engineer and was generally preferred over the construction of buildings on top of the existing Interceptor.

Prior to performing any evaluation of routing, the Project's civil/utility engineers performed extensive plan and field research on the Interceptor. As-built plans were obtained from BWSC and the BRA for both the Interceptor and the Stony Brook Conduit (Conduit), which is the large drain/combined sewer pipe that runs around the southern perimeter of the Project Site. These plans showed that both the Interceptor and the Conduit have been previously relocated to accommodate development projects such as the creation of Malcolm X Boulevard and the restructuring of parcels in the vicinity of the Project Site. In addition, the record plans showed that portions of each had been rebuilt over time so that different sections are built with different materials (brick, concrete, metal, etc.). The Project's civil/utility engineers subsequently made a Site visit with personnel from BWSC's Operations Division. This Site visit was made on a rainy day when it had been raining through the previous night to best gage each system's combined sewer flows. During this Site visit, flow velocities in the Interceptor appeared very high with flow depths of approximately 1.5-feet. The bottom of structures along the Interceptor generally appeared free of sediment build up. The Conduit, on the other hand, showed much lower flow velocities with flow depths of approximately 6-inches. Large amounts of sediment build up was visible in the bottoms of structures on the Conduit. If flow velocities in the Conduit are generally as low as observed, this would result in the sediment build up. Additionally, the Project's civil/utility engineers discussed the Interceptor and Conduit condition with BWSC staff in the BWSC Operations Division. BWSC staff indicated that there were no known capacity issues in either the Interceptor or the Conduit, but that the Interceptor generally always experiences some flows.

Using the plan and field research as well as the recently completed Site survey, the Project's civil/utility engineers have performed a preliminary evaluation of rerouting options for the Interceptor. This preliminary evaluation has determined that the most appropriate route for relocating the Interceptor is southeasterly past the Project Site roughly parallel to the Madison Park Technical Vocational High School, then northeasterly along the paper street, Downing Street, then northwesterly in Whittier Street, and reconnecting to its existing location roughly at the intersection of Whittier

Street and Hampshire Street. A plan and profile view of this preliminary rerouting are shown on Figure 3-20. In order to create the required space to install a pipe of this size, it may be necessary to remove the existing 15-inch sewer on the east side of Whittier Street, south of Hampshire Street. All sewer service connections to this existing main would be reconnected to the relocated Interceptor. In a preliminary meeting with Engineering Customer Services at the BWSC, it was indicated that the elimination of the 15-inch sewer might be acceptable to BWSC. However, in order to tie existing sewer services from the Whittier Street Apartments into the relocated Interceptor, BWSC would require that these services be combined on the BHA property into one connection.

Additionally, somewhere along the Interceptor's new route, it will be necessary to cross beneath the Conduit. Southwest of Vernon Street, the Conduit is a 72-inch storm drain pipe. At the intersection of Vernon and Downing Streets, it becomes a 72-inch by 96-inch brick combined sewer. Based on invert elevations, the rerouted Interceptor should be able to cross beneath the Conduit northeast of the intersection of Vernon and Downing Streets. In order to provide sufficient spacing between the top of the Interceptor and the bottom of the Conduit, it will most likely be necessary to install a box culvert or other non-circular pipe to make this crossing.

Final design of the relocated Interceptor will be based on a hydraulic analysis of the existing pipe. The new Interceptor will be sized to carry existing flows as well as any additional flows from the Project. Due to the longer distance needed to route the Interceptor around the Project Site rather than through it, the new Interceptor will have a more shallow slope than existing. Therefore, it is likely that a larger pipe than the existing 4.5-feet by 4-feet pipe will be required. Based on the existing cross sectional area (approximately 18-square feet) and the existing slope (approximately 0.18%), as well as the slope of the relocated Interceptor (approximately 0.13%), it is initially estimated that a 5-foot diameter pipe will be required for the replacement. At the point where the relocated Interceptor crosses under the existing Stony Brook Conduit, it is anticipated that a lower profile culvert, initially estimated as a 3-foot X 6-foot, will be required.

The final routing of the Interceptor, the location where it crosses beneath the Conduit, and the final hydraulic design and sizing will be detailed in future Article 80 filings with the BRA. Figure 3-1 shows the preliminary route and a conceptual profile for the proposed Interceptor relocation.

Construction Considerations:

Careful planning and design considerations must be implemented to minimize impacts on the neighborhood and abutting properties. Three key items to incorporate into final construction documents will include 1) a system to keep the Interceptor active throughout construction; 2) appropriate measures to protect both the existing Stony Brook Interceptor sections that are to remain and the nearby Stony Brook Conduit (Conduit), particularly at the point of crossing; and 3) maintaining access to the abutting school property.

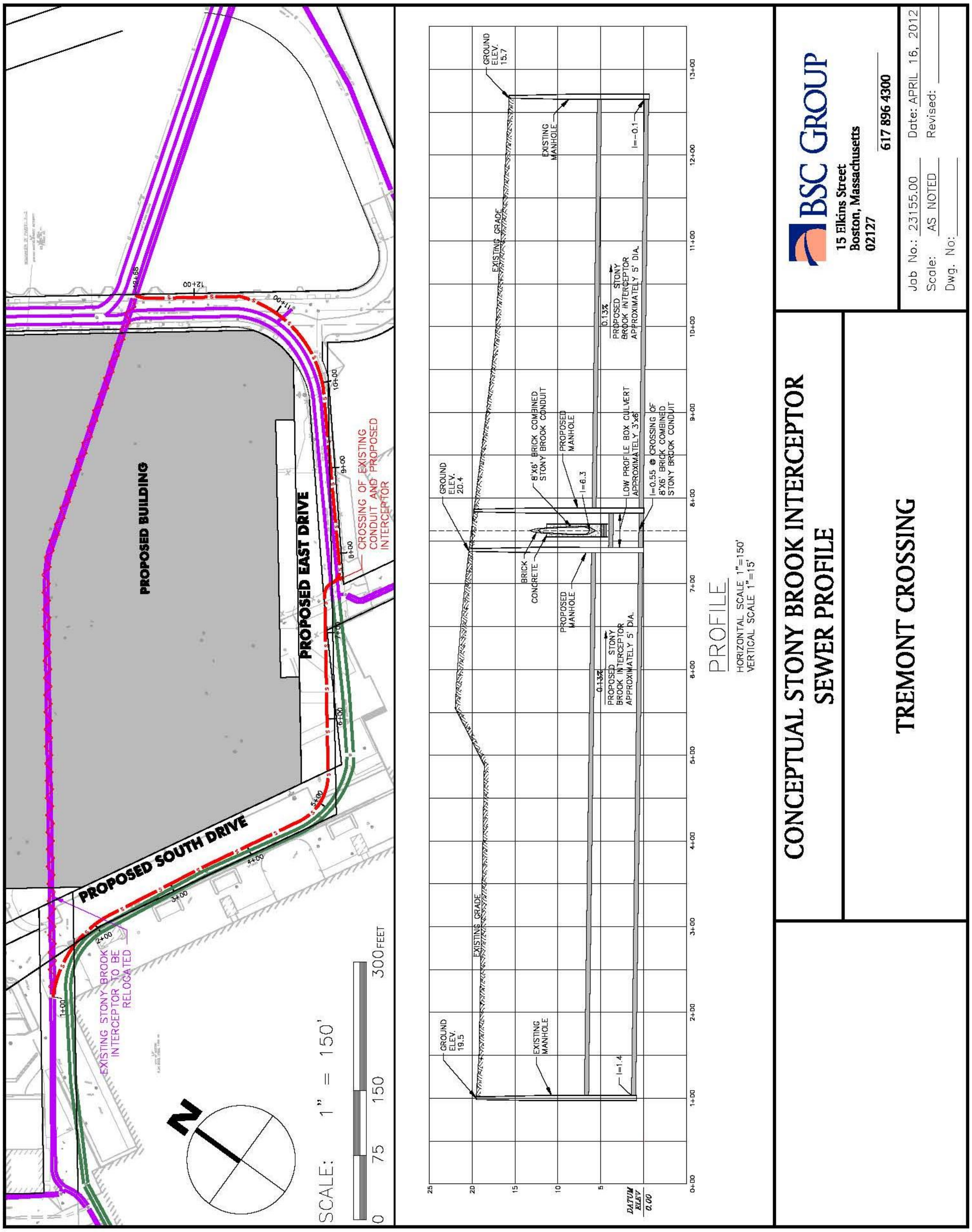
1. Given the high volume of flows observed within the existing Interceptor, it is anticipated that a bypass system will be required to keep the system live and functioning during construction. It is anticipated that the majority of the new line would be constructed around the perimeter of the Site prior to any connections or impacts to the existing Interceptor. When the connections from the new Interceptor are made to the existing Interceptor, it is anticipated that a pumping bypass system will be required to keep the system fully functional. These design elements will be coordinated with the BWSC.

2. Final selection of the construction methods will need to incorporate measures to protect both the existing Interceptor sections that are to remain and the nearby Conduit. Portions of both of these existing pipe systems are older and some are constructed out of brick, clay and other materials susceptible to damage if disturbed. Particular care must be taken during the construction of the crossing of the new Interceptor under the existing Conduit to remain. Again, these design elements will be coordinated with the BWSC.

3. One of the primary access points to the abutting school is through what is identified as South Drive on the proposed plans. Access through this area during the construction of the new Interceptor, as well as other phases of construction is very important to the school and the City. During the construction of the Interceptor careful coordination with the School will be required to schedule activities in a manner that will maintain sufficient access routes for deliveries and emergency vehicles. This may require the construction or delineation of alternate access roads outside of active construction areas or alternate work schedules outside of school activities. Additionally, all construction within the surrounding public ways will require Traffic and Construction Management Plans to be prepared in coordination with the Boston Transportation Department to ensure appropriate and safe

access for both vehicular and pedestrian traffic are provided throughout the construction process.

Figure 3-20: Conceptual Stony Brook Interceptor Sewer Profile



3.6 Environmental Protection

3.6.1 Stormwater / Water Quality

The quality of stormwater runoff and, therefore, downstream waters, is expected to improve due to the inclusion of stormwater treatment best management practices (BMP's) that will be included in the project design. The specifics of these BMP's and the stormwater management systems will be described in future Article 80 filings with the BRA. Section 3.7.4 provides an overview of the proposed stormwater management systems and how they will connect to the Boston Water and Sewer Commission's (BWSC's) existing drainage system. All stormwater management systems will be designed in accordance with BWSC Standards and Regulations.

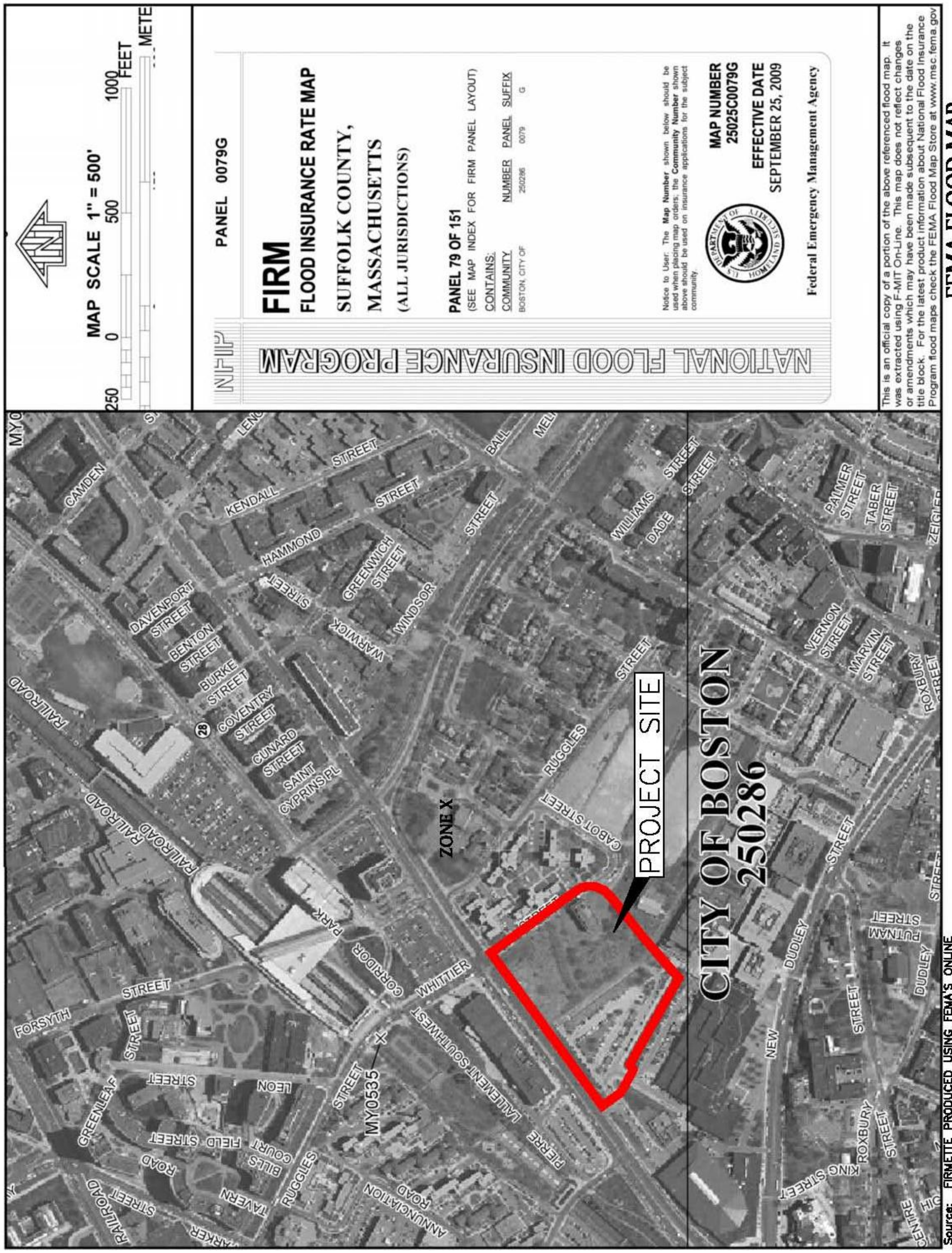
During construction, stormwater impacts will be mitigated through appropriate erosion and sedimentation BMP's, including perimeter controls, controls on new and existing stormwater inlets, and construction techniques to minimize the amount and duration of unstabilized surfaces. Based on the size of the project, it will be necessary to prepare a Stormwater Pollution Prevention Plan (SWPPP) and to file a Notice of Intent (NOI) for coverage under the most recent Construction General Permit (CGP) of the Environmental Protection Agency's (EPA's) National Pollutant Discharge Elimination System (NPDES) program. Additionally, erosion and sedimentation controls will comply with the Water Quality section of the City of Boston Environment Department Guidelines for Construction.

3.6.2 Flood Hazards/Wetlands

The Federal Emergency Management Agency (FEMA) Flood Insurance Map (FIRM) Suffolk County, Massachusetts (All Jurisdictions), Panel 79 of 151, City of Boston Map Number 25025C0079G, September 25, 2009 indicates the FEMA Flood Zone Designations for the Site area. As shown on this map (see Figure 3-21), the Project is located in a Zone X, Areas Determined to Be Outside the 0.2% Annual Chance Floodplain.

The Project Site does not contain wetlands or wetland resource areas and is not located within the buffer zone to any resource areas.

Figure 3-21: FEMA Flood Map



3.6.3 Solid and Hazardous Wastes

The Project will generate solid waste typical of other retail/mixed-use projects. Based on the solid waste generation rates of 5.5-tons per 1,000-sq.ft. per year for commercial, retail, and restaurant space and 4-pounds per bedroom per day for residential space, the Project is expected to generate approximately 4,757-tons of solid waste per year. Table 3-20 summarizes this estimate.

Table 3-20: Solid Waste Generation

Unit Type	**Program**	**Generation Rate**	**Solid Waste (tons/year)**
Residential	300 bedrooms	4 lbs/bedroom/day	219
Commercial / Retail / Restaurant / Museum	825,000 sq.ft.	5.5 tons/1,000 sq.ft./year	4538
Total Solid Waste Generation			**4,757**

Solid waste is expected to include wastepaper, cardboard, glass, and other typical waste associated with retail, restaurant, commercial office, and residential uses. A portion of the waste is expected to be recycled with the remainder removed by a waste hauler contracted by the Property Manager. The Project's recycling program will be described in future Article 80 filings with the BRA. Other than typical "household hazardous wastes" such as paint and cleaning fluids, the Project is not expected to generate hazardous waste.

3.6.4 Construction Impacts

Due to the adjacent residential neighborhood, church, school, and police department, as well as the existing high traffic use of Tremont Street, the Project will require careful and thoughtful scheduling of construction material removal and delivery. Planning with the City and surrounding neighborhood will be essential to the successful development of the Project.

A Construction Management Plan (CMP) will be submitted to BTD for review and approval prior to issuance of a building permit. The CMP will define construction work hours and truck routes for delivery and removal of construction materials, detail methodologies for maintaining existing sidewalk access, and describe any required use of existing City streets during construction. The CMP will provide for police details as necessary to maintain pedestrian and vehicular flows at various points of construction.

Construction methodologies that ensure public safety and protect nearby properties will be employed. Temporary barricades, walkway relocation, restriping, and signage will be used as necessary throughout construction. Appropriate construction management, including construction worker commuting and parking plans, truck routing and scheduling, protection of existing utilities and structures, maintenance of emergency access routes, and noise and dust control, will minimize construction impacts on the surrounding environment and general public. An appropriately secured construction perimeter will be maintained to protect the public from construction activities.

The Project will comply with the City of Boston Environment Department Guidelines for Construction (the Guidelines). Details of specific elements are described below.

3.6.4.1 Construction Air Quality

Short term fugitive dust impacts to air quality may be expected during the early phases of demolition and construction. Appropriate methods for controlling fugitive dust during demolition and construction will be employed, including mechanical street sweeping, wetting of exposed soils and stockpiles, and removal of demolition and construction waste in covered or enclosed trailers. The construction contract(s) issued for the Project will include strictly enforced requirements for dust control to be employed by contractors to reduce potential emissions and minimize impacts. These measure are expected to include:

- Use of appropriately designed construction entrances and wheel wash facilities as necessary to prevent migration of soils offSite;
- Mechanical street sweeping of construction areas and surrounding streets and sidewalks;
- Removal of demolition and construction waste in covered or enclosed trailers;
- Wetting of exposed soils and stockpiles to prevent dust generation;
- Minimizing stockpiling of materials on Site;
- Turning off construction equipment when not in use and minimizing idling times;

- Minimizing the storage of demolition and construction wastes on Site; and
- Minimizing the duration that soils are left exposed.

As recommended by the Guidelines, the Project will investigate the potential to comply with the Massachusetts Clear Air Construction Initiative's Voluntary Diesel Retrofit Program. This program will be investigated further closer to the start of construction once a general contractor has been selected.

3.6.4.2 Construction Noise

The Proponent is committed to minimizing noise impacts from the Project's construction. Increased sound levels, however, are an inherent consequence of construction activities. Construction noise levels will comply with the City of Boston's Regulation For the Control of Noise as administered by the Air Pollution Control Commission. Every reasonable effort will be made to minimize the noise impacts from construction activities. Noise mitigation measures are expected to include:

- Implementing a proactive program to ensure compliance with the City of Boston's Regulation For the Control of Noise;
- Ensuring that appropriate mufflers are installed and maintained on construction equipment;
- Turning off construction equipment when not in use and minimizing idling times; and
- Mitigating the impact of noisy equipment on sensitive locations by shielding or distance to the extent practical.

3.6.4.3 Construction Waste Management

A construction waste management plan will be prepared prior to the start of construction work. This plan will allow for the segregation and reuse or recycling of various demolition and construction wastes. Demolition and construction materials that cannot be reused or recycled will be hauled off-Site to licensed disposal facilities. All materials hauled off Site will be done so in covered or enclosed trailers.

3.6.4.4 Construction Sequencing

The sequencing of construction will be designed in a manner which facilitates continued access and operations of the Project's abutters. Specifically: the WSHC will have continued access to seventy-five (75) parking spaces either in their current location or in another, adjacent area; and the MPHS will have continued access to its parking and delivery areas during the construction process. Several alternatives to these considerations are under review and fully developed solutions will be presented for review in subsequent Article 80 filings.

3.6.5 Rodent Control

A rodent extermination certificate will be filed with the building permit application. Rodent inspections, monitoring, and treatment will be performed before, during, and at the completion of construction in accordance with the City's requirements. Rodent extermination prior to construction commencement will occur at areas throughout the Site and regular Site visits by a rodent control company will be made throughout construction.

3.6.6 Wildlife Habitat

The Project is located outside of the Estimated Habitats of Rare Wildlife and the Priority Habitats of Rare Species according to the most recent GIS polygons for each as maintained by the Natural Heritage and Endangered Species Program (NHESP) of the Massachusetts Division of Fisheries and Wildlife.

3.6.7 Sustainable Design

The Project will be Leadership in Energy and Environmental Design (LEED) certifiable in accordance with the BRA's Article 37 Green Building Program (Green Building Program). Energy conservation and efficiency will be integral parts of the Project's design. Buildings will employ energy efficient features in the mechanical, electrical, architectural, and structural elements where possible. Mechanical and HVAC systems will be designed and installed to industry standards as well as applicable sections of the Massachusetts Building Code. The Project is situated in a dense, urban Site that is well serviced by public transportation.

A preliminary LEED checklist is provided at the end of this section to identify sustainable design goals for the Project. At this stage of the design process, specific building systems and specifications have yet to be determined. However, any such solutions will provide of a Project that is certifiable in accordance the Green Building Program):

LEED 2009 for New Construction and Major Renovations

Project Checklist

Project Name

Date

Y	?	N		Sustainable Sites	Possible Points: 26
#	8	6			
Y			Prereq 1	Construction Activity Pollution Prevention	
1			Credit 1	Site Selection	1
5			Credit 2	Development Density and Community Connectivity	5
		1	Credit 3	Brownfield Redevelopment	1
6			Credit 4.1	Alternative Transportation—Public Transportation Access	6
		1	Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	1
	3		Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehic	3
		2	Credit 4.4	Alternative Transportation—Parking Capacity	2
		1	Credit 5.1	Site Development—Protect or Restore Habitat	1
	1		Credit 5.2	Site Development—Maximize Open Space	1
		1	Credit 6.1	Stormwater Design—Quantity Control	1
	1		Credit 6.2	Stormwater Design—Quality Control	1
	1		Credit 7.1	Heat Island Effect—Non-roof	1
	1		Credit 7.2	Heat Island Effect—Roof	1
	1		Credit 8	Light Pollution Reduction	1

Y	?	N		Water Efficiency	Possible Points: 10
	#				
Y			Prereq 1	Water Use Reduction—20% Reduction	
	4		Credit 1	Water Efficient Landscaping	2 to 4
	2		Credit 2	Innovative Wastewater Technologies	2
	4		Credit 3	Water Use Reduction	2 to 4

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

Y	?	N		Materials and Resources	Possible Points: 14
3	5	6			
Y			Prereq 1	Storage and Collection of Recyclables	
		3	Credit 1.1	Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 3
		1	Credit 1.2	Building Reuse—Maintain 50% of Interior Non-Structural Elements	1
1	1		Credit 2	Construction Waste Management	1 to 2
	1	1	Credit 3	Materials Reuse	1 to 2

Y	?	N		Materials and Resources, Continued	
1	1		Credit 4	Recycled Content	1 to 2
1	1		Credit 5	Regional Materials	1 to 2
	1		Credit 6	Rapidly Renewable Materials	1
		1	Credit 7	Certified Wood	1

Y	?	N		Indoor Environmental Quality	Possible Points: 15
	#	2			
Y			Prereq 1	Minimum Indoor Air Quality Performance	
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	
		1	Credit 1	Outdoor Air Delivery Monitoring	1
	1		Credit 2	Increased Ventilation	1
	1		Credit 3.1	Construction IAQ Management Plan—During Construction	1
	1		Credit 3.2	Construction IAQ Management Plan—Before Occupancy	1
	1		Credit 4.1	Low-Emitting Materials—Adhesives and Sealants	1
	1		Credit 4.2	Low-Emitting Materials—Paints and Coatings	1
	1		Credit 4.3	Low-Emitting Materials—Flooring Systems	1
	1		Credit 4.4	Low-Emitting Materials—Composite Wood and Agrifiber Products	1
	1		Credit 5	Indoor Chemical and Pollutant Source Control	1
	1		Credit 6.1	Controllability of Systems—Lighting	1
	1		Credit 6.2	Controllability of Systems—Thermal Comfort	1
	1		Credit 7.1	Thermal Comfort—Design	1
	1		Credit 7.2	Thermal Comfort—Verification	1
	1		Credit 8.1	Daylight and Views—Daylight	1
		1	Credit 8.2	Daylight and Views—Views	1

Y	?	N		Innovation and Design Process	Possible Points: 6
2	4				
	1		Credit 1.1	Innovation in Design: SS Cr 2	1
1			Credit 1.2	Innovation in Design: SS Cr 4.1	1
	1		Credit 1.3	Innovation in Design: SS Cr 4.3	1
	1		Credit 1.4	Innovation in Design: SS Cr 7.1	1
	1		Credit 1.5	Innovation in Design: Specific Title	1
1			Credit 2	LEED Accredited Professional	1

Y	?	N		Regional Priority Credits	Possible Points: 4
	2	2			
	1		Credit 1.1	Regional Priority: SS Cr 7.1	1
	1		Credit 1.2	Regional Priority: SS Cr 7.2	1
		1	Credit 1.3	Regional Priority: Specific Credit	1
		1	Credit 1.4	Regional Priority: Specific Credit	1

Y	?	N		Total	Possible Points: 110
17	#	#			

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

3.7 Historic and Archeological Resources

This section describes the historic and archeological resources that may be affected by the Project.

3.7.1 Historic Resources Within the Site

The Project Site does not contain any properties included in the *Inventory of Historic and Archeological Assets of the Commonwealth* (Inventory), maintained by the Massachusetts Historical Commission (MHC).

3.7.2 Historic Resources Within Vicinity of the Site

Multiple Sites listed on the Inventory and the State and National Registers of Historic Places are located in the vicinity of the Project Site. These include, but are not limited to, John Eliot Square, the First Church of Roxbury, the Marcus Garvey House and Gardens, Ionic Hall, the James F. Timilty School, the Modern Sewing Machine and Supply Company, and Saint Cyprian's Episcopal Church and Parish House.

Table 3-21 presents listed resources that are located within one-quarter mile of the Project Site. These resources are shown on Figure 3-22.

Table 3-21: Listed Sites within One-Quarter Mile of Project Site

	Historic Resource	Address
1	Olmsted Park System	
2	John Eliot Square Historic District	
3	Roxbury Highlands Historic District	
4	Lower Roxbury Industrial District	
5-8		20-23 Anita Terrace
9-11		994, 996, 998 Cabot St
12	Foreign Car Specialists	1-3 Centre St
13		2-4 1/2 Centre St
14-15		13, 14 Centre St
16		19-19 1/2 Centre St
17		21-23 Centre St
18	Boston Enginer #14 Fire House	25 Centre St
19		29-31 Centre St
20	Center Amnor Nursing Home	45 Centre St
21		47 Centre St
22	Underwriters Salvage Company Warehouse	780 Columbus Ave
23	Police Station #10	1170 Columbus Ave
24-27		7, 9-11, 13-15, 17-21 Dudley St
28-29		1-3 Eliot Terr
30		1 Elmwood St

31-34		10, 12, 16-18, 24 Gardner St
35-39		3-5, 9, 19, 21, 25 Highland St
40	First Church of Roxbury	John Eliot Sq
41	Putnam Chapel	John Eliot Sq
42	Cox Building	1-3 John Eliot Sq
43	Garvey, Marcus House	20 John Eliot Sq
44	Marcus Garvey Gardens	24-44 John Eliot Sq
45-47		48-50, 50A, 52-54 John Eliot Sq
48	L and P Gas Station	72-74 Roxbury St
49	Church of United Community	116-118 Roxbury St
50	Ionic Hall	149 Roxbury St
51	Saint Luke's Chapel to Saint John	149A Roxbury St
52	Dillaway - Thomas House	183 Roxbury St
53	Timilty, James F. School	185-205 Roxbury St
54		207-219 Roxbury St
55		227 Roxbury St
56-59		244-247, 249, 251 Roxbury St
60	Modern Sewing Machine and Supply Company	255-257 Roxbury St
61-62		259, 261-263 Roxbury St
63	Prang, Louis Lithograph Factory	270-286 Roxbury St
64-67		275-279, 281, 285, 288-300 Roxbury St
68	Saint Francis de Sales Roman Catholic Church	159 Ruggles Street
69		1011-1013 Tremont St
70		1015-1019 Tremont St
71		1021 Tremont St
72		1023 Tremont St
73		1025-1027 Tremont St
74		1029 Tremont St
75		1031-1033 Tremont St
76		1035-1039 Tremont St
77		1041-1043 Tremont St
78		1045-1047 Tremont St
79		1049-1051 Tremont St
80		1053-1055 Tremont St
81	The Burlingame	1057-1063 Tremont St
82		1065-1069 Tremont St
83	Saint Cyprian's Episcopal Church and Parish House	1075 Tremont St

3.7.3 Archeological Resources on the Project Site

There are no known archeological resources listed in the State and National Registers of Historic Places or included in the Inventory located within the Project Site. As the Project Site is a previously developed, urban Site, it is unlikely that the Project will affect any previously unidentified archeological resources.

3.7.4 Coordination of Historic Resources Reviews

3.7.4.1 Boston Landmarks Commission (Article 80)

The submission of this PNF initiates review of the Project by the Boston Landmarks Commission (BLC) under the City's Article 80 Review process. Direct and indirect impacts to historic resources including, but not limited to, demolition, urban design, architecture, shadow, and geotechnical will be addressed in future Article 80 filings with the BRA.

3.7.4.2 Boston Landmarks Commission (Article 85)

The proposed demolition of the existing building on the Project Site will be subject to review by the BLC under Article 85 of the Boston Zoning Code. An Article 85 Application for this demolition will be submitted to the BLC as required.

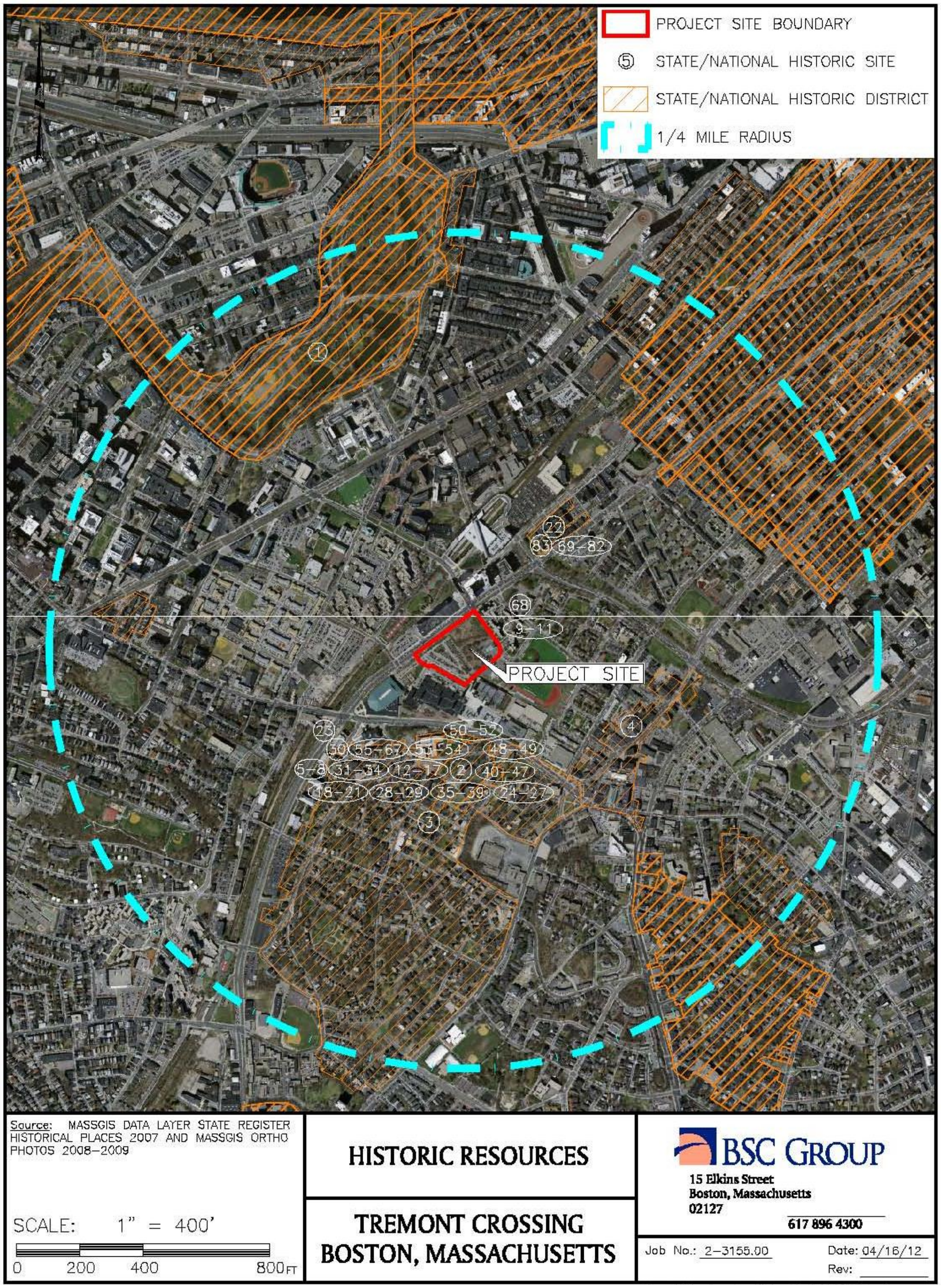
3.7.4.3 Massachusetts Historical Commission (MHC)

The MHC has review authority over projects requiring state funding, licensing, permitting, and/or approvals that may have direct or indirect impacts to properties listed on the State Register of Historic Places. This MHC review process will be initiated through the submittal of an Environmental Notification Form (ENF) under the Massachusetts Environmental Policy Act (MEPA).

3.7.4.4 Massachusetts Environmental Policy Act

The Project will require the submittal of an Environmental Notification Form (ENF) under MEPA.

Figure 3-22: Historic Resources



3.8 Infrastructure Systems

3.8.1 Overview of Existing Utility Services

The Project Site consists of approximately 7.86 acres of land area and is bounded by Tremont Street to the northwest, Whittier Street to the northeast, Downing Street to the southeast, the Reggie Lewis Track and Athletic Center to the southwest, and the Madison Park Technical Vocational High School and the John D. O'Bryant School of Mathematics and Science to the southwest. In addition, the paper streets Vernon Street and Hampshire Street cut through the Project Site north/south and east/west respectively. As shown on Figures 3-23, 3-25 and 3-27 there are existing utilities in each street as well as through the Site in the paper streets. In Tremont Street, there are existing sanitary sewer, storm drainage, water, gas, electric, and telecommunications lines. There are existing sewer, storm drainage, water, gas, and electric lines in Whittier Street. There are sewer, gas, and electric lines in Downing Street, including the 72-inch by 96-inch, Stony Brook Conduit combined sewer. Included among the utilities that run through the Site is the Stony Brook Interceptor combined sewer. A discussion on the relocation of the Interceptor is included in Section 3.5.

Approval of Site Plans and a General Service Application are required from Boston Water and Sewer Commission (BWSC) for construction and activation of sewer, water, and storm drainage service connections. The sewer and water connections, as well as the Project's stormwater management systems, will be designed in conformance with BWSC's design standards, Requirements for Site Plans, Regulations Governing the Use of Sanitary and Combined Sewers and Storm Drains, and Regulations Governing the Use of the Water Distribution Facilities of the Boston Water and Sewer Commission.

3.8.2 Water System

3.8.2.1 Existing Water Service

BWSC owns, operates, and maintains the water distribution systems in the vicinity of the Project Site. According to available record plans from BWSC and the BRA, there is an existing 48-inch low pressure water main in Tremont Street closest to the Project Site that was built in 1946. Additionally, there is a 12-inch ductile iron (DI) low pressure main built in 1996 in the far side of Tremont Street. In Whittier Street, there is an 8-inch DI low pressure main constructed at an unknown date. There is an 8-inch cast iron (CI) main built in 1908 that ties into the main in Whittier Street and runs into the Site in the paper street, Hampshire Street. Per BWSC record plans, this main is capped approximately 150-feet into the property. According to record plans obtained from the BRA, however, this main extends through the full length of Hampshire Street on the Project Site. There is an existing fire hydrant, on the Project Site, connected to this main. In Vernon Street, which is also a paper street, there is a 12-inch CI, low pressure main built in 1896 that connects to the 12-inch main in Tremont Street, runs through the Project Site, and is capped approximately 230-feet southeast of the Project Site adjacent to the Madison Park Technical Vocational High School. There are three existing fire hydrants on or adjacent to the Project Site connected to this main as well as a 6-inch low pressure line that runs northeasterly in Downing Street that is capped approximately 250-feet from the main. The existing water distribution in the vicinity of the Project Site is shown on Figure 3-23.

3.8.2.2 Estimated Proposed Water Demand

The estimated proposed water demand for the Project is based on the estimated sanitary sewer flow (see Table 3-22), with a factor of 1.1 applied to account for consumption and other loses. Based on this formula, the Project's estimated peak water demand for domestic uses is 126,000-gallons per day. The proposed water demand calculation will be refined as the building program is further refined in future Article 80 filings with the BRA and coordinated with BWSC. The domestic water will be supplied by the BWSC water system.

Based on discussions with BWSC, there are no expected water capacity problems in the vicinity of the Project Site. Prior to full design, this will be confirmed by flow testing by BWSC. The Project's engineer will coordinate water demand and availability with BWSC during Project design to ensure the Project needs are met while maintaining adequate water flows to the surrounding neighborhood.

3.8.2.3 Proposed Water Service

Based on a preliminary meeting with Engineering Customer Service at the BWSC, the project will attempt to minimize the number of direct connections to the BWSC water mains in the area. To accomplish this, the Project will attempt to use a header service from a main in Tremont Street through the pedestrian corridors withinin the middle of the Project Site. Individual building service lines would connect to this header. The conceptual design of the proposed water utilities is shown in Figure 3-24. The size and location of this service header will be coordinated between the Project's engineer and the BWSC. All service connections from this header will be metered in accordance with BWSC requirements including the installation of meter transmission units (MTU's) to comply with BWSC's automatic meter reading system. Appropriate gate valves and backflow prevention devices will also be installed on each water service to allow individual services to be shut off and to prevent potential backflow of non-potable water or other contaminants into the public water supply.

The Project is also expected to include multiple fire protection services, which are also expected to come from this header pipe. The size and location of these service connections will be coordinated between the Project's engineer and the BWSC. Appropriate gate valves and backflow prevention devices will also be installed on each fire protection service to allow individual services to be shut off and to prevent potential backflow of non-potable water or other contaminants into the public water supply. If required, the Project will include internal booster pumps to ensure adequate water pressure to all standpipes and sprinkler systems.

The Project will include either the removal of the existing 12-inch main in Vernon Street as well as the existing 6-inch water line in Downing Street and removal or relocation of the existing 8-inch line in Hampshire Street depending on the extent to which it exists. Whether these lines are removed or relocated will be based upon a more detailed study of what, if any, properties are serviced by each line. This will be described in future Article 80 filings with the BRA.

In order to provide appropriate fire hydrants around the Project perimeter, a new water main will be looped from a main in Tremont Street, around the Project to the southwest and southeast, and connecting to the main in Whittier Street. If there are existing services from the 12-inch main in Vernon Street or the 6-inch main in Downing Street, these will be reconnected to this new looped main as well.

3.8.2.4 Water Supply Conservation and Mitigation

The Project will be LEED certifiable in accordance with the BRA's Article 37 Green Building program. As such, various water conservation measures such as low-flow toilets and urinals, restricted flow faucets, and sensor operated sinks, toilets, and urinals may be incorporated in order to meet the LEED water conservation requirements. Specific water conservation measures to be included in the Project will be more fully described as the building designs develop.

Figure 3-23: Existing Water Utilities

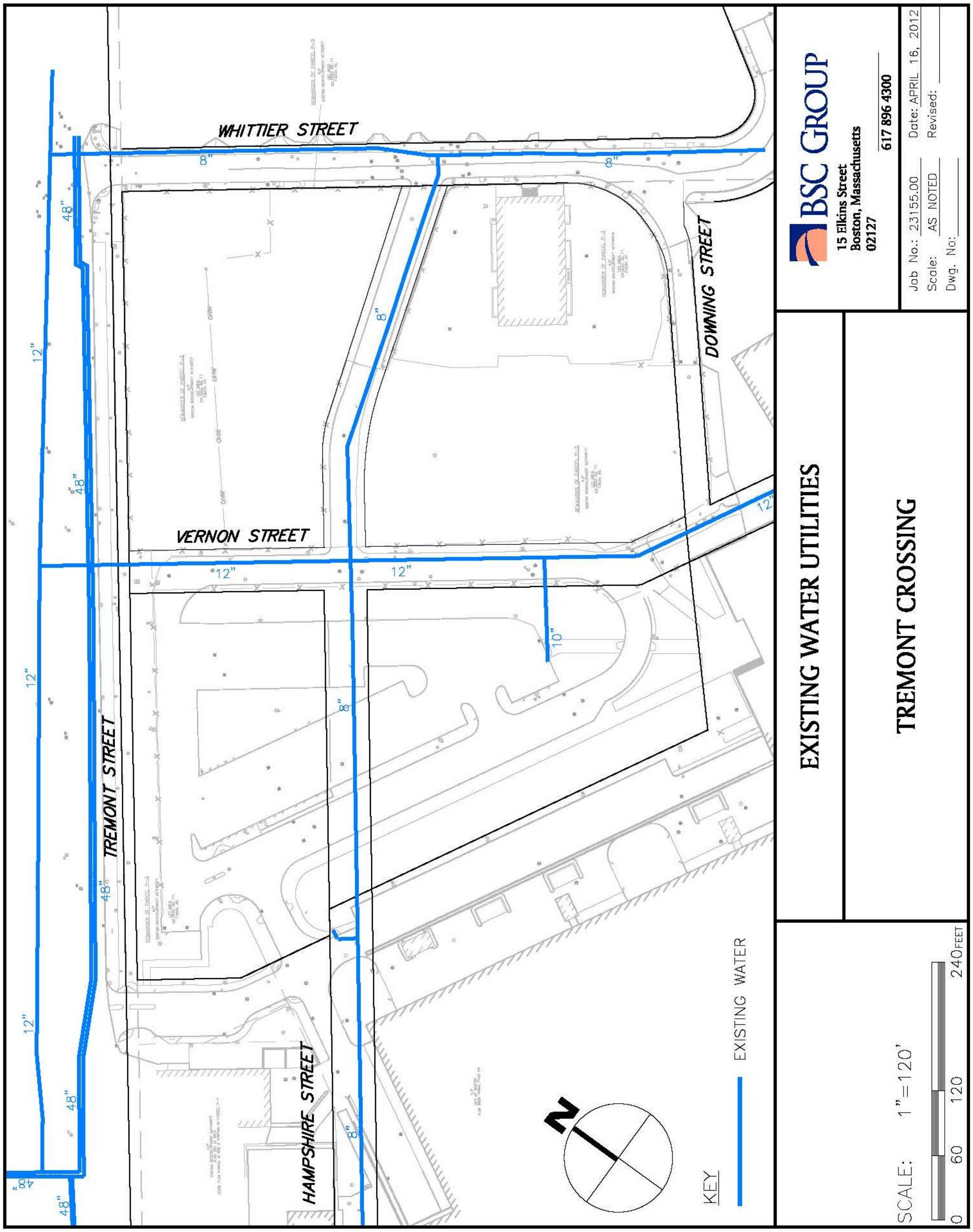
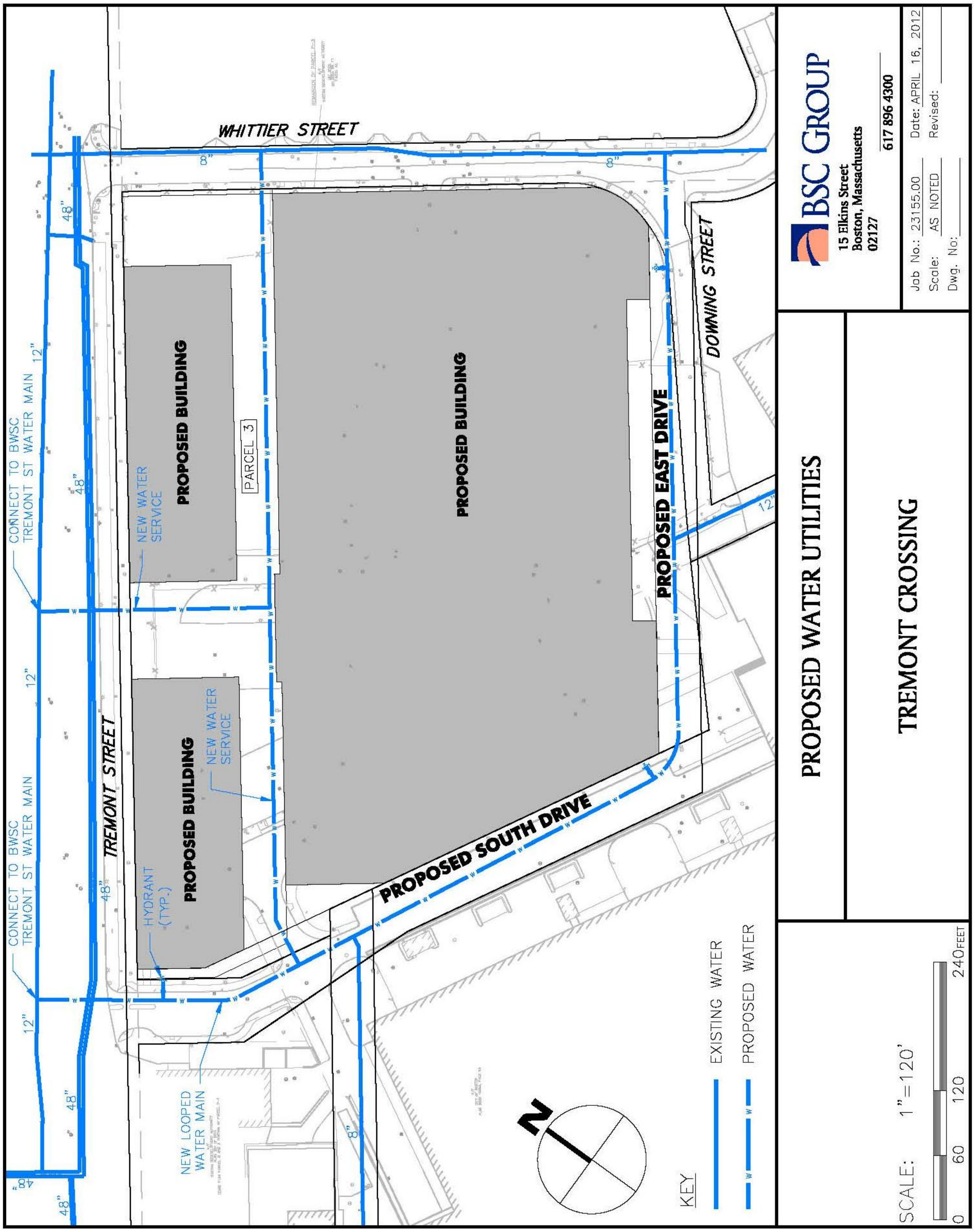


Figure 3-24: Proposed Water Utilities



3.8.3 Sanitary Sewer System

3.8.3.1 Existing Sanitary Sewer System

BWSC owns, operates, and maintains the sanitary and combined sewer mains on and in the vicinity of the Project Site. Per available record information from BWSC and the BRA, as well as the recently performed Site survey, there are separated sewer mains in Tremont Street, Whittier Street, and Downing Street surrounding the Project Site. Additionally, there are combined sewers in Whittier Street and Downing Street surrounding the Project Site and the Stony Brook Interceptor in Hampshire Street through the Project Site. The separated sewer in Tremont Street is a 12-inch main that flows to the northeast and connects to the combined sewer in Whittier Street. There are two 10-inch separated sewer mains in Whittier Street that connect to the Stony Brook Interceptor at the intersection with Hampshire Street – one from the northwest and one from the southeast. The combined sewer in Whittier Street is a continuation of the 72-inch by 96-inch Stony Brook Conduit combined sewer that begins in Downing Street and flows to the northwest. There are two 12-inch separated sewers flowing northeast in Downing Street that combine, turn southeast in Whittier Street, and connect to a combined sewer in Cabot Street. The existing sanitary and combined sewer system in the vicinity of the Project Site is shown on Figure 3-25. The separated and combined sewers ultimately flow to the Massachusetts Water Resources Authority's (MWRA's) Deer Island Wastewater Treatment Plant, where it is treated and discharged to Massachusetts Bay.

3.8.3.2 Estimated Proposed Sanitary Flow

The Massachusetts Department of Environmental Protection (MassDEP) establishes sewer generation rates for various types of establishments in a section of the State Environmental Code Title V (Title V), 310 CMR 15.203. Based on an estimate of the Project's building program, Table 3-22 gives the estimated proposed sanitary sewer flows expected to be generated by the Project. Based on these Title V sewer generation rates, the project is expected to produce approximately 114,500-gallons/day of sewer flow. The proposed sewer generation calculation will be refined as the building program is further refined in future Article 80 filings with the BRA and coordinated with BWSC.

Table 3-22: Sewer Generation

Unit Type	Program	Sewer Generation Rate	Sewer Flow (gpd)
Residential	300 bedrooms	110 gallons/day/bedroom	33,000
Retail / Arts	615,000 sq.ft.	50 gallons/day/1,000 sq.ft.	30,750
Office	210,000 sq.ft.	75 gallons/day/1,000 sq.ft.	15,750
Allowance for uses such as restaurants, supermarkets and other potential tenants and amenities.			35,000
Total Sewer Generation			**114,500**

In accordance with 314 CMR 7.00, the project will require a Sewer Connection Permit from MassDEP as it is expected to exceed the 50,000 gallons/day threshold. The Sewer Connection Permit will be submitted to BWSC at the same time as the Site Plan package for review and approval as the municipal sewer system owner. Upon approval from BWSC, the permit will be forwarded to MassDEP for review and approval. As part of the Sewer Connection Permit, it is expected that the Project will need to eliminate inflow and infiltration (I/I) into the BWSC sewer system at a rate of 4-gallons for every 1-gallon of new sewer flow, initially calculated at 458,000-gallons/day. The Project's proponent and engineer will work with BWSC to determine where this I/I elimination may be performed.

Based on preliminary calculations and discussions with BWSC, there are no expected sewer capacity problems in the vicinity of the Project Site. The Project's engineer will coordinate final, proposed sewer flows and available capacity with BWSC during Project design to ensure the Project needs are met without disruption of service to the surrounding area.

3.8.3.3 Proposed Sanitary Sewer Connections

Due to the size of the Project and the expected locations of various buildings on the Project Site, it is expected to require multiple service connections to the BWSC sewer systems in the surrounding streets. Service connections may occur in Tremont Street and/or Whittier Street as well as to the relocated Stony Brook Interceptor in the rear (south) of the Project Site. The size and location of these service connections will be coordinated between the Project's engineer and the BWSC. Based on a preliminary meeting with Engineering Customer Service at the BWSC, the Project will attempt to distribute the sewage flows to the various mains around the Project to minimize impacts to any one sewer. Any restaurant space will include separate sewers from the kitchen(s) through appropriately sized grease trap(s). Floor drains from the covered levels of the parking garage will be collected and routed through an approved oil/grease separator prior to discharge into the sanitary sewer system.

All sewer connections will be constructed so as to minimize effects on adjacent streets, sidewalks, and other areas within the public right-of-way. All sewer service connections will be kept separate from storm drain connections in accordance with BWSC requirements. However, sewer and storm drain connections may be made to the same combined sewer main. Where connecting to a combined sewer system, these separate connections will be provided to allow future connections to separated sanitary and storm drain systems when they are constructed by BWSC.

3.8.3.4 Sewer System Mitigation

As previously state, the Project will be LEED certifiable in accordance with the BRA's Article 37 Green Building program. As such, various measures for water conservation and wastewater reduction such as low-flow toilets and urinals, restricted flow faucets, and sensor operated sinks, toilets, and urinals may be incorporated in order to meet the LEED requirements. Specific water conservation and wastewater reduction measures to be included in the Project will be more fully described as the building designs develop.

3.8.4 Storm Drainage System

3.8.4.1 Existing Storm Drainage System

The existing Project Site is a combination of paved parking lot, one building, grassed areas, and lightly wooded areas. Runoff from portions of the active parking lot in the southwest side of the Project Site currently flows into catch basins that connect to the BWSC drainage system. Runoff from the remainder of this parking lot, as well as from the grassed and lightly wooded areas on Site, sheet flows off Site to the various surrounding streets and/or properties. While it is not clear where runoff from the roof of the existing building is directed, there are catch basins that collect runoff from the paved area surrounding this building and direct it to a drainage main in Downing Street that connects to the combined sewer in that same street.

The Natural Resources Conservation Service (NRCS) Soil Survey lists the Site as roughly evenly split between Urban Land, Udorthents, loamy, and Udorthents, wet substratum. Urban land is an area that is sufficiently covered by buildings and/or pavements that determining the existing soils types cannot be performed. Udorthents is a soil type made up of human transported fill and can vary greatly over a given Site. Therefore, it will be necessary to perform test pits for soil evaluation prior to design of any stormwater management systems.

3.8.4.2 Proposed Storm Drainage System

The proposed stormwater management system will be designed to comply with BWSC requirements. Stormwater runoff will be collected and treated, as necessary, on Site and will be routed to infiltration systems to the maximum extent practicable in an effort to reduce the impact on the BWSC drainage system. Appropriate stormwater best management practices (BMP's) will be included in the project to improve the quality of stormwater runoff discharged from the Project Site, to promote infiltration to groundwater, and to reduce the peak flows to below existing levels. Based on preliminary discussions with Engineering Customer Services at the BWSC, the Project will most likely include one significant connection to the BWSC 30-inch by 42-inch drain main in Tremont Street. Overflow from the underground infiltration areas due to larger, less frequent storm events will be routed to this connection and discharged to the BWSC drain system. Specific BMP's proposed for the Project will be described in more detail in future Article 80 filings with the BRA. A long term operations and maintenance plan will be prepared to assist the Property Manager in maintaining the stormwater BMP's in appropriate operational condition. The conceptual layout of both the sanitary sewer and storm drainage sewer systems are shown in Figure 3-26.

Since the Project will disturb more than one acre of land, construction will require the submittal of a Notice of Intent (NOI) for coverage under the Construction General Permit (CGP) as part of the Environmental Protection Agency's (EPA's) National Pollutant Discharge Elimination System (NPDES). Conformance with NPDES will require the preparation of a Stormwater Pollution Prevention Plan (SWPPP) for the Project's construction and performance of applicable SWPPP Site inspections. As part of conformance with the SWPPP and NPDES, appropriate erosion and sedimentation (E&S) controls will be installed to prevent sediment laden stormwater runoff from leaving the Site and entering the BWSC drainage system. E&S controls may include structural methods such as catch basin inlet controls, haybales, silt fence, and silt socks as well as non-structural methods such as minimizing the extent and duration of exposed soils. E&S controls will be maintained as necessary until all disturbed areas have been stabilized through the placement of pavement, structure, or established vegetative cover and will conform to the Water Quality section of the City of Boston Environment Department Guidelines for Construction.

Figure 3-25: Existing Sewer and Drain Utilities

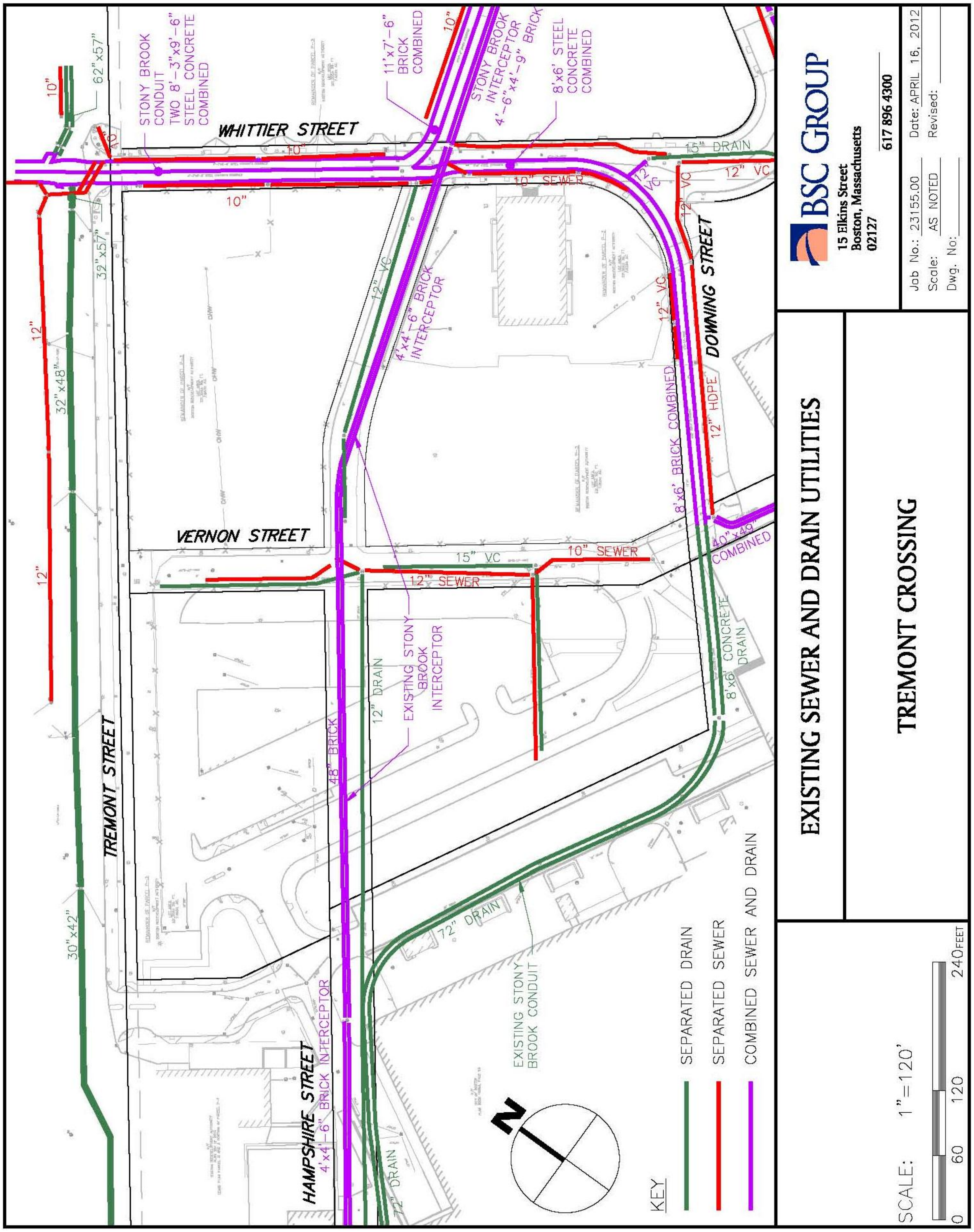
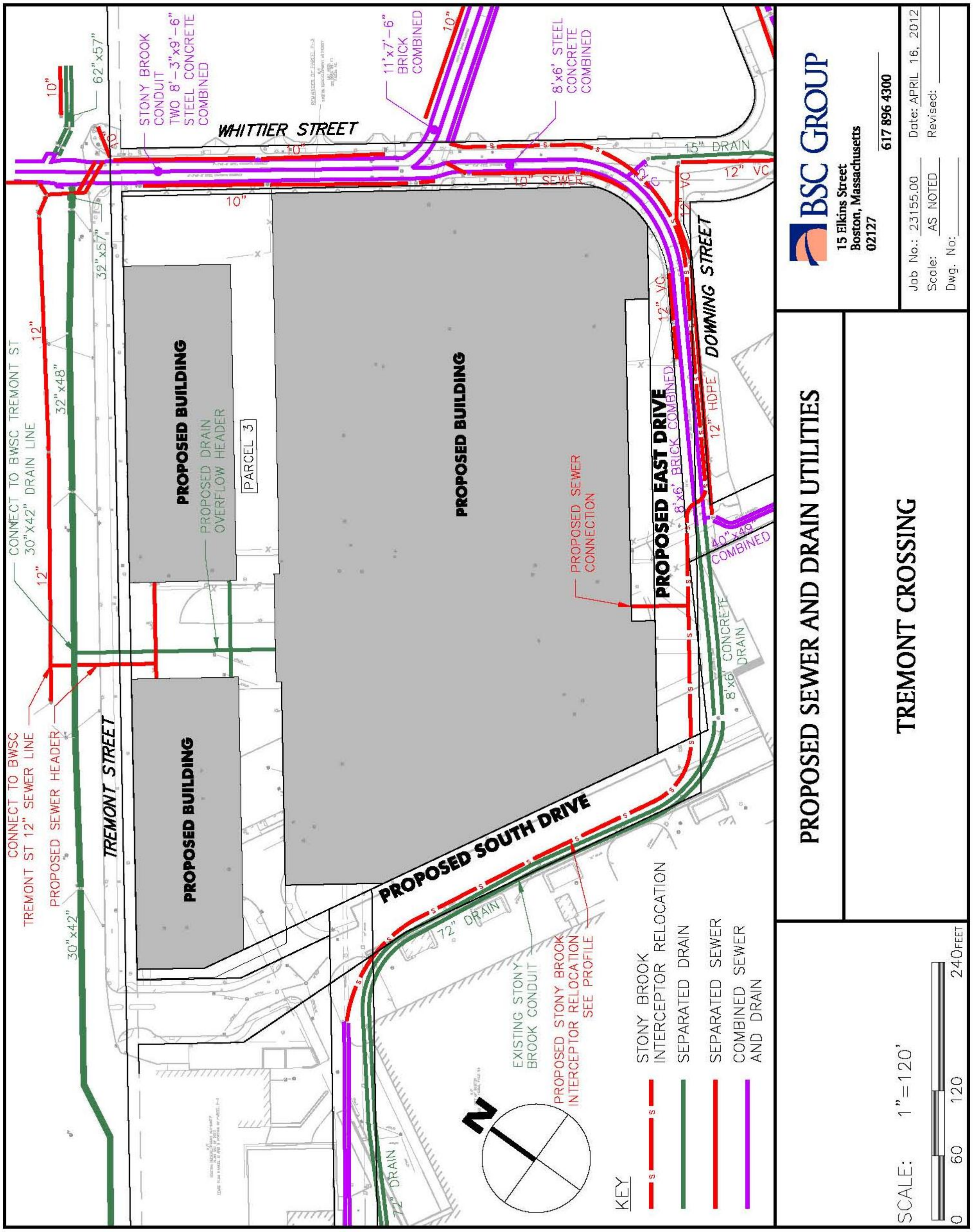


Figure 3-26: Proposed Sewer and Drain Utilities



3.8.5 Energy and Telecommunications

According to available record data, there are existing natural gas mains adjacent to the Project in Tremont Street, Whittier Street, and Downing Street as well as through the Project Site in both Vernon and Hampshire Streets. These mains are owned, operated, and maintained by National Grid. It will be necessary to remove the existing mains in Vernon and Hampshire Streets or to relocate them around the Project Site prior to construction. The Project engineer will coordinate removal or relocation of these mains as well as service requirements and locations with National Grid and the City as necessary.

Record plans provided by NSTAR Electric show electic distribution lines adjacent to the Project Site in Tremont Street, Whittier Street, and Downing Street as well as through the Site in Vernon Street. The distribution lines in Vernon Street will need to be removed or relocated around the Project Site to facilitate construction. The Project engineer will coordinate removal or relocation of the distribution lines as well as electrical service requirements for the Project with NSTAR and the City as necessary. Figures 3-27 show existing gas and electric utilities and conceptual relocation of gas and electrical utilities around the Project Site respectively.

Based on available record plans, telecommunications lines are available at the Project Site. The Project engineer will coordinate requirements and design of telecommunications services with the appropriate utility company. The conceptual layout of the utility relocations are shown in Figure 3-28.

There are existing street lights on both Tremont and Whittier Streets. As part of the improvements made to both streets as well as the construction of the new roads to the southwest and southeast of the Project Site, new street lighting will be installed. This street lighting will conform to the requirements of the City of Boston Public Works Department, Street Lighting Division.

Figure 3-27: Existing Gas and Electric Utilities

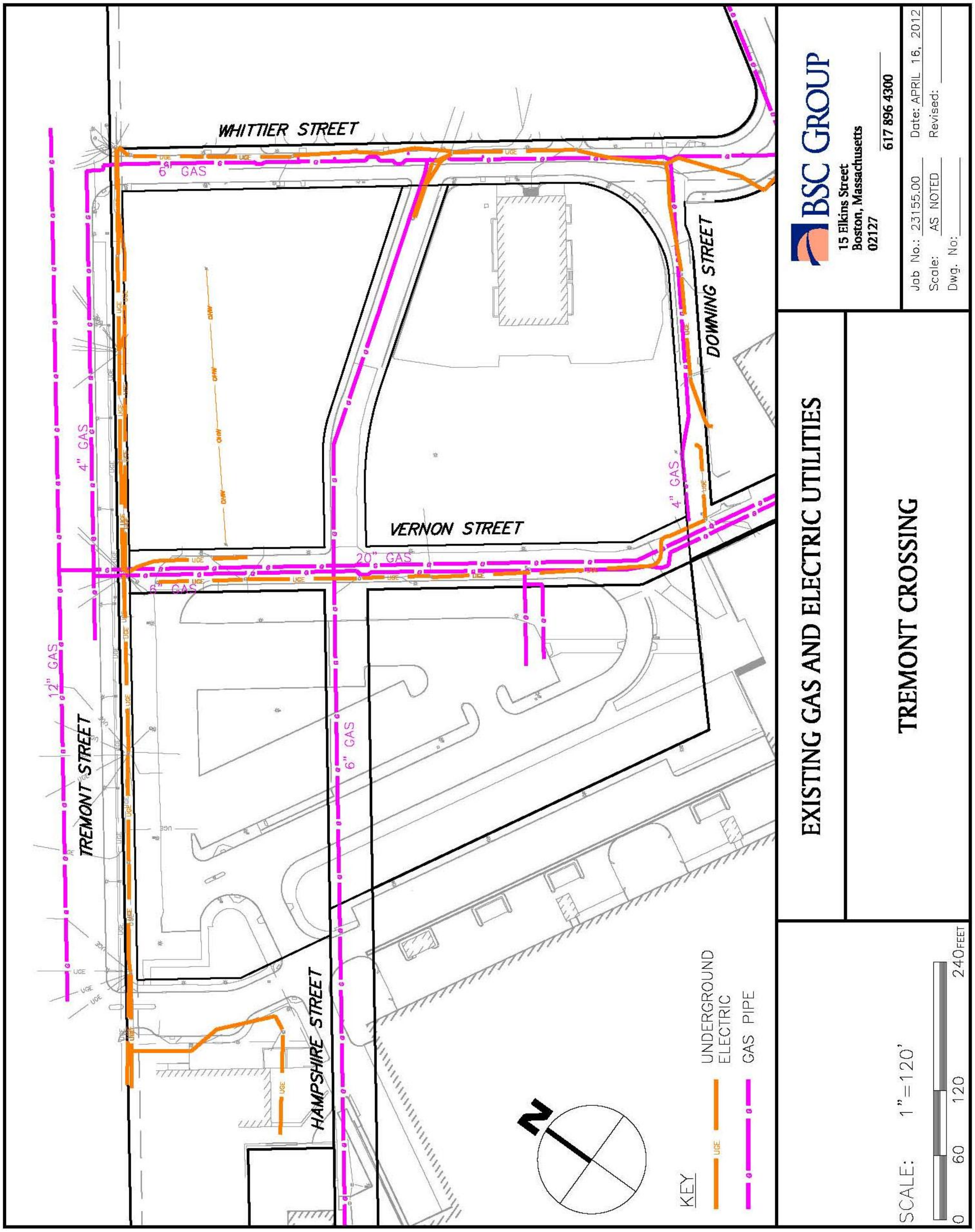
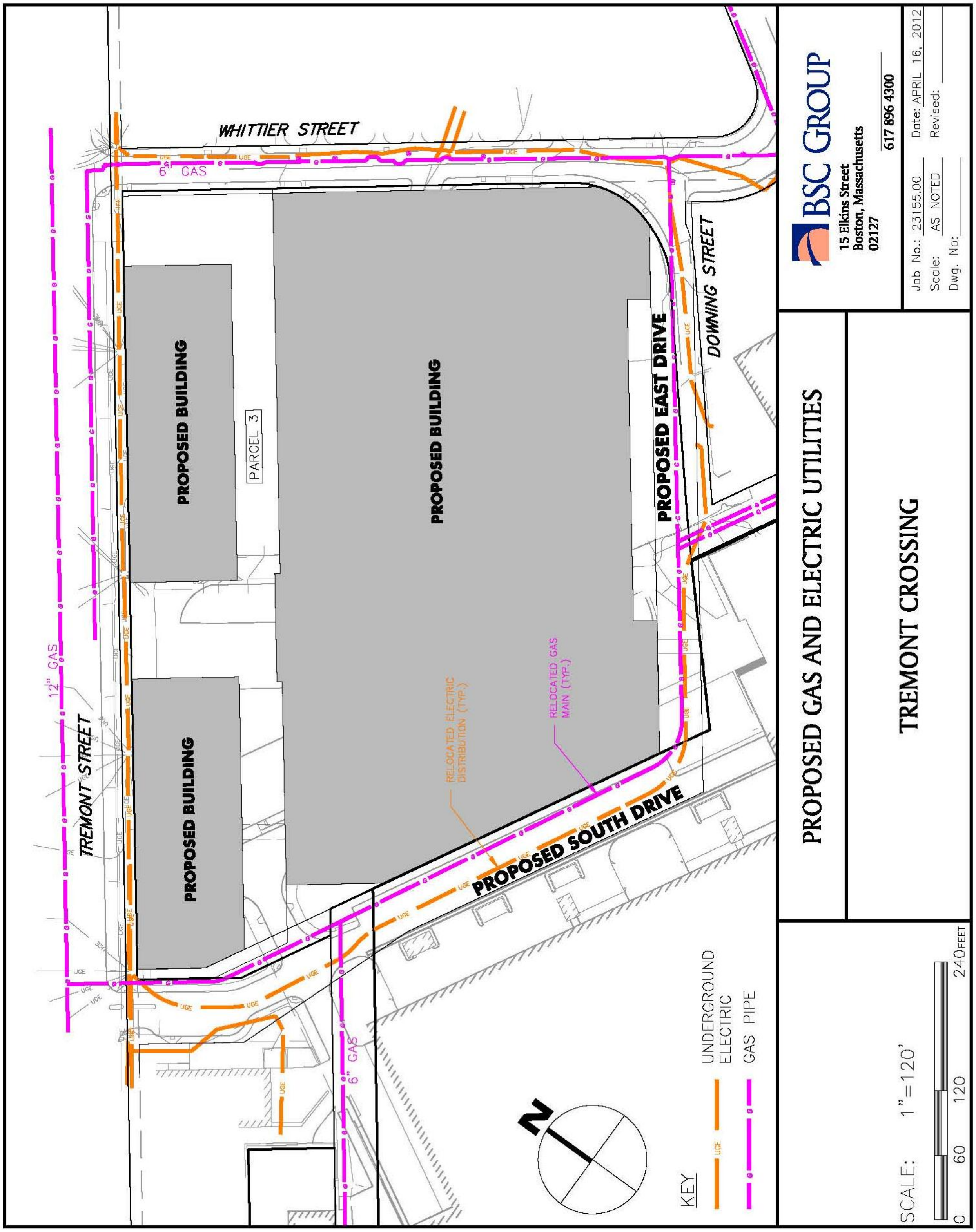


Figure 3-28: Proposed Gas and Electric Utilities



3.8.6 Roadway Network

Currently, the paper streets Vernon Street and Hampshire Street run north-south and east-west through the Project Site. In addition, the paper street Downing Street runs along the southeastly side of the Site from Whittier Street to Vernon Street. These streets are shown on Figure 3-29. In order to facilitate construction of the Project, each of these paper streets will be discontinued through the street discontinuance process with the Boston Public Improvement Commission (PIC). Based on preliminary meetings, these discontinances are acceptable to PIC, the City of Boston Public Works Department (PWD), and the City of Boston Transportation Department (BTD). The proposed limit of discontinuation is shown on Figure 3-30.

To provide access to and circulation around the Project Site, two new roads are proposed. South Drive and East Drive will be located along the southwest and southeast Site of the Project Site respectively. The ultimate status of these roads as public or private ways will be determined through discussion with PWD, BTD, and PIC. Additionally, the Project calls for the existing Whittier Street right-of-way, adjacent to the Project Site, to be widened to 44.5-feet. This will require approximately 4.5-feet of Parcel-3 to be conveyed to the City to be included in the new right-of-way. The widening allows this portion of Whittier Street to provide two-way travel while maintaining an 8-foot parking lane on the northeast side and a minimum of 7-foot walkways on both sides of the street.

The modifications to the Proposed Roadway Network are shown on Figure 3-31. In addition to the meetings described above, meetings have occurred with the abutting Madison Park High School to discuss how these modifications will impact their facility and operation. On-going dicsussion with all mentioned parties will continue as the roadway network is further developed.

Figure 3-29: Existing Roadway Network

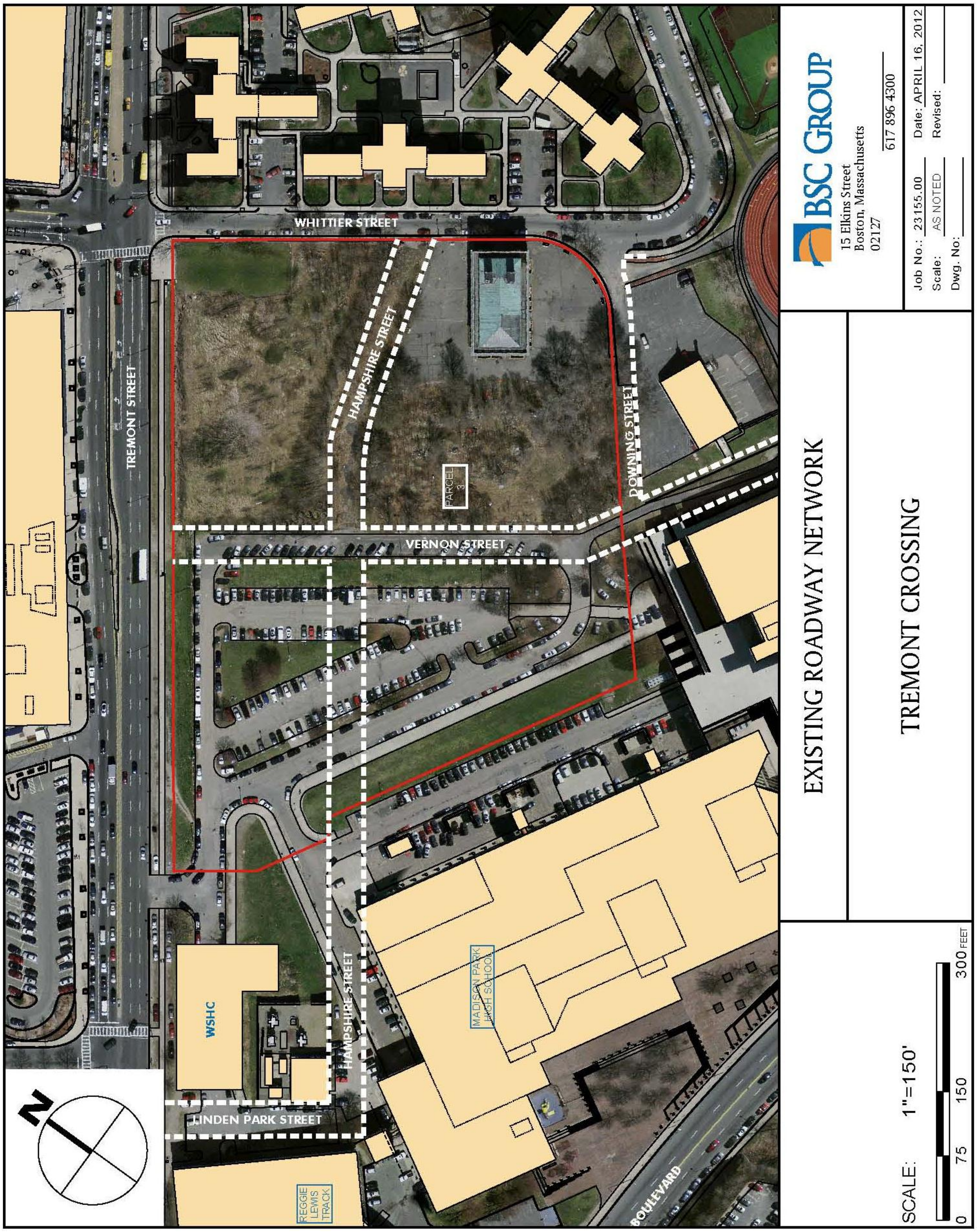


Figure 3-30: Existing Right of Ways To Be Discontinued

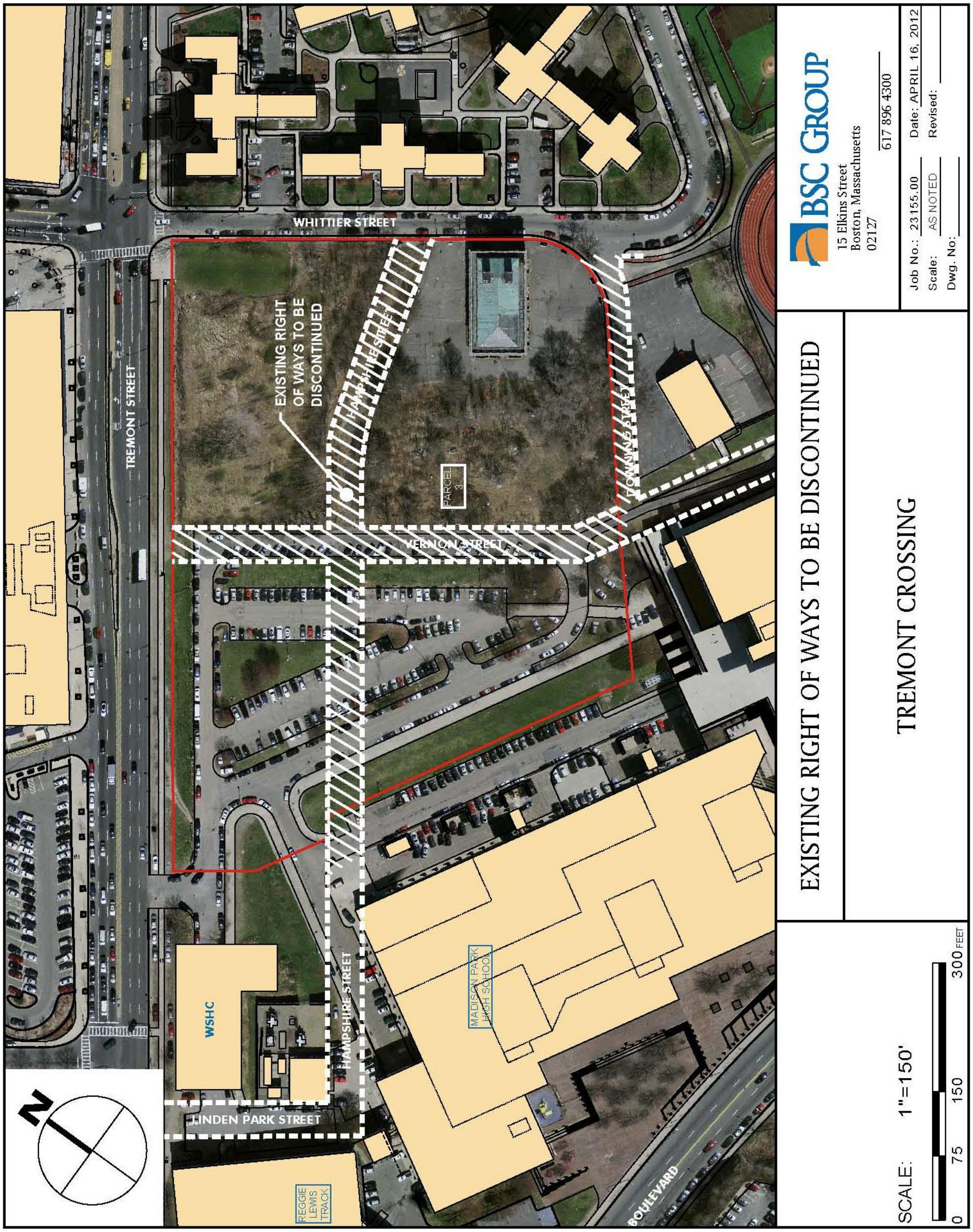
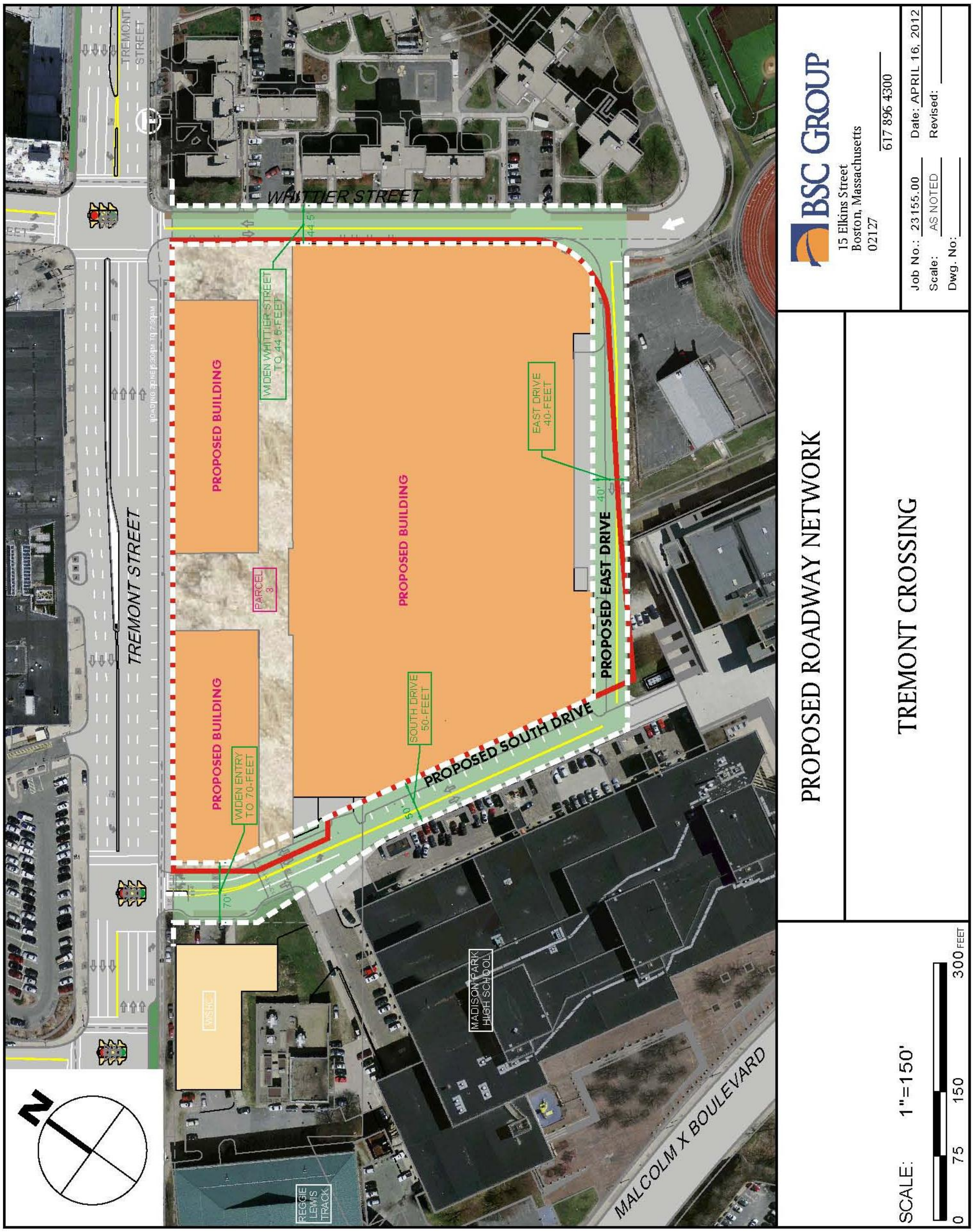


Figure 3-31: Proposed Roadway Network



3.8.7 Existing Conditions Survey

In order to better understand the existing conditions and infrastructure on and immediately adjacent to the Project Site, a topographic survey and perimeter survey was performed. The primary objectives of the survey were to confirm the limits of Parcel-3 available for development of buildings, identify locations of existing public roadways adjacent to and within the project Site, collect information on portions of adjacent parcels to identify elements that may be impacted by improvements to the existing and proposed roadway networks, locate key utilities to better understand infrastructure revisions required, and more accurately understand how the proposed development items relate to the existing conditions surrounding the development.

Figure 3-32 is a reduced image of the Existing Conditions Plan which depicts the scope and limit of the survey completed to date. Figure 3-33 shows the boundary of Parcel-3 with bearings, distances and overall parcel area. It should be noted that the perimeter defined as the Project boundary was coordinated with the BRA legal staff and does not include all of the land within the currently defined Parcel-3. A portion of Parcel-3, immediately adjacent to Tremont Street, contains an easement over a portion of land which was previously part of the Tremont Street layout. It has been identified that this portion of land is intended to be recombined with Tremont Street and become part of the public Right-of-Way in the future. Therefore, this portion of land has not been included within the development perimeter.

<u>Other Parcels anticipated to be impacted by the development of the roadway network</u>

As identified in this document, the Project has been designed to maintain all building footprints within the defined development perimeter of Parcel-3. Given the nature of this development and the existing property improvements adjacent to the Site, the Project is proposing to modify and redefine the existing roadway network. Figure 3-34 shows portions of adjacent parcels that are expected to be impacted by the roadway network. The South Drive is proposed over portions of Parcel 3 (BRA controlled), Parcel 3-H (BRA controlled) and Parcel-1 (City of Boston controlled) and existing public ways (City of Boston controlled). The East Drive is proposed over portions of Parcel-3 (BRA controlled), Parcel-1 (City of Boston controlled), and adjacent parcels along the southerly side of Downing Street (BRA controlled), and existing public ways (City of Boston controlled). The Whittier Street widening required to accommodate 2-way traffic on a portion of Whittier Street is proposed over a portion of Parcel-3 (BRA controlled).

In this regard, a Letter of Cooperation is included herein (Appendix 1), which memorializes an understanding in concept between the Proponent and BPS.

Figure 3-32: Existing Conditions

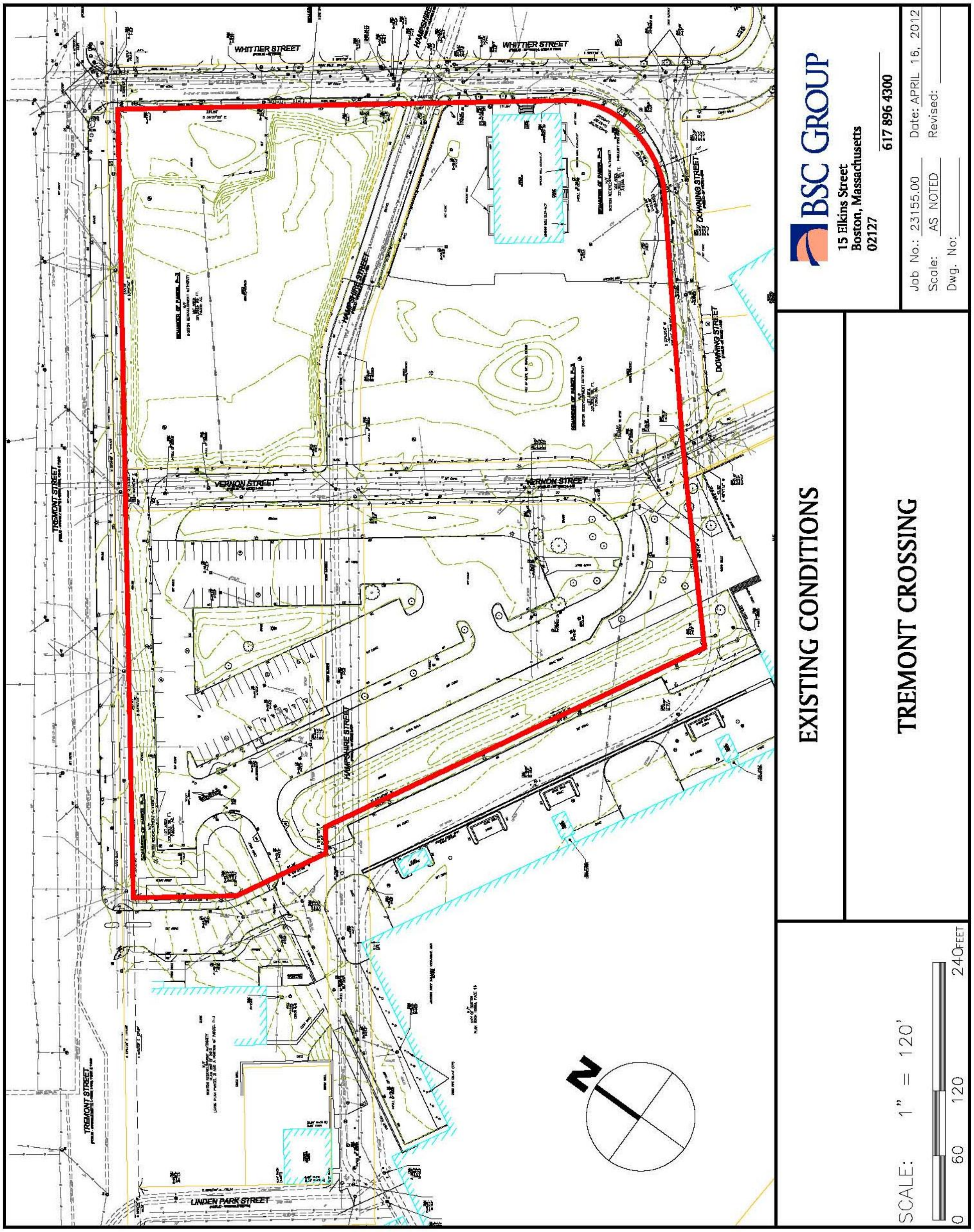


Figure 3-33: Parcel P-3 Perimeter Exhibit

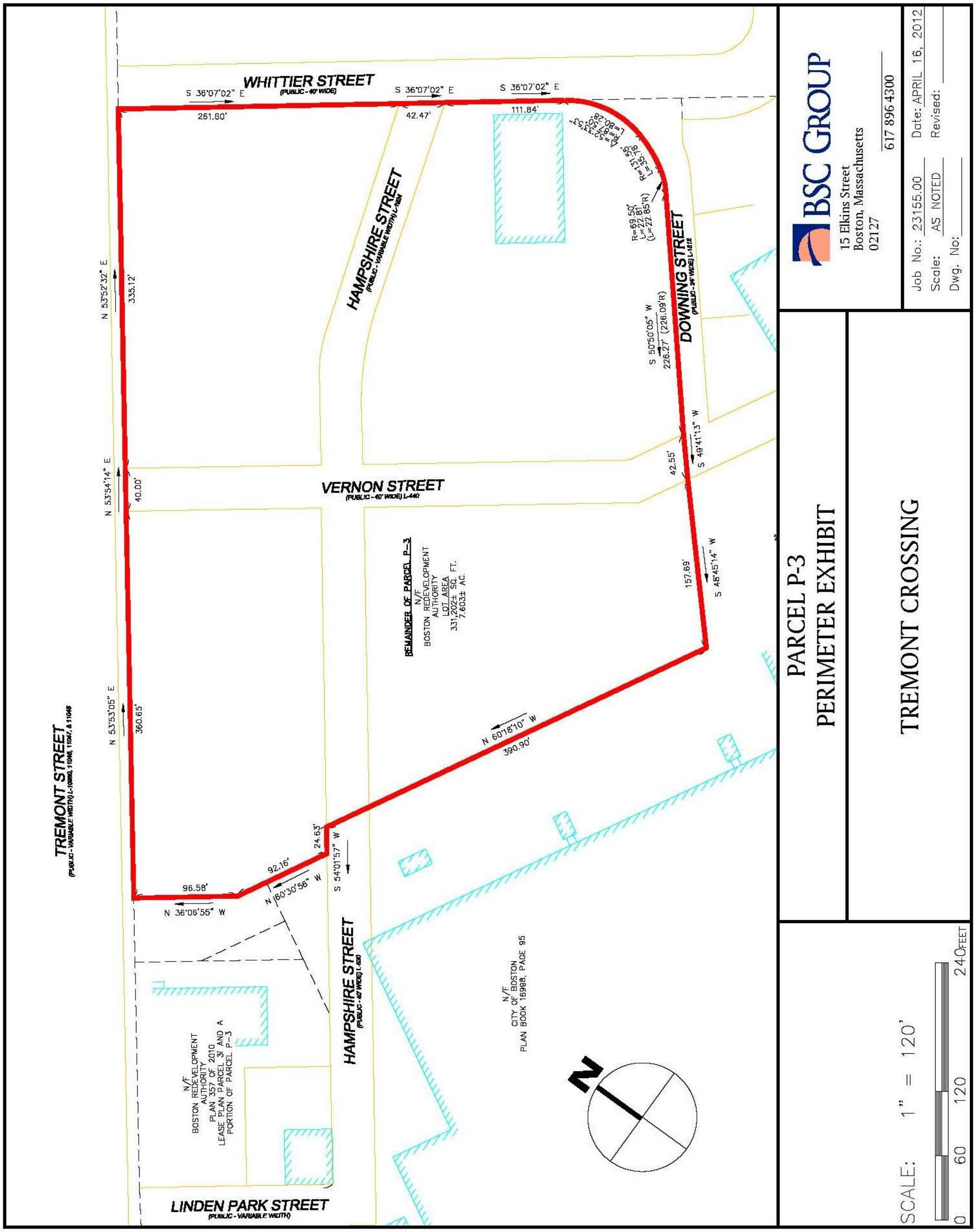
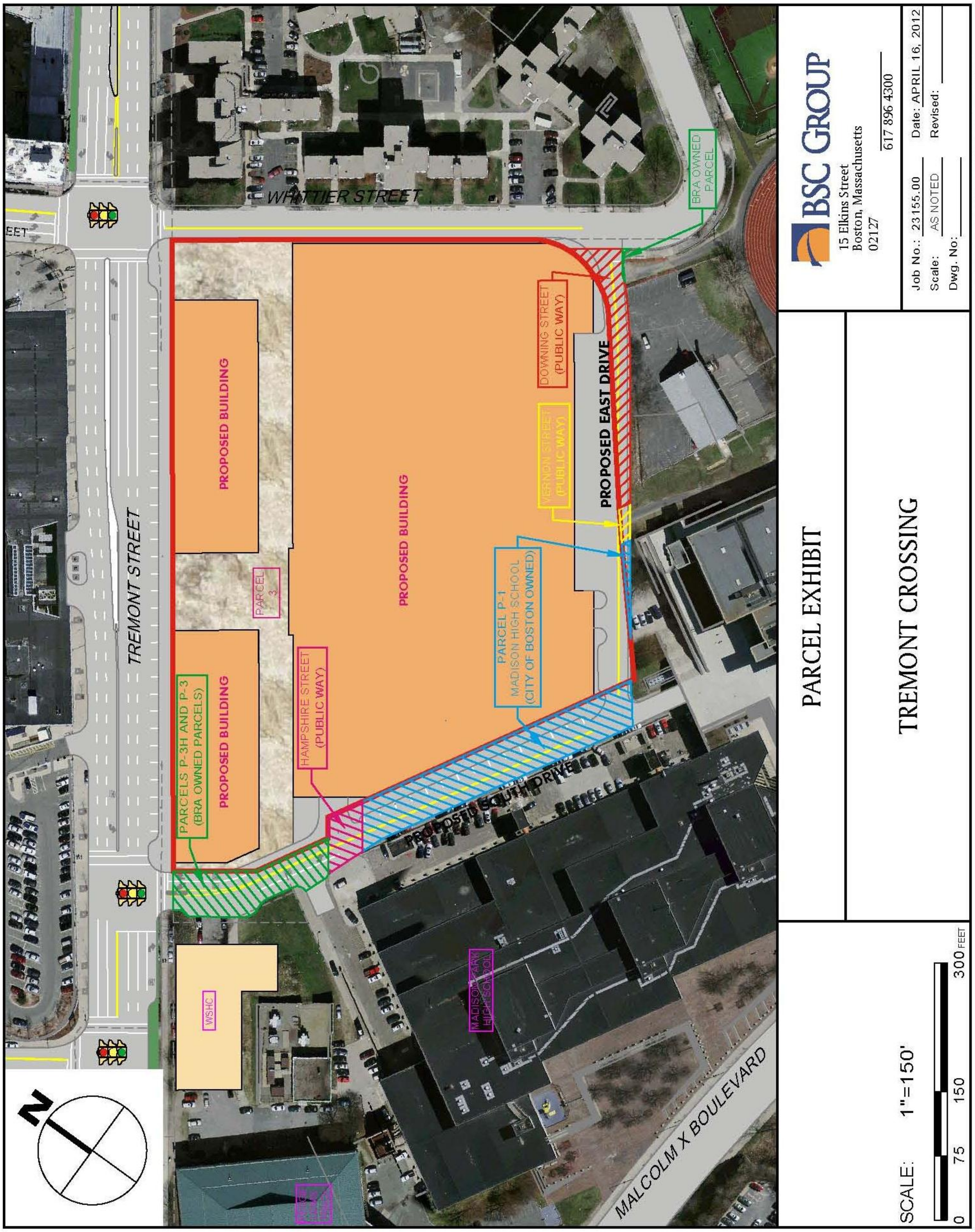


Figure 3-34: Parcel Exhibit



4.0 COORDINATION WITH OTHER GOVERNMENT AGENCIES

4.1 Architectural Access Board Requirements

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

4.2 Boston Civic Design Commission

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

4.3 Other Permits and Approvals

Section 1.5 of this PNF lists agencies from which permits and approvals for the Project will be sought.

Additionally, the Project Site has been designated as necessitating a Public Involvement Plan (PIP), by mandate of a neighborhood petition. The PIP pertains to the environmental remediation component of the site. There will need to be a public hearing regarding the PIP and a requisite written agreement to be delivered to the BRA.

4.4 Community Outreach

The Proponent is committed to effective and meaningful community outreach and will engage the community to ensure public input on the Project.

5.0 PROJECT'S CERTIFICATION

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

APPENDIX 1

LETTER OF COOPERATION WITH BOSTON PUBLIC SCHOOLS

BOSTON PUBLIC SCHOOLS

OFFICE OF THE SUPERINTENDENT

April 13, 2012

Mr. Edmund Barry Gaither
Mr. Barry E. Feldman
P-3 Partners, LLC
300 Walnut Street
Roxbury, MA 02119

Re: Letter of Cooperation- Tremont Crossing Development

Dear Messrs. Gaither and Feldman:

This Letter of Cooperation is in reference to the ongoing conversations that Boston Public Schools ("BPS") and P-3 Partners, LLC ("P-3 Partners" or the "Developer") have had regarding the mixed-use, development project at the site that is commonly referred to as Parcel P-3 in Roxbury, Massachusetts ("Parcel P-3" or the "Development Site"). In that regard, it is the understanding of BPS that the Developer's project will consist of approximately one million square feet of uses that will include both large and small format retail, multifamily residential, office space, a cultural/museum facility and a multi-level Parking Facility consisting of approximately 1,700 parking spaces (the "Project"). To that end, the Developer has represented that all of the aforementioned uses and the Parking Facility will be located on Parcel P-3. However, P-3 Partners has indicated to BPS that the viability of the Project necessitates that a portion of land that is owned in part by BPS and also by the Boston Redevelopment Authority (the "BRA") be shared with and/or utilized by the Developer (the "Shared Access"). This Shared Access would be used by P-3 Partners for the purpose of vehicular access to the Project and for the relocation of the Stony Brook Interceptor (the "Interceptor"), which is a fifty-four (54) inch sanitary sewage and storm drain that currently bisects Parcel P-3.

Specifically, the Developer has identified the Shared Access as consisting of the existing drive lane that is currently utilized by the Madison Park Technical Vocational High School

("MPHS") as a means of access to the school's parking facilities and for a portion of their street parking (the "Existing Drive Lane"). The Existing Drive Lane emanates from Tremont Street and continues in a southeasterly direction for approximately six hundred (600) feet with a terminus at the entrance to a building structure that consists of various facilities of the MPHS, including a parking structure and receiving and loading for the school's deliveries. It is recognized by BPS that the first approximately two hundred (200) feet of the Existing Drive Lane is currently owned by the BRA and is located on land that is a part of Parcel P-3. The aforementioned portion of the Existing Drive Lane that is owned by BPS consists of the remaining approximately four hundred (400) feet of drive lane ("BPS Owned Land"). The Developer has proposed to BPS that the Shared Access be used in a capacity whereby MPHS has continued access to its building and parking facilities and in a manner which will also allow for access to the Project's Parking Facility in addition to connecting the Project's circulation to a secondary means of ingress/egress at Whittier Street.

Additionally, P-3 Partners has indicated that the Project would sit atop the Interceptor, making the necessary access for maintenance impossible. Therefore, it has been determined by the Developer that a portion of the Interceptor will need to be rerouted around the back southeasterly side of the Project (the "New Sewer Route"). The Developer has indicated to BPS that the New Sewer Route would include portions of the BPS Owned Land.

Further, it has been represented by P-3 Partners, that relative to their investigation into the impact of the Shared Access, that they have conducted a series of field studies of the MPHS parking inventory in order to quantify the number of parking spaces that are being utilized by the school. Their findings are as follows: The MPHS currently utilizes approximately forty-five (45) parking spaces along the BPS Owned Land. Thirty-four (34) of these spaces are striped, head-in parking that are along the north side of the drive, adjacent to Parcel P-3. The Developer has determined that in order to facilitate its traffic circulation program and for reasons of safety that these head in spaces would need to be replaced by approximately fourteen (14) parallel parking spaces. This would result in a loss of approximately twenty (20) spaces. Additionally, MPHS utilizes the south side of the BPS Owned Land (along the Existing Drive Lane) for parallel parking. The exact number of such spaces is approximate, as parking in this area is not striped and is done in an improvised manner. However, through several field studies, the Developer has determined that there are approximately eleven (11) such spaces currently in use. It has also been determined by the Developer that all of these spaces would be utilized for a new traffic lane in the Shared Access. Thus, in total, MPHS would have approximately thirty-one (31) Authorized Parking spaces displaced as a result of the construction of the Project.

In addition to the aforementioned authorized parking, MPHS currently utilizes an additional twenty-seven (27) spaces in an area of Parcel P-3 that is closest to the MPHS. It was indicated to the Developer by representatives of MPHS during one of the field studies that this was the "unofficial area" of Parcel P-3 where MPHS employees parked (hereinafter referred to as the Unofficial Parking Area). As a result of the Project's anticipated site plan, MPHS would no longer have use of the twenty-seven (27) parking spaces in the Unofficial Parking Area, as the Project's buildings would be occupying this portion of Parcel P-3. Thus, in total, the aggregate number of MPHS parking spaces that will be displaced by the Project would be fifty-eight (58) (including the thirty-one (31) Official Spaces and the twenty-seven (27) spaces in the Unofficial Parking Area).

Relative to the above, it is the position of BPS that it agrees in concept to a Shared Access with the Developer that would include portions of the BPS Owned Land. Further, it is recognized that this Shared Access would accommodate the relocation of a portion of the Interceptor. BPS looks forward to working out the specific details of such an arrangement and feels confident that based on the conversations that it has had with the Developer for over a year that a mutually satisfactory agreement can be achieved. The conditions of such an agreement would include, but not be limited to, a satisfactory plan of emergency preparedness, adequate access of MPHS delivery vehicles, parking engineering studies, drafting of mutually satisfactory easements for BRA and BPS land comprising the Existing Drive Lane and adequate consideration of the displaced MPHS parking spaces which would, in concept, include the following: The Developer will agree to replace the thirty-one (31) Authorized Parking Spaces that will be displaced in the Project's Parking Facility at its expense. Additionally, the Developer will agree to accommodate the replacement of the twenty-seven (27) spaces that will be displaced in the Unofficial Parking Area in the Parking Facility. However, it is recognized that the inclusion of these unauthorized spaces in the Parking Structure is predicated on the Developer entering into a financial arrangement with BPS and/or another City agency to cover the expense of replacing such spaces or leasing them at a market rate. BPS looks forward to our continued cooperation with P-3 Partners on these matters and to our memorializing them in a mutually satisfactory, binding agreement in the near future.

Sincerely,

Carol R Johnson

Dr. Carol R. Johnson
Superintendent Boston Public Schools

APPENDIX 2

RESIDENTIAL MARKET STUDY

KIRK&COMPANY

Residential Market Study
Tremont Crossing – Parcel 3

A proposed mixed-use development located
in the Roxbury neighborhood of **Boston,**
(Suffolk County), Massachusetts

Date of Report: February 3, 2012

Prepared by:

David S. Kirk, MAI, CRE®
Mass. Certified General
Real Estate Appraiser No. 1520

Brett N. Pelletier
Mass. Appraiser Trainee
Real Estate Appraiser No. 103241

Prepared for:

Jeffrey Feldman
Feldco Development
Two Canal Park, 5th Floor
Cambridge, MA 02141

REAL ESTATE COUNSELORS

99 SUMMER STREET, SUITE M120 BOSTON, MA 02110
TEL: 617-261-7100 FAX: 617-261-7910
EMAIL: dsk@kirkco.com

February 3, 2012

Jeffrey Feldman
Feldco Development
Two Canal Park, 5th Floor
Cambridge, MA 02141

RE: Tremont Crossing; Parcel 3, Boston, MA

Dear Mr. Feldman:

At your request we have inspected the subject property and reviewed the local real estate markets and sub-markets to help determine the likely highest and best use of the residential component of the proposed mixed-use development, demand for the residential use, and the competitive supply of the proposed Tremont Crossing. We have studied the subject market, spoken with market participants, and conducted research with the assistance of market participants and the Boston Redevelopment Authority (BRA). This study has been prepared for financial planning and due diligence assistance for decision making.

Tremont Crossing is a proposed mixed-use development of approximately one million square feet including commercial office, retail space, a parking garage, and community space, as well as the subject multifamily component. Tremont Crossing is to be developed on a parcel of approximately 8.33 acres located along the northwestern boundary of the Roxbury neighborhood of Boston, adjacent to the Fenway and Mission Hill neighborhoods of Boston.

The purpose of our assignment was to determine the likely highest and best apartment use including: the project size; the apartment unit distribution (household size and profile); rental pricing points; unit sizes and services to be offered; unit finishes and amenities; and project amenities and services. In addition, our assignment has evaluated the absorptive capacity of this location and the impact of affordable housing and the proposed overall mixed-use development on the multifamily subject property. Our comparative analysis and conclusions examine and compare the existing inventory and planned additions with your proposed development based on preliminary schematic plans for the subject property. Our analysis included recent and prospective trends in design, project size, pricing, finishes, services and parking by existing and likely competitive properties in the Boston neighborhood markets and other similar developments outside of the immediate local market. Based on the probable pricing range for the rental apartments and our analysis of the local competitive market, we established the market position for marketability for the proposed project and prospective absorption.

99 SUMMER STREET, SUITE M120 BOSTON, MA 02110
TEL: 617-261-7100 FAX: 617-261-7910
EMAIL: dsk@kirkco.com

Our analysis has included a survey of current price points within neighborhoods surrounding the subject property that might be attracted to the site. Additionally, we have studied and analyzed current and future project pipeline data and projected future pricing data. We have established a current market position for the proposed units at the subject property and have considered an implied rental range for the proceeding 12- to 18-months based on recent and historical pricing trends and current market projections. The property should provide adequate services to be competitive; and uses should be separated to the extent possible and include a clearly defined identity for each use within the project.

The estimates and conclusions in this report are subject to the statements of assumptions and limiting conditions included in the attached report. We are delighted to be of service to you. If you have any questions regarding the content of this report please feel free to contact us.

Sincerely,

David S. Kirk, MAI, CRE®

Brett N. Pelletier

TABLE OF CONTENTS

EXECUTIVE SUMMARY

The Assignment

Property address:	Tremont Street, Roxbury, Boston, Suffolk County, Massachusetts
Map Block Lot:	0902980010
Current Ownership:	Boston Redevelopment Authority
Effective date of value:	February 3, 2012
Special assumptions:	Refer to statements of assumptions and limiting conditions

The Property

Current Use:	Vacant Land
Parcel Size:	8.33 acres

ASSUMPTIONS AND LIMITING CONDITIONS

Special Assumptions and Limiting Conditions

1. For the preparation of this study, we have relied upon written documentation and verbal communication provided by Feldco Development and the Boston Redevelopment Authority regarding the proposed development project, physical description, and current status of the project and proposed projects.

Basic Assumptions and Limiting Conditions

1. It is assumed that the title to this property is good and marketable. The value estimate is given without regard to any questions of title, boundaries or encroachments. It is assumed that all assessments are paid. We assume the property to be free and clear of liens and encumbrances except as noted. No attempt has been made to render an opinion or determine the status of easements that may exist.

2. The legal description, included herein, should be verified by legal counsel before being relied upon or used in any conveyance or other document.

3. We are not familiar with any engineering studies made to determine the bearing capacity of the land. It is assumed that soil and subsoil conditions are stable unless specifically outlined in this report.

4. Any exhibits in the report are intended to assist the reader in visualizing the property and its surroundings. The drawings are not intended as surveys and no responsibility is assumed for their cartographic accuracy. Any drawings are not intended to be exact in size, scale or detail.

5. Our value estimate involves only the real estate and all normal building equipment if any improvements are involved. No consideration was given to personal property, (or special equipment), unless stated.

6. It is assumed that the property is subject to lawful, competent and informed ownership and management unless noted.

7. Information in this report concerning market data was obtained from buyers, sellers, brokers, attorneys, trade publications and public records. To the extent possible, this information was examined for accuracy and is believed to be reliable. Dimensions, area or data obtained from others is believed correct; however, no guarantee is made in that the appraisers did not personally measure same.

8. Any information, in whatever form, furnished by others is believed to be reliable; however, no responsibility is assumed for its accuracy.

9. The physical condition of the improvement described herein was based on visual inspection. Electrical, heating, cooling, plumbing, sewer and septic systems, mechanical equipment and water supply were not specifically tested, but were assumed to be in good working order, and adequate, unless otherwise specified. No liability is assumed for the soundness of structural members, since no engineering tests were made of same. The roof(s) of structures described herein are assumed to be good repair unless otherwise noted.

The existence of potentially hazardous material used in the construction or maintenance of the building, such as urea formaldehyde foam insulation and/or asbestos insulation, which may or may not be present on the property, has not been considered. In addition no deposit of toxic wastes, unless specifically mentioned herein have not been considered. The appraisers are not qualified to detect such substances and suggests the client seek an expert opinion from a qualified professional, if desired.

10. In addition, if the client has any concern regarding the structural, mechanical or protective components of the improvements described herein, or the adequacy or quality of sewer treatment plant, water or other utilities, it is suggested that independent contractors or experts in these disciplines, be retained by said client, before relying upon this appraisal.

11. Any valuation analysis of the income stream is predicated upon financing conditions as specified herein, which we have reason to believe are currently available for this property. Financing terms and conditions other than those indicated may alter the final value conclusions.

12. Expenses shown in the Income Capitalization Approach, are estimates only, and are based on past operating history if available, and are stabilized as generally typical over a reasonable time period.

13. The appraisers are not required to give testimony or appear in court because of having made this appraisal, with reference to the property in question, unless arrangements have been made previously hereto. If the appraisers are subpoenaed pursuant to court order, the client will be required to compensate said appraisers for their time at their regular hourly rates plus expenses.

14. All opinions, as to values stated, are presented as the appraisers' considered opinion based on the information set forth in the report. No responsibility is assumed for changes in market conditions or for the inability of the client or any other party to achieve their desired results based upon the appraised value. Further, some of the assumptions made can be subject to variation depending upon evolving events. Some assumptions may never occur and unanticipated events or circumstances may occur. Therefore, actual results achieved during the projection period may vary from those in the report.

15. The appraisal is made subject to satisfactory completion of construction, repairs, alterations, remodeling and rehabilitation, and is contingent upon completion of such work in a timely manner using good quality materials and workmanship and in substantial conformity to plans or descriptions or attachments made hereto.

16. It is assumed that the construction and use of the appraised property, complies with all public authorities having jurisdiction, including but not limited to the National Environmental Protection Act and any other applicable federal, state, municipal, and local environmental impact or energy laws or regulations.

17. Areas and dimensions of the property may or may not have been physically measured. If furnished by the principal or from plot plans or surveys furnished by the principal, or from public records, areas and dimensions are assumed to be reasonably accurate. In the absence of current surveys, land areas may be based upon representations made by the owner's

agents or the client. No responsibility is assumed for discrepancies, which may become evident from a licensed survey of the property.

18. It is agreed that the liability of the appraisers to the client is limited to the amount of the fee paid as liquidated damages. The responsibility of the appraiser is limited to the client, and use of this appraisal by third parties shall be solely at the risk of the client third parties.

19. A signatory of this appraisal report is a member or candidate for membership of the Appraisal Institute. The Bylaws and Regulations of the Appraisal Institute require each member and candidate to control the use and distribution of each appraisal report signed by such member or candidate. Therefore, except as hereinafter provided, the party for whom this appraisal report was prepared may distribute copies of this appraisal report, in its entirety, to such third parties as may be selected by the party for whom this was prepared. Selected portions of this appraisal report, however, shall not be given to third parties without prior written consent of the signatories of this appraisal report. Further, neither all nor any part of this appraisal report shall be disseminated to the general public by the use of advertising media, public relations media, news media, sales media or other media for public communication without the prior written consent of the signatories of this appraisal report. This restriction applies particularly as to the valuation conclusions, the identity of the appraisers, or any reference to the Appraisal Institute or the MAI designations.

20. Disclosure of the contents of this appraisal report is governed by the Bylaws and Regulations of the Appraisal Institute.

21. The Americans with Disabilities Act (ADA) became effective on January 26, 1992. A detailed analysis of the subject and the ADA could reveal that the property is not in compliance with one or more of the regulations of the act, which could have a negative impact on the value of the subject. However, since no evidence of compliance was provided, and a comprehensive survey of compliance is beyond the scope of the assignment, the possible non-compliance of the subject has not been considered in estimating the Market Value in this report.

Purpose

The purpose of the study is to help determine the likely highest and best use of the residential component of the proposed mixed-use development, demand for the residential use, and the competitive supply of the proposed Tremont Crossing.

Scope of the Study

The scope of this study includes inspecting the property, collecting market characteristics and trends, analyzing property and market data, and arriving at a conclusion of the likely highest and best use of the residential component of the proposed mixed-use development, demand for the residential use, and the competitive supply. Market inquiries and Kirk & Company files have been used to determine market rents. The specific methodology of data collection and analysis, verification and valuation is detailed within this report.

Use of the Study

This rent determination study has been prepared for the exclusive use of Feldco Development and their affiliates for financial planning and due diligence assistance for decision making.

Effective Date of Report

The date of this report is February 3, 2012 and the effective date of this report is February 3, 2012.

Identification of the Property

The subject property is located on Tremont Street in Boston, MA between Whittier Street and Malcolm X Boulevard and is referred to by the city of Boston as parcel 0902980010. The subject property consists of approximately 8.33 acres of vacant land area. The proposed development includes a residential component of a proposed a multi-story, mixed-use development of the site including 500,000 square feet of large-format retail, 50,000 square feet of smaller shops and restaurants, 200,000 square feet of Class A office space, 58,000 square feet of museum space, a parking garage of 1,900 spaces, and a large public plaza.

Image Source: Provided by Developer

Property Description

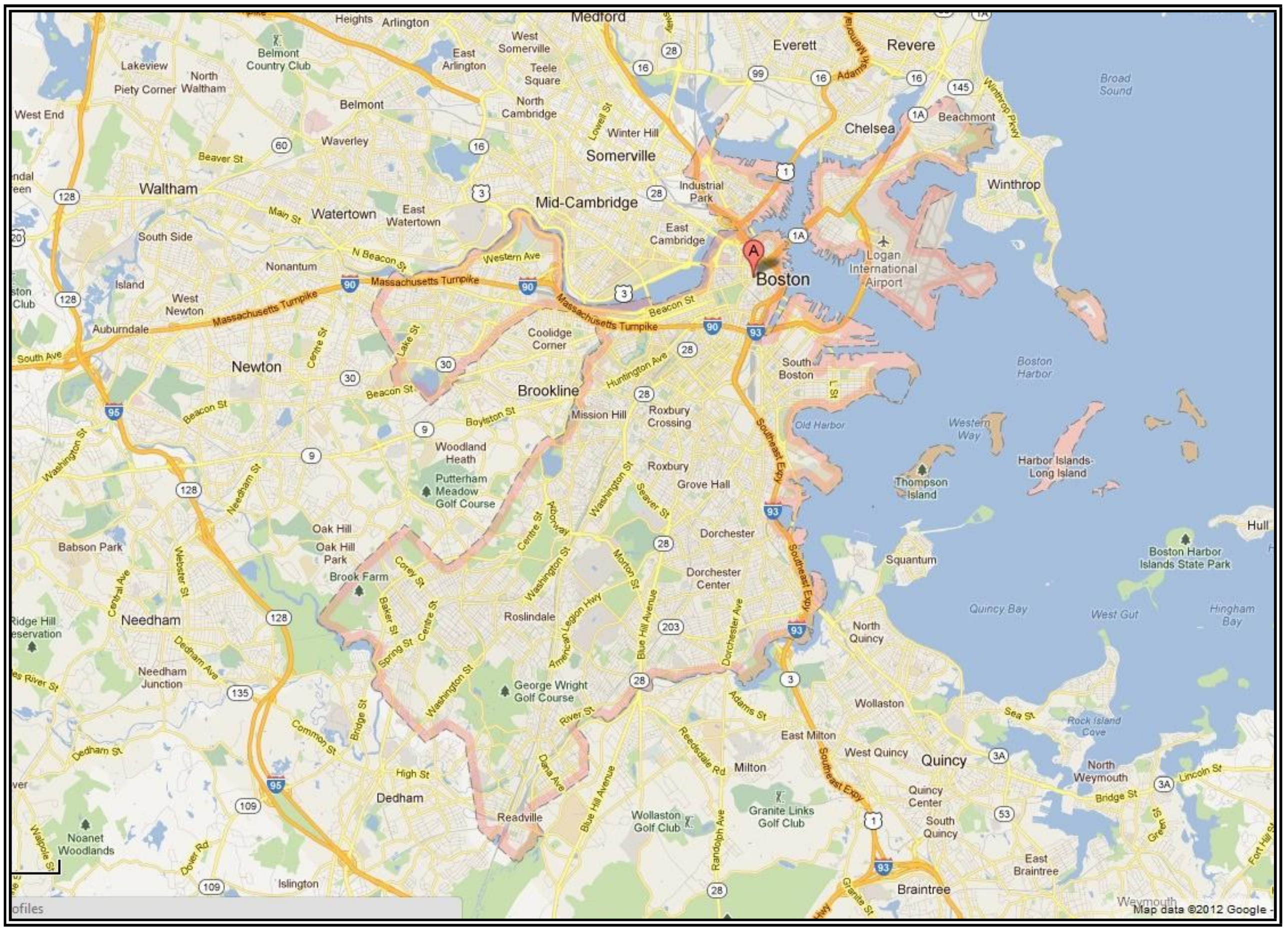
Tremont Crossing is a proposed mixed-use development of a vacant city-owned site within the northwest corner of the Roxbury neighborhood of Boston. The site, known as Parcel 3, is approximately 8.33 acres and is located along Tremont Street, directly across from the Boston Police Headquarters. In addition to the residential component of the project, the developer has proposed a multi-story, mixed-use development of the site to include 500,000 square feet of large-format retail, 50,000 square feet of smaller shops and restaurants, 200,000 square feet of Class A office space, 58,000 square feet of museum space, a parking garage of 1,900 spaces, and a large public plaza.

The property is well located within the Roxbury neighborhood of Boston amongst agglomerative uses such as residential, educational and institutional, commercial retail, and municipal. The subject property is particularly well-located within Roxbury along Tremont Street at the intersection with Whittier Street, between the blocks bounded by Melnea Cass Boulevard and Malcolm X Boulevard. The property is bounded by Tremont Street to the northwest, Whittier Street Housing (Boston Housing Authority) to the east and northeast, the Reggie Lewis Center, Madison Park High School, and Madison Park to the west and southwest of the project, as indicated by the below photograph.

Photo Source: Google

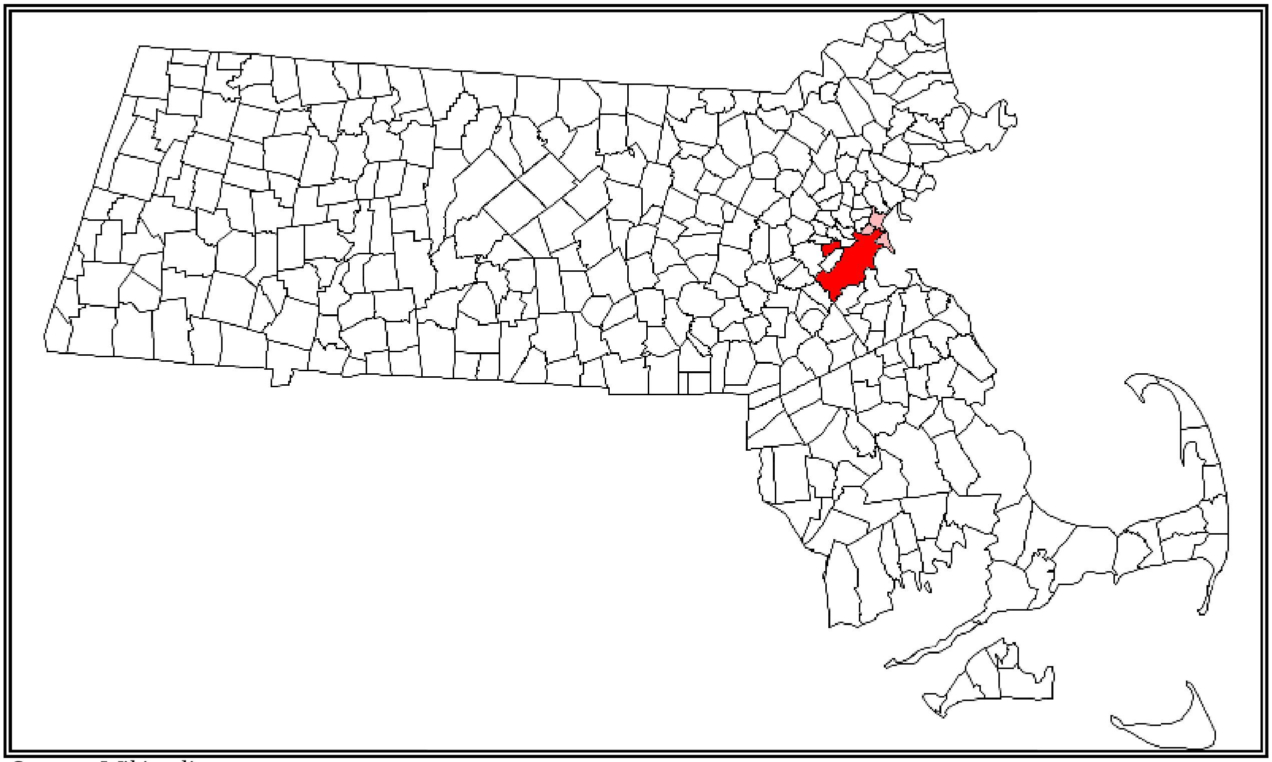
The proposed units at the project will feature high-quality finishes and amenities to be specifically determined at a later date; however, for the purpose of this assignment it has been assumed that units will include hardwood flooring, ceramic tile, solid wood cabinets, natural stone or solid surface countertops, and top-range appliances and in-unit laundry. Common area amenities will include landscaped grounds, garage parking, and an elevator. Current market-rate rental inventory within the subject market area includes a mix of garden, mid-rise, and high-rise buildings with a wide range of unit and project features and amenities. Most recent renovations within the past 10 years have focused on providing project and unit amenities that were once considered luxury features and now are expected by market renters in new construction projects. Project amenities at competitive developments include common sitting areas, community rooms, high-speed internet, elevator access, fitness centers, swimming pools, bike storage, garage parking, landscaping, walking trails, and sitting areas. Unit amenities at competitive developments include laundry facilities within rental units, wood flooring, ceramic tile, or natural stone flooring surfaces, hardwood cabinets with natural stone or solid surface counters, top-range appliances including range, range hood, refrigerator, dishwasher, garbage disposal, and microwave oven. Additionally, many units within the market feature tall ceilings, central air conditioning, private patios or balconies, and upgraded fixtures.

When the proposed project is ultimately developed, the property should provide adequate features, amenities, and services. Various project uses should be separated to the extent possible and include a clearly defined identity for each use within the project. The absorption, rent-up, and ongoing competitiveness of the residential portion of the project will be impacted by the final project design and execution, which should provide access and distinction to each use, appropriate light and air throughout the project, and circulation throughout the site. The commercial, retail, and cultural uses of the project will increase marketability and utility as long as the uses do not interfere with the safety, security, and services of the project, which would be unmatched in this submarket.



Boston Economy

The subject property is located in the Roxbury neighborhood of Boston, (Suffolk County, in eastern Massachusetts.) Accordingly the economic strength of Boston and the region are indications of the neighborhood stability and strength for this project. Boston, the capital of the Commonwealth of Massachusetts, serves as the center of finance, commerce, and culture for the New England region. The capital city is often referred to as "the Hub" because of its role as the center of New England for business, cultural activities, transportation and education. Therefore, the subject is heavily influenced by the geographic, social, political and economic conditions of the Greater Boston region and New England.



Source: Wikipedia.com

Nationally and regionally economic conditions have improved over the past 12 months after the severe economic crisis. However, recent improvements in both the national the Maine economy indicate signs of recovery and overall general improving economic conditions. The Federal Reserve Board (Fed), in its January 11, 2012 publication of the Beige Book, for the Boston District, reported improving economic conditions. According to the Fed, most business contacts in the First District continue to report year-over-year revenue increases, but an uncertain outlook. Responding retailers cited mixed results and increased optimism about 2012; manufacturing contacts, by contrast, say they are uncertain about the outlook even though most current results remain good. Software and IT services companies continue to see good demand growth, while results are mixed, though mostly positive, for staffing firms. Real estate markets remain subdued. With the exception of software and IT services, contacts say their firms are doing mostly replacement hiring; some cite difficulty in filling specific skilled jobs. Cost pressures are said to be modest. The Beige Book report confirms the cautious optimism of local markets and the continued modest improvements experienced in the Boston and New England markets.

According to estimates released by the U.S. Commerce Department's Bureau of Economic Analysis (BEA), the gross domestic product (GDP) increased 2.8% in the fourth quarter 2011 after increasing 2.0% in the third quarter. The increase in real GDP in the fourth quarter reflected positive contributions from private inventory investment, personal consumption expenditures, exports, residential fixed investment, and nonresidential fixed investment that were partly offset by negative contributions from federal government spending and state and local government spending. Imports, which are a subtraction in the calculation of GDP, increased.

According to the January 2012 edition of the KeyPoint Partners *Keypoints*, major national retailers experienced a 3.5% increase in same-store sales over the sales from January 2011. Luxury Stores led the month with an 8.0% increase, followed by wholesale clubs with a 7.0% increase, department stores were up 3.4%, discounters rose 3.1%, drug stores rose 1.3%, and apparel stores were up 2.9%. The U.S. Department of Commerce reported that retail sales increased by 6.4% year-over-year December, which was the slowest pace in seven months.

The consumer price index (CPI), as reported by the U.S. Department of Labor, was unchanged in the most recent report of January 2012. The CPI for the nation has increased 3.0% over the past 12 months before seasonal adjustment. According to the Bureau of Labor Statistics, a decline in the energy index offset small increases in the indexes for food and all items less food and energy.

S&P Indices (S&P)s reported in a December 27, 2011 press release that the U.S. National Home Price Index decreased by 1.1% and 1.2% for the 10- and 20-city composites. According to S&P the third quarter national index posted an annual decline of 3.9%, an improvement over the 5.8% decline posted in the second quarter. Nationally, home prices are back to their first quarter 2003 levels.

A national consumer confidence index, published monthly by the Conference Board, has improved in November, after declining in October as reported in their November 29, 2011 survey. The consumer confidence index currently stands at 56.0 which is up from 40.9 in October. The Conference Board reported, "Confidence has bounced back to levels last seen during the summer (July 2011, 59.2). Consumers' assessment of current conditions finally improved, after six months of steady declines. Consumers' apprehension regarding the short-term outlook for business conditions, jobs and income prospects eased considerably. Consumers appear to be entering the holiday season in better spirits, though overall readings remain historically weak." The current consumer confidence report indicates an overall improvement in consumer's current outlook and expectations of the future.

Nationally, current mortgage rates are hovering around historical lows. According to HSH Associates, the average for a 30-year fixed conventional mortgage is currently 4.31% in the Boston area.

Transportation

According to U.S. Census reports, employed residents within Boston commute an average of 28.8 minutes each way to work and approximately 41.5% of residents drive alone to work, with approximately 45.3% either walking or taking public transportation in Boston. The highest concentration of resident's commuting patterns is located within the 10 to 19 minute commute time-bracket and the 25 to 34 minute time bracket with approximately 22.3% and 25.6% respectively of Boston residents. Within the subject neighborhood (0.5 mile radius) 41.6% of residents commute to work via public transportation and 23.6% of residents walked to work, while only 23.8% drove to work. The highest concentration of resident's commuting patterns within the subject neighborhood is located within the 10 to 19 minute commute time-bracket and the 25 to 34 minute time bracket with approximately 25.5% and 23.9% respectively with an average commute time of 25.0 minutes. Within the subject neighborhood, only 47.2% of residents have access to a vehicle for transportation, while 52.8% do not.

Massachusetts also has an extensive commuter rail service and subway system, both operated by the Massachusetts Bay Transit Authority (MBTA), serving the greater Boston area. There is also Amtrak rail service from stations in Boston. South Station in Boston's Downtown and Back Bay Station located adjacent to Copley Square in Boston provides Amtrak service to points west and south. North Station between the West End and North End neighborhoods of Boston provide commuter rail service to the northern suburbs and limited service beyond. MBTA transportation is located within convenient access to the subject via the Ruggles Station on the MBTA Orange Line, just three blocks northwest of the subject property.

Massachusetts benefits from a broad-based and well-established transportation network. Logan International Airport, located in the city of Boston, is one of the country's most active terminals serving both domestic and international travelers. A large interstate highway system connects Massachusetts with the rest of New England and the country. Interstate 95 connects with State Route 128 and forms the inner loop around Boston, while Interstate 495 forms the outer loop, both of which run in a generally north-south direction. The Massachusetts Turnpike (Interstate 90) originates in Boston and connects the city with points west and upstate New York. The John F. Fitzgerald Expressway (the Central Artery) runs north-south through Boston and connects the north and south shores. The Central Artery Project has expanded and depressed the Southeast Expressway and connects the Massachusetts Turnpike to Logan Airport through the Ted Williams Tunnel in an effort to ease traffic congestion and beautify the city of Boston. North Station adjacent to the North End neighborhood provides commuter rail service to the northern suburbs and limited service beyond, while commuter rail service from South Station services the southern and western suburbs.

Demographics & Population

Population growth over the past ten years in Boston and the subject neighborhood has been substantial, averaging 4.83% in Boston between 2000 and 2010 and 14.12% in Roxbury over the same period. Household formation has also increased at a rate of 2.64% in Boston over the ten-year period, as indicated by the chart below.

Population & Households

Population	Boston	Roxbury
2000	589,141	49,795
2010	617,594	56,827
Change	28,453	7,032
% Change	4.83%	14.12%

Households	Boston
2000	239,528
2010	245,857
Change	6,329
% Change	2.64%

Additions to the rental housing supply within Boston and Roxbury have been modest when compared to population and household growth within the same areas. The below charts indicate real labor force growth, employment growth, and the number of Boston residents employed within the city of Boston, which is an indication of real employment and job growth trends within the city of Boston.

Housing Units

Total Housing Units	Boston	Roxbury
2000	251,935	20,836
2010	272,481	23,320
Change	20,546	2,484
% Change	8.16%	11.92%

Renter Housing Units	Boston	Roxbury
2000	162,302	15,475
2010	166,908	15,727
Change	4,606	252
% Change	2.84%	1.63%

Vacant Housing Units	Boston	Roxbury
2000	12,407	1,936
2010	19,782	1,798
Change	7,375	(138)
% Change	59.44%	-7.13%

5+ Units MF/Condo				
Year	# of Permits	# of Units	Construction Cost	% Change
2000	23	344	$51,576,000	-38%
2001	34	578	$83,280,603	120%
2002	14	556	$37,790,534	-47%
2003	38	1,030	$71,610,465	52%
2004	21	721	$46,967,032	-15%
2005	46	704	$55,548,504	-64%
2006	39	1,967	$155,055,841	128%
2007	33	820	$68,059,861	11%
2008	20	358	$61,563,968	39%
2009	19	235	$44,349,834	116%
2010	11	231	$20,507,367	-87%
2011	17	692	$155,713,644	
Total	**315**	**8,236**	**$852,023,653**	

All Units				
Year	# of Permits	# of Units	Construction Cost	% Change
2000	175	567	$73,648,144	-35%
2001	208	883	$114,032,951	92%
2002	146	772	$59,377,361	-49%
2003	294	1,508	$117,181,623	39%
2004	234	1,079	$84,236,678	-6%
2005	226	997	$89,400,667	-57%
2006	282	2,419	$207,862,341	122%
2007	150	1,041	$93,721,675	22%
2008	69	446	$76,976,560	25%
2009	80	332	$61,815,978	98%
2010	45	295	$31,181,676	-82%
2011	74	785	$171,603,271	
Total	**1,983**	**11,124**	**$1,181,038,925**	

The positive additions to population and employment within Boston and the neighborhood of Roxbury over the past 10 years, coupled with modest additions to supply are an indication that the subject property should benefit from consistent historical increases in population, employment, and the relative low number of housing units developed within Boston on an annual basis.

Labor Force & Employment

Labor Force	Boston	Roxbury
2000	304,224	22,798
2010	327,561	NA
Change	23,337	NA
% Change	7.67%	NA

Employed	Boston	Roxbury
2000	295,008	20,157
2010	301,649	NA
Change	6,641	NA
% Change	2.25%	NA

Boston Residents Employed	Within Boston	Outside of Boston
2000	184,954	93,509
2010	208,987	100,633
Change	24,033	7,124
% Change	12.99%	7.62%

Employment

In Massachusetts, the labor force has not increased greatly over the past 24-month periods and has decreased slightly in the past 12-month period. Unemployment has started to decrease over the same periods. The unemployment rate in Massachusetts as of December 2009 was 8.5% and 8.0% as of December 2010; and as of December 2011 the unemployment rate was 6.5%. The national unemployment rate was 8.5% in November 2011. The labor force in the City of Boston has increased by 0.9% over the past 24 months and has increased slightly by 0.2% over the past 12 months. The City of Boston has unemployment levels, which have been historically lower than that of the Commonwealth of Massachusetts and surrounding regions. The outlook for improving employment conditions remains optimistic as the Massachusetts economy continues to experience recovery and sings of growth.

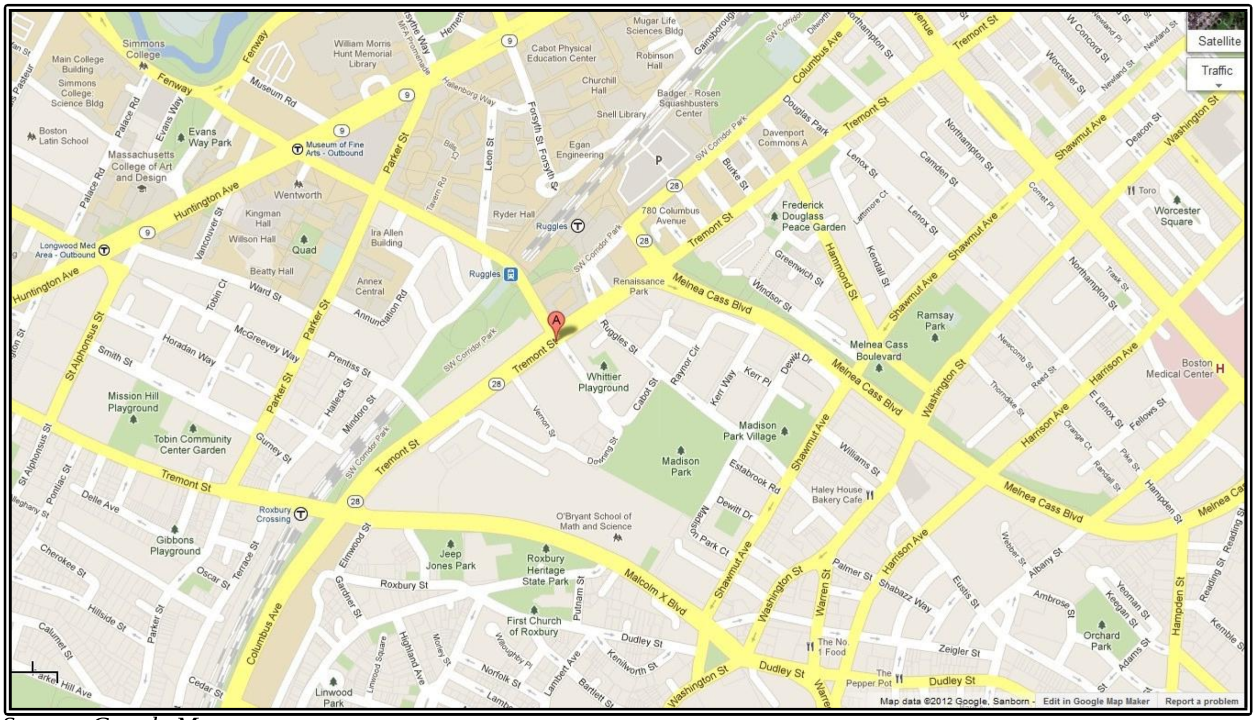
Employment Trends

Massachusetts	Dec-09	Dec-10	Dec-11	24 month % Change	12 month % Change
Labor Force	3,453,900	3,488,300	3,483,300	0.9%	-0.1%
Employed	3,159,700	3,209,100	3,255,400	3.0%	1.4%
Unemployed	294,200	279,200	227,900	-22.5%	-18.4%
Unemployment Rate	8.5%	8.0%	6.5%	-23.2%	-18.3%
Boston-Cambridge-Quincy, NECTA	Dec-09	Dec-10	Dec-11	24 month % Change	12 month % Change
Labor Force	2,521,937	2,546,973	2,550,804	1.1%	0.2%
Employed	2,325,972	2,365,155	2,401,913	3.3%	1.6%
Unemployed	195,965	181,818	148,891	-24.0%	-18.1%
Unemployment Rate	7.8%	7.1%	5.8%	-24.9%	-18.2%
Suffolk County	Dec-09	Dec-10	Dec-11	24 month % Change	12 month % Change
Labor Force	373,232	377,787	378,566	1.4%	0.2%
Employed	343,592	349,359	355,099	3.3%	1.6%
Unemployed	29,640	28,428	23,467	-20.8%	-17.5%
Unemployment Rate	7.9%	7.5%	6.2%	-21.9%	-17.6%
City of Boston	Dec-09	Dec-10	Dec-11	24 month % Change	12 month % Change
Labor Force	325,280	327,437	328,123	0.9%	0.2%
Employed	300,358	303,503	308,489	2.7%	1.6%
Unemployed	24,922	23,934	19,634	-21.2%	-18.0%
Unemployment Rate	7.7%	7.3%	6.0%	-21.9%	-18.1%

Source: MA Department of Labor and Workforce Development

Conclusion

The economic recovery of the nation can be characterized as steady as overall conditions in labor markets, GDP growth, investment spending, consumer confidence, and in the availability of capital for investment continue to improve; albeit slowly. On January 24, 2012, the Federal Reserve Bank decided to maintain the target range for the federal funds rate at 0.0% to 0.25% and anticipates that economic conditions are likely to warrant exceptionally low levels of the federal funds rate at least through 2014. The Committee currently anticipates that economic conditions, including low rates of resource utilization and a subdued outlook for inflation over the medium run are likely to warrant exceptionally low levels for the federal funds rate at least through late 2014.



Source: Google Maps

Site and Neighborhood

The site is located on a single parcel located in the Roxbury neighborhood of Boston, approximately 2 miles southwest of downtown Boston and 1 mile south of the Back Bay. The subject property is within close proximity to necessities, conveniences and neighborhood services buildings and is within close walking distance to public transportation, educational, medical, and cultural resources. Tremont Crossing is located within an approximately 20-minute walk from the Longwood Medical Area (LMA), a 10 minute walk from the Museum of Fine Arts, and a 25-minute walk to Prudential Plaza and the Back Bay. The subject property is located just east of the Mission Hill and Longwood Medical Area neighborhoods of Boston and just southeast of the Fenway neighborhood. Many of the sub-neighborhoods within Roxbury are transitional neighborhoods that benefits from the efforts of surrounding neighborhood organizations and non-profits in developing and redeveloping both residential and commercial properties in the area; along with for-profit development of residential housing and educational uses. Additionally, these neighborhoods have good proximity to institutional users such as hospitals like New England Baptist Hospital located ¾ mile southwest of the subject, Boston Medical Center located less than ¾ mile east of the subject, the Longwood Medical Area located less than 1 mile northwest of the subject; colleges and universities like Northeastern University, Wentworth Institute of Technology, Mass College of Art and Design, and Emmanuel College, all located within 1 mile of the subject property.

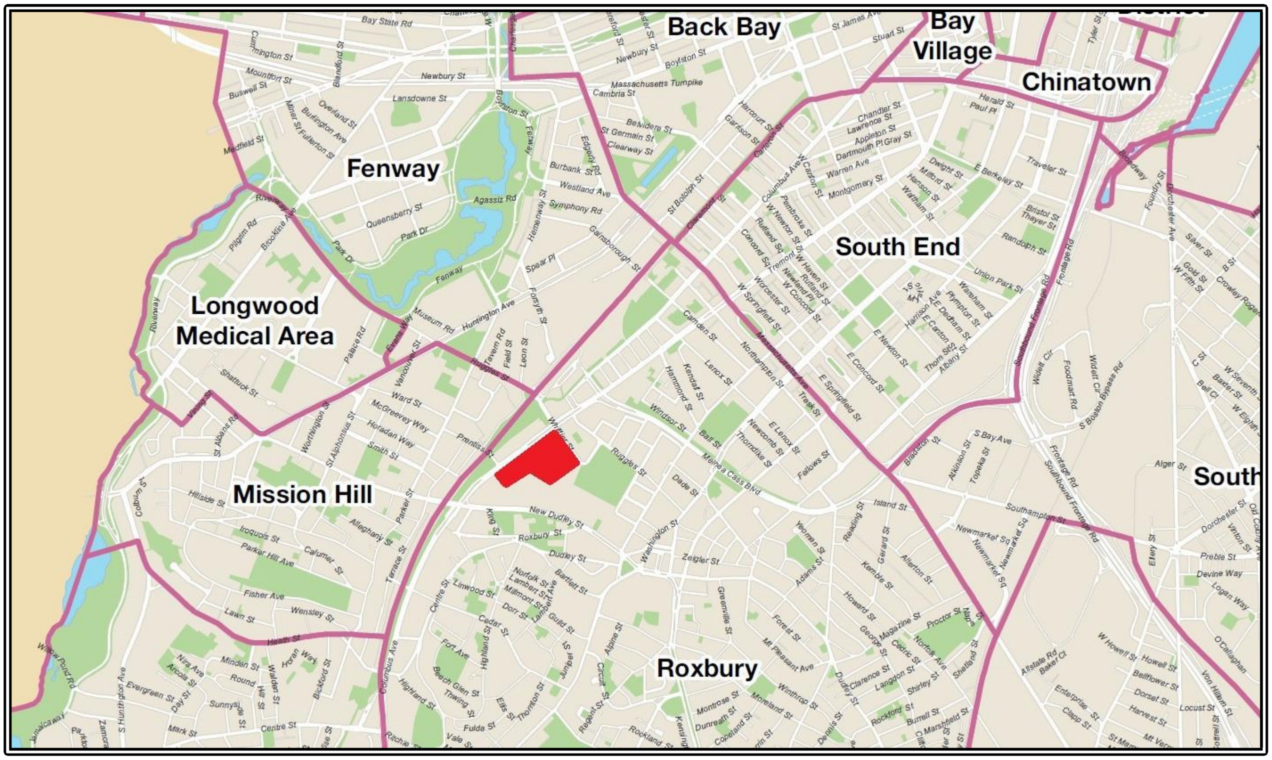


Image Source: Boston BRA

Roxbury is a good example of a neighborhood that has benefited from recent housing rehabilitation, and new office and retail construction. Revitalization projects in the subject market area and the surrounding neighborhoods are making the area more attractive to potential renters and owners and the subject neighborhoods are established commercial and residential neighborhoods with diverse and complimentary land uses including residential, institutional and commercial properties. Together with neighborhood revitalization efforts, its close proximity to employment, services, shopping, and commuting facilities, and its overall accessibility make the subject property's location a desirable area. Currently there are proposals for two major expansions in employment within the subject neighborhood including Boston University's 200,000 square foot BioLab which may receive approval to begin conducting Level 4 research and the redevelopment of the Ferdinand Building in Dudley Square. The Dudley Square Municipal Building will house over 500 staff from the Boston Public Schools Administration, Jobs and Community Services, and a satellite Municipal Service Center. The project is slated to break ground in March 2012 and includes over 145,000 square feet of office space and ground floor retail. In addition to the residential component of the project, the developer has proposed a multi-story, mixed-use development of the site to include 500,000 square feet of large-format retail, 50,000 square feet of smaller shops and restaurants, 200,000 square feet of Class A office space, 58,000 square feet of museum space, will bring commercial office and retail tenants to the site for both construction and permanent operation. The property has excellent access to public transportation services including Ruggles Station on the MBTA Orange Line, just three blocks northwest of the subject property. Additionally, the site has excellent access to regional highway systems and has access to neighborhood and regional shopping and services.

Medical Uses

The subject site is located within walking distance to the Mission Hill neighborhood of Boston and the Longwood Medical and Academic Area (LMA) of the city. The Longwood Medical Area straddles the Fenway-Kenmore and Mission Hill neighborhoods and is centered on Longwood Avenue as it runs between Huntington Avenue and the Riverway. The LMA is located west of the Back Bay and Financial District, and adjacent to the “Emerald Necklace” parklands of the Riverway and Back Bay Fens.

The 213-acre LMA campus is one of America’s leading centers for medicine and research comprised of 24 including three major Harvard affiliated teaching hospitals, three research or research treatment centers, three Harvard schools, six historic colleges organized into the Colleges of the Fenway, a private secondary school, an HMO, an art museum, one public high school, a State mental health center, a children’s treatment center, a religious institution, an international pharmaceutical research company, and a healthcare insurer. The hospitals in the LMA, including Beth Israel Deaconess Medical Center (BIDMC), Brigham and Women’s Hospital, Children’s Hospital Boston, Dana-Farber Cancer Institute and Joslin Diabetes Center combine to form one of the world’s leading medical centers and serve over one million patients per year. A key to the success of the LMA is the project density. A majority of the LMA’s 43,600 employees and 19,200 students work within a 10-minute walk of one another providing a great collaborative environment. According to MASCO’s *Longwood Medical and Academic Area Fact Sheet 2011*, 34% of LMA employees are Boston residents. This increased by 1,100 people between 2005 and 2008 with half of the employees from Boston living in the neighborhoods of Fenway/Kenmore, Dorchester, Jamaica Plain, Brighton and Roxbury (in order according to population). 13% of LMA employees live in Brookline and Newton, with another 9% commuting from the South Shore, Plymouth and Cape Cod. Additionally, MASCO indicates that in the fifteen years between 1993 and 2008, the LMA has averaged a growth rate of 1,200 new employees per year.

The LMA is a hub of research and medicine as well as a center for education. Many colleges and universities are located in the LMA including Harvard Medical School, Harvard School of Dental Medicine, Massachusetts College of Art, Massachusetts College of Pharmacy and Health Sciences, Simmons College, Wheelock College, Emmanuel College and Wentworth Institute of Technology.

Educational Uses

Boston includes a concentration of educational and instructional uses including secondary, and post secondary colleges and universities and their accessory uses such as dormitories, staff offices, and performance venues. The subject property is located within walking distance to major educational and institutional facilities within the city of Boston, including Wentworth Institute of Technology, Massachusetts College of Art and Design, Northeastern University, Simmons College, and Emmanuel College.

Recent and proposed development in the subject neighborhood includes various improvements to existing college and university campuses. Wentworth Institute of Technology has an approved institutional master plan recorded with the Boston Redevelopment Authority (BRA) that plans for a 10-year timeline of improvements including a new 46,000 square-foot student center, a parking garage for 400 cars, a 40,000 square-foot addition to their academic building and a new student residence hall. According to the BRA there are 7 projects in various stages of the development pipeline within the Roxbury neighborhood surrounding the subject property aggregating 577 residential units, 390 rental units and 104 graduate housing residences for Boston University Medical School students. Emmanuel College has been approved for a 7-story residential hall building of approximately 77,500 square feet to be located in the Fenway/Kenmore neighborhood of Boston. The project was approved in 2008 and could include up to 200 beds of student housing for Emmanuel undergraduate students. Additionally, Emmanuel has submitted a master plan to the BRA that has not yet been approved or voted on.

The plan includes a 10-year growth plan and proposes two new building projects including a renovation of the Cardinal Cushing Library and Julie Hall North Dormitory.

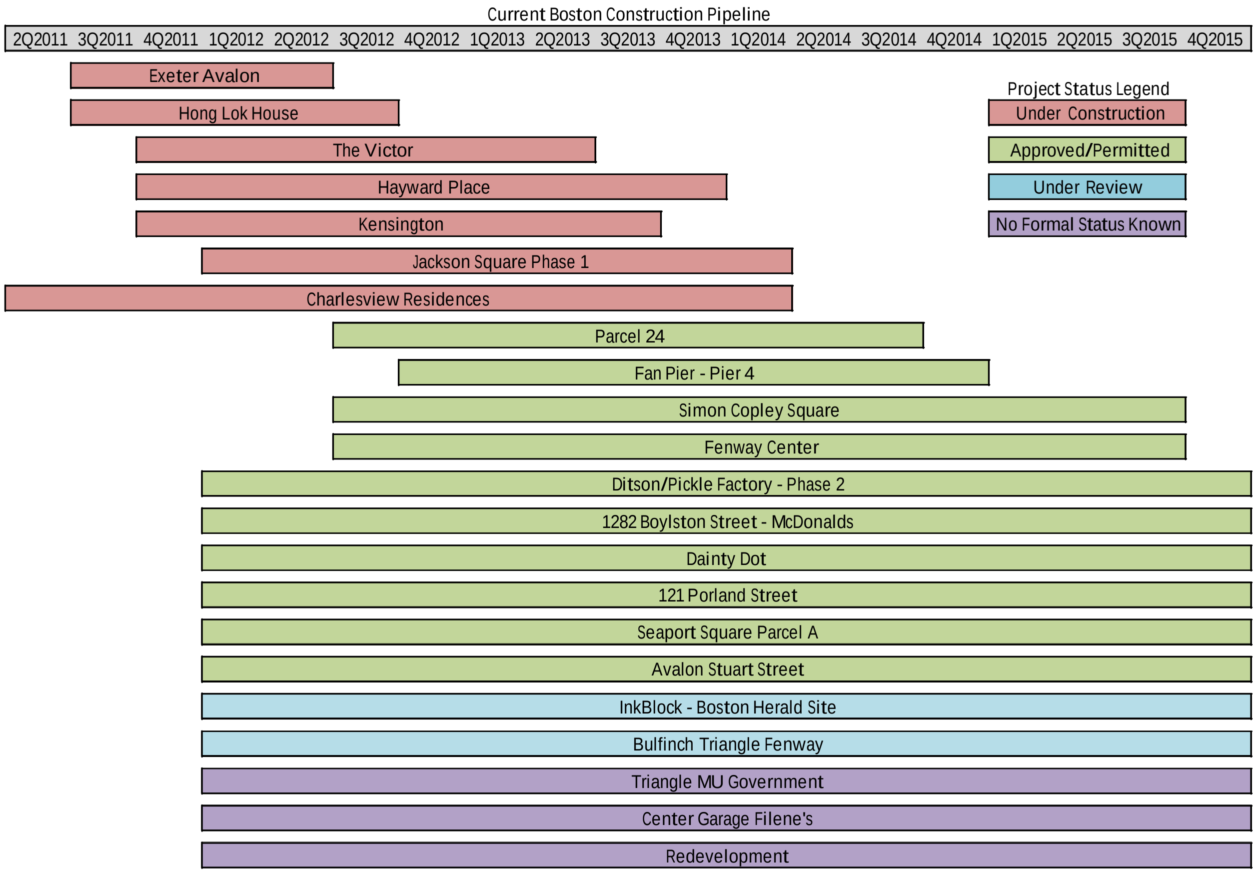
Northeastern University is located approximately ½ mile northeast of the subject property. Northeastern includes a total of approximately 19,500 undergraduate students and 10,000 graduate students; both full- and part-time and offers 8,100 beds of dormitory housing for undergraduate and graduate students within the surrounding neighborhoods. Northeastern is one of Boston's largest employers and currently employs approximately 3,600 people, approximately half of which are staff and half of which are academic faculty.

Wentworth Institute of Technology is located approximately 1/3 mile northwest of the subject property. Wentworth includes a total of approximately 3,700 undergraduate students and 150 graduate students; both full- and part-time and offers 1,935 beds of dormitory housing for undergraduate and graduate students within the surrounding neighborhoods.

Massachusetts College of Art and Design (MassArt) is located approximately ½ mile northwest of the subject property. MassArt includes a total of approximately 2,300 undergraduate students and 200 graduate students; both full- and part-time and offers 370 beds of dormitory housing for undergraduate and graduate students within the surrounding neighborhoods.

Simmons College is located approximately ½ mile northwest of the subject property. Simmons includes a total of approximately 2,060 undergraduate students and 2,873 graduate students; both full- and part-time and offers 984 beds of dormitory housing for undergraduate and graduate students within the surrounding neighborhoods.

Emmanuel College is located approximately 1 mile northwest of the subject property. Emmanuel includes a total of approximately 2,300 undergraduate students and 250 graduate students; both full- and part-time and offers 1,150 beds of dormitory housing for undergraduate and graduate students within the surrounding neighborhoods.



Boston Residential Pipeline

There are currently approximately 5,260 units of residential housing in the Boston pipeline, slated for delivery over the next four-to-five year period. There are few new multifamily and residential condominium development projects or proposals for projects within the subject neighborhood; however, there are many projects in various stages of development within Boston's surrounding neighborhoods. According to research and analysis conducted by *Kirk&Company*, there are currently seven major residential projects currently under construction within Boston, aggregating approximately 1,255 units of rental housing and for-sale condominiums. According to our research, 261 units of housing are expected to be delivered in 2012, 932 units are expected to be delivered in 2013, 1,145 units are expected to be delivered in 2014 and approximately 3,000 units are expected to be delivered in 2015 or later. Additionally, there are projects currently in early planning stages that have not formally filed with the Boston Redevelopment Authority (BRA) or have not projected an estimated timeline and therefore have not been counted in these estimates.

According to the *CBRE/New England 2012 Multi-Housing Market Outlook*, there are fifteen projects with a combined 2,900 units projected to deliver in 2012 throughout the Greater Boston multifamily market, and whilst this is a significant increase from 2011 it is well below the 5-year average of 4,500 units delivered per year that has been experienced in past years.

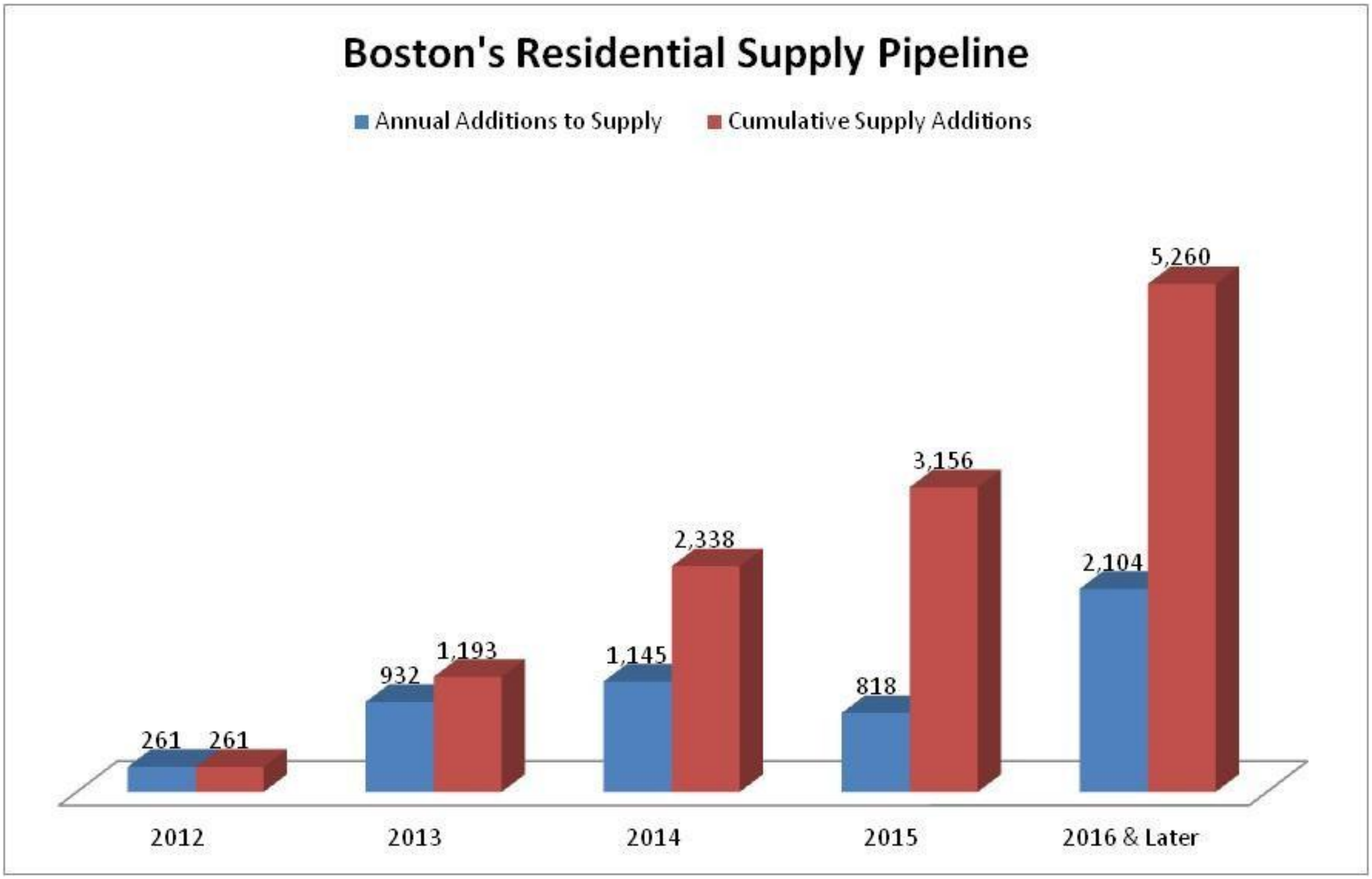


Chart Source: Kirk&Company

Avalon Exeter

Avalon Exeter is a 28-story residential tower currently under construction at 88 Exeter Street in the Back Bay neighborhood of Boston. The tower, which is estimated to cost $100 million to construct, will house 187 units of rental housing within studio, one-, two-, and three-bedroom unit types. The developer, AvalonBay, has begun construction of the tower, which finishes the residential component of the Prudential Center development plan and is expected to be delivered around September 2012.

Hong Lok House

Hong Lok House is an 8-story redevelopment project currently under construction on Essex Street in the Chinatown neighborhood of Boston. The project broke ground in August of 2011 and is expected to be completed in phases with the first residents moving before the end of 2012. The project is estimated to cost $33 million to construct and will house 74 units of affordable rental housing with supportive services for seniors.

The Victor

The Victor is an 11-story mixed-use project located at Causeway Street and Beverly Street in the North End neighborhood of Boston. The development broke ground in November 2011 and is expected to be finished by early 2013. The project will include 286 units of rental housing, 121 garage parking spaces, and 17,000 square feet of ground-floor retail space. The unit mix is expected to include 44 studio units, 170 one-bedroom units, and 72 two-bedroom units. The project will offer amenities such as washers and dryers in units, stainless steel appliances, hardwood floors throughout, floor to ceiling windows offering views, an athletic center, and resident lounge.

Hayward Place

Hayward Place is a 15-story residential condominium tower currently under construction on Hayward Place in the Downtown neighborhood of Boston, between the Theatre District and Chinatown. The project, which is estimated to cost $220 million to construct, will house 256 condominium units, 125 garage parking spaces, and 9,700 square feet of ground-floor retail space. The developer, Millennium Partners, broke ground on the project in November 2011 and is expected to complete construction in late 2013.

Kensington

Kensington is a 27-story residential tower currently under construction at 659 Washington Street between Chinatown and the Theatre District in the Downtown neighborhood of Boston. The tower, which is estimated to cost $170 million to construct, will house 384 units of rental housing within studio, one- and two-bedroom unit types, 110 parking spaces, and 2,300 square feet of ground floor retail space. The project will include 40 studio units, 217 one-bedroom units, and 127 two-bedroom units. The developer, National Development, broke ground in October 2011 and is expected to be delivered during the summer of 2013.

Jackson Square - Phase 1

The Jackson Square Initiative is a proposed 14-building redevelopment of Jackson Square that involves approximately 11.2 acres of vacant land within Roxbury. The project is adjacent to the Jackson Square MBTA station and is a mixed-use, mixed-income development that will include 429 units of housing, including 290 units of affordable housing, 67,700 square feet of ground floor retail space, 13,500 square feet of commercial office space, and 51,000 square feet of community facilities. Additionally, the project includes provisions for approximately 500 off-street and 128 on-street parking spaces. The project is expected to cost upwards of $250 million and will be constructed in phases. The first phase of construction has been approved by the BRA and construction began in March 2011 and is expected to be completed by early 2014. Phase 1, 225 Centre Street, will include 103 units of rental housing of which 60% are affordable, 37 condominium units of which 60% are affordable, a Department of Youth Services facility, a 30,000 square-foot Youth and Family Center and the reconstruction of the F.W. WEBB building.

Charlesview Residences

The Charlesview Residences is the redevelopment of an existing housing development in the Allston-Brighton neighborhood of Boston. The redevelopment project includes approximately 340 units of residential housing, 240 of which will be affordable as rental units and 100 of which will be condominiums; with 26 reserved as affordable to low- and moderate-income households. The first phase of the project, which is currently under construction and is expected to cost $157 million, will include 260 units of housing and will be ready for occupancy early 2014. A second, $50 million phase, will include 80 additional condominium units along Telford Street and will be built dependent on market conditions. The project will also include a park area, retail space, garage parking, and a community center.

Parcel 24

Parcel 24 is a City-owned parcel of land located in the Chinatown neighborhood of Boston, on land bounded by Hudson Street, Kneeland Street, and Albany Street which was made available through the Central Artery Project. The parcel was recently the subject of a BRA Request for Proposals and was awarded to the Asian Community Development Corporation and

New Boston Fund, Inc. The approved plan calls for the construction of a 20-story tower and the creation of approximately 345 units of housing, including approximately 95 affordable rental units, 50 affordable condominiums, and 200 market-rate rental apartments. Additionally, the project will include 125 garage parking spaces, 5,500 square feet of retail space, 6,000 square feet of community space, and areas of open space. Construction on the project is expected to begin during the summer of 2012 and will be completed in late 2014.

Fan Pier 4

The Fan Pier development is a master-planned 2.9 million square-foot mixed-use project located in the Seaport neighborhood of Boston. The project site aggregates approximately 21 acres in the Seaport and is to be constructed in phases and will include 2.0 million square feet of commercial office space, luxury residential units, hotel and spa facilities, a six-acre marina, and retail facilities. Phase I of the project included an office building that was recently completed and totaled 18 stories and approximately 493,000 square feet and Vertex Pharmaceuticals will be occupying two new office towers that broke ground in June 2011 aggregating approximately 1.1 million square feet and estimated to cost $800 million. The next phase in the development is the construction of the Pier 4 residential tower. Pier 4 is a 21-story tower that will include 357 apartments, retail stores, and an underground parking garage adjacent to the Institute of Contemporary Art. The tower, which is estimated to cost $170 million to construct, is expected to start construction in the summer 2012 with an estimated completion date late in 2014.

Simon Copley Square

Simon Copley Square is a 47-story residential condominium tower currently approved at the Copley Place retail development in the Back Bay neighborhood of Boston. The tower, which is estimated to cost $500 million to construct, will house 318 units of luxury condominium housing and will include a renovation and expansion of the existing Neiman Marcus. The developer, Simon Properties, plans to build 10 affordable units on-site and 38 of the required 15% affordable units, off-site in the South End and Back Bay. According to the BRA, the expansion includes 75,000 square feet of new retail, restaurant space, and a public atrium. A 40,000 square foot addition will be made to the existing 115,000 square foot Neiman Marcus retail space, and 670,000 square feet of new residential space will be constructed. Approximately 785,000 of new square footage will be added to the existing building. The project is expected to break ground in the fall of 2012 with an estimated construction timeline of 3 years.

Fenway Center – One Kenmore

Fenway Center is a 500-unit proposed mixed-use development located on Parcel 7 and over the Massachusetts Turnpike within the Fenway neighborhood of Boston. The proposed development will include 1,290 parking spaces including 750 shared-use spaces, 500 residential apartments including 10% on-site affordable units and 5% offsite affordable units, 170,000 square feet of commercial office space, 90,000 square feet of retail space, 30,000 square feet of parks and green space, bicycle storage and a bicycle share station, community space, and a day care center. The project is expected to break ground in 2012 with an estimated construction timeline of 4 years.

Ditson/Pickle Factory – Phase 2

The Diston/Pickle Factory is a redevelopment of an historic building in the Mission Hill neighborhood of Boston. The first phase of the development was Oliver Lofts, a 62-unit loft apartment component which is currently in rent-up. The project has been formally approved for 175 units of residential housing, however, the status of the remaining 113 units is unknown.

1282 Boylston Street

1282 Boylston Street is a proposed redevelopment of a former McDonald's Restaurant located within the Fenway Neighborhood of Boston. Plans for the development includes the creation of approximately 333,000 gross square feet of mixed-use space. The new building will contain 210 residential units, 88,000 square feet of office space and 12,000 square feet of ground floor retail space. The project, which is estimated to cost $150 million to construct, will include a 2,700 square foot ground floor community center furnished with computers and presentation equipment that will be maintained by the building management and available for use by the neighborhood. The project was approved in November 2011, however the current timeline for construction is unknown.

Dainty Dot

The Dainty Dot project is a proposed 21-story residential tower located at 120 Kingston Street in the Chinatown neighborhood of downtown Boston. The tower, which is estimated to cost $105 million to construct, will house 200 units of rental housing, ground floor retail, and 70 garage parking spaces. The project is currently approved and construction is expected to begin in the first half of 2012 and will take approximately two years to complete.

121 Portland Street

121 Portland Street is a proposed redevelopment of the former Forecaster Building to include 62 loft condominiums at 121-127 Portland Street in the North End neighborhood of Boston. The project will include 62 units of housing, 44 garage parking spaces, and 4,000 square feet of ground floor retail space. The project will include 4 studio units, 17 one-bedroom units, 31 two-bedroom units, and 10 three-bedroom units; of which 8 will be affordable. The project was approved and construction is expected to resume in the spring of 2012.

Seaport Square Parcel A

The Seaport Square Parcel A development is a 3-acre site within the $3 billion master planned Seaport Square development. The Seaport Square master plan includes the development of 2,500 units of housing including 1,125 studio and one-bedroom units, 875 two-bedroom units and 500 three-bedroom units. The proposed Parcel A development is between Sleeper Street and Northern Avenue, Seaport Boulevard, and Fan Pier Boulevard. The project will include underground parking for 1,000 cars, a four-story retail center of 340,000 square feet and two 22-story apartment buildings atop the retail building. The development will include approximately 750 units of housing with the initial phase of 110 units estimated to begin construction by the end of 2012.

Avalon Stuart Street

Avalon Stuart Street is a proposed 29-story residential tower at 45 Stuart Street between Chinatown and the Theatre District in the downtown of Boston. The tower will house 404 units of rental housing in studio, one-bedroom, and two-bedroom layouts, and 198 garage parking spaces. The developer, AvalonBay, submitted a Project Notification Form with the BRA in August and has not begun construction of the project.

InkBlock – Boston Herald Site

The Ink Block is the proposed redevelopment of the six-acre Boston Herald site at the northern edge of the South End neighborhood of Boston, at 300 Harrison Avenue. The project includes a plan for a mixed-use center of four new buildings of varying heights, 85,000 square feet of retail space including a grocery store, 471 apartment units, 400 parking spaces, and a transportation facility to include electric car chargers, bike storage, and a shared car service. The 471 residential units will include one- to three-bedroom layouts, however, unit distributions have not been disclosed. The developer plans to begin construction by the end of 2012.

Bulfinch Triangle

The Bulfinch Triangle project is a mixed-use development proposed in the North End neighborhood of Boston. The site is an air rights parcel at the intersection of Beverly and Causeway Streets at the northern end of the Rose Fitzgerald Kennedy Greenway, close to the North End and the revitalized North Station area. The development includes a 210-room hotel and 230 units of rental housing. The project, known at The Merano, will include approximately 248,000 square feet of building area and will include a mix of studio, one-bedroom, and two bedroom apartment units. The plan also calls for 184 garage parking spaces and space for retail and restaurant use. The project was approved by the BRA in 2008 and filed a Notice of Project Change in October 2011 and has not begun construction of the project.

Fenway Triangle Mixed-Use

The final phase of the Fenway Triangle Mixed-Use development includes two buildings at 1325 Boylston Street and 132 Brookline Avenue in the Fenway neighborhood of Boston. The towers, which is estimated to cost $315 million to construct, will house 290 units of rental housing within two buildings. The project plan calls for a total of 700,000 square feet of building area, 290 residential units, as well as office and retail uses and 575 parking spaces. The developer, Samuels & Associates, was granted approvals from the BRA in September 2011 and construction is expected to begin in spring 2012 and be completed by the end of 2014.

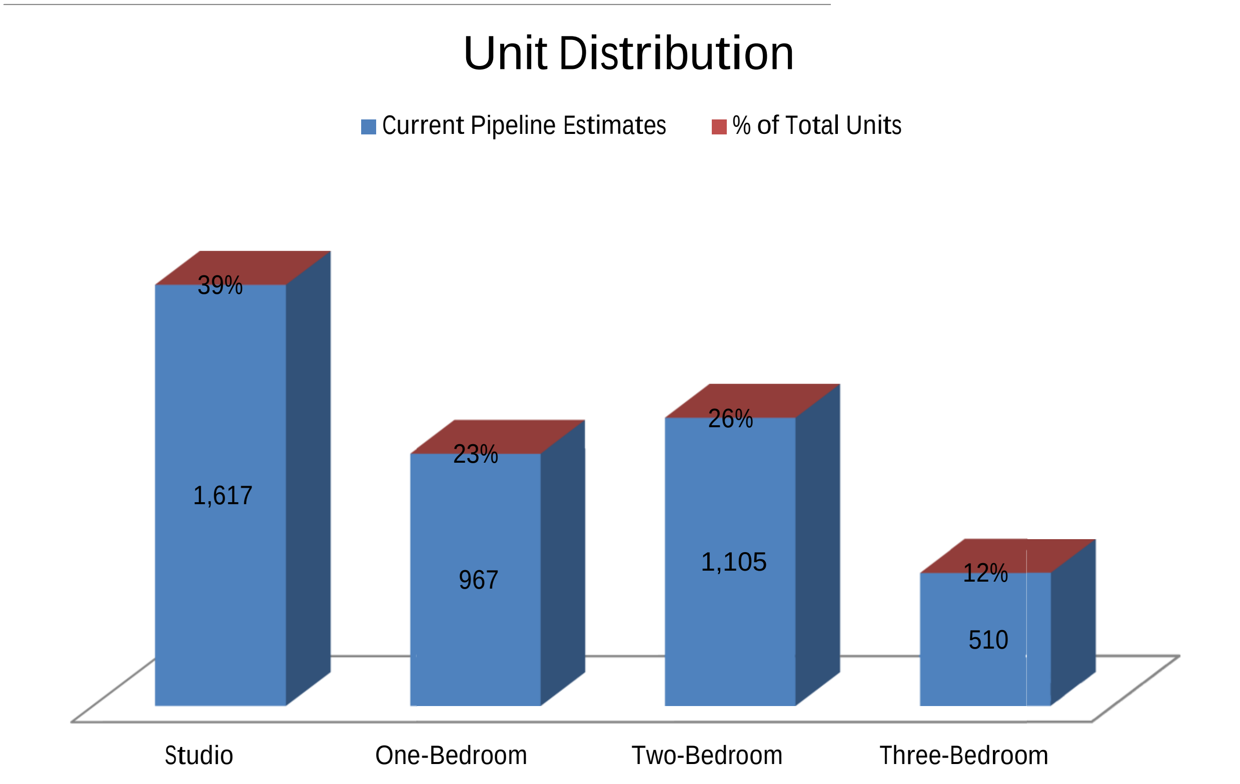
Government Center Garage

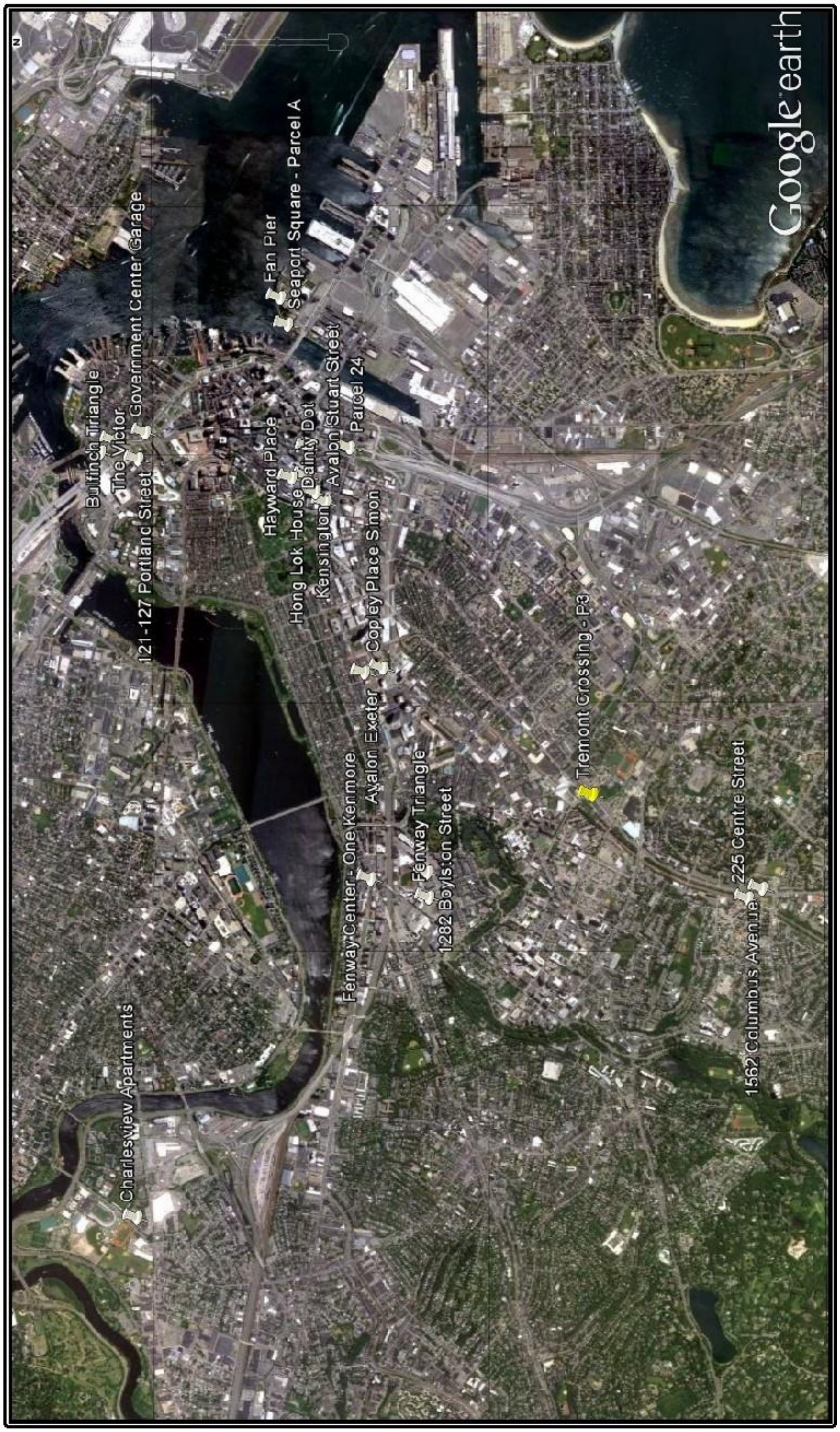
The Government Center Garage redevelopment is a proposed mixed-use development of 2.4 million square feet at the site of a parking garage and office building. The developers filed a new Letter of Intent with the BRA in June 2011, however, no action has been taken by the BRA. The project was originally proposed in 2008, however the current timeline for construction is unknown.

Filene's Redevelopment Site

One-Franklin is the proposed redevelopment of the former Filene's site along Summer Street in the downtown of Boston. The project was stalled during demolition and a new developer has taken over the project as of February 2012. The $750 million project includes a mixed-use development to include a 38-story tower that will include retail shopping, office space, and residential housing. The project is currently being reviewed by the BRA and the developer expects to begin construction in the first quarter of 2013.

The chart below depicts the estimated unit distribution for known projects within the pipeline. Not all project unit distributions for all projects described within this report are known.



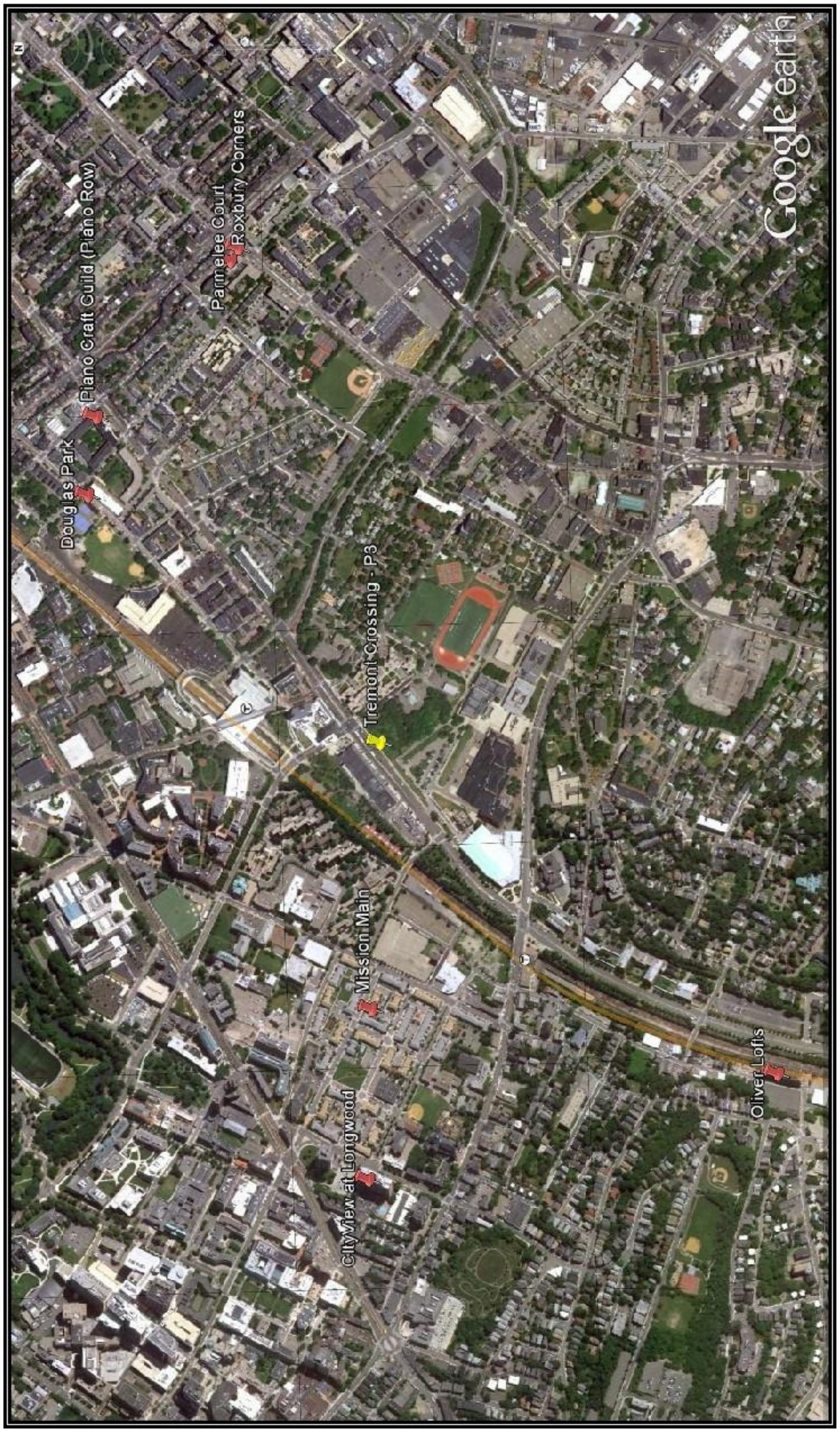

Bulfinch Triangle
The Victor
Government Center Garage
121-127 Portland Street
Fan Pier
Seaport Square - Parcel A
Hayward Place
Hong Lok House
Dainty Dot
Kensington
Avalon Stuart Street
Parcel 24
Copley Place Simon
Avalon Exeter
Fenway Center - One Kenmore
Fenway Triangle
1282 Boylston Street
Tremont Crossing - P3
225 Centre Street
1562 Columbus Avenue
Charlesview Apartments
Google earth

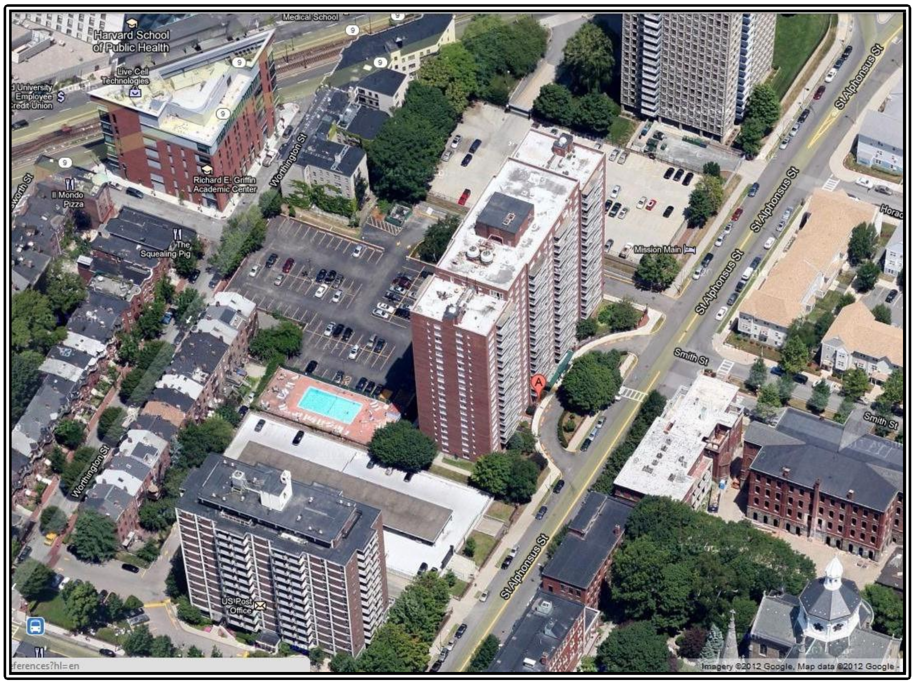
Determination of Market Rent

It is assumed for the purposes of this analysis that the development will include upwards of 204 units of market-rate rental housing located within one or two high-rise buildings located within the Tremont Crossing mixed-use development in the Roxbury neighborhood of Boston. The development will offer a total of 240 units of residential housing including approximately 204 market-rate units and 36 affordable units reserved for residents earning 70% or less than AMI. The 240 units would include including 60 studio units of approximately 550 square feet, 120 one-bedroom units of approximately 750 square feet, and 60 two-bedroom, two-bathroom apartment units of approximately 1,000. The units will feature high-quality finishes and details comparable or superior to the existing supply of housing in the neighborhood. All the comparable properties surveyed are located in a comparable neighborhood to the subject property with access to shopping, services, transportation and employment. Monthly rents of studio, one-, two- and three-bedroom units at the comparable properties were surveyed. The sample is representative of comparable apartment complexes in the market area. The results of this study are summarized on the following page.

Residential Rent Comparables

No.	Property	Year Built Stories	Unit(s) Distribution	Unit Type	Unit Size (sf)	Monthly Rent	Rent/ SF	Rent Includes	Occupancy
SP	**Tremont Crossing**	2012/2013	60	Studio/Efficiancy Unit	550	$1,600	$2.91	Heat	NA
	Parcel 3 - Tremont Street		120	1 Bedroom 1 Bathroom	750	$2,150	$2.87	Hot Water	
	Boston, MA		60	2 Bedroom 2 Bathroom	1,000	$2,600	$2.60	Sewer/Trash	
			240						
1	**CityView at Longwood**	1969		Studio	561	$2,195	$3.91	Heat	94%
	75 St. Alphonsus Street	2004 Renovation		1 Bedroom 1 Bathroom	771	$2,155	$2.80	Hot Water	
	Boston, MA	20-Story		2 Bedroom 1.5 Bathroom	961	$2,630	$2.74	A/C	
				2 Bedroom 1.5 Bathroom	1,150	$2,965	$2.58	Gas	
				3 Bedroom 2 Bathroom	1,600	NA		Trash	
			296						
2	**Piano Craft Guild Apartments**	1972	117	1 Bedroom 1 Bathroom	550	$1,800	$3.27	Heat	
	791 Tremont Street	1997 Renovation		1 Bedroom 1 Bathroom	1,100	$2,600	$2.36	Hot Water	
	Boston, MA	5-Story	51	2 Bedroom 1 Bathroom	800	$2,400	$3.00	Electricity	
				2 Bedroom 1 Bathroom	1,600	$2,900	$1.81	Trash	
			6	3 Bedroom 2 Bathroom	1,175	$3,600	$3.06	Sewer	
				3 Bedroom 2 Bathroom	2,000	$4,000	$2.00	Cold Water	
			174						
3	**Mission Main Apartments**	2000	120	1 Bedroom 1 Bathroom	NA	NA	NA		98%
	43 Smith Street	2-Story	255	2 Bedroom 1 Bathroom	959	$1,850	$1.93	Heat	
	Roxbury, MA	7-Story		2 Bedroom 1 Bathroom	1,276	$1,950	$1.53	Hot Water	
			105	3 Bedroom 1.5 Bathroom	1,256	$2,200	$1.75	Cold Water	
				3 Bedroom 1.5 Bathroom	1,529	$2,500	$1.64	A/C	
			55	4 Bedroom 2 Bathroom	NA	NA	NA		
			535						
4	**Douglas Park Apartments**	1989	35	1 Bedroom 1 Bathroom	702	$2,050	$2.92	Heat	
	650 Columbus Avenue	7-Story		1 Bedroom 1 Bathroom	720	$2,050	$2.85	Hot Water	
	Boston, MA		75	2 Bedroom 2 Bathroom	1,056	$2,800	$2.65	Cold Water	
				2 Bedroom 2 Bathroom	1,065	$3,000	$2.82		
			12	3 Bedroom 2 Bathroom	1,556	$3,600	$2.31		
				3 Bedroom 2 Bathroom	1,556	$3,750	$2.41		
			122						
5	**Roxbury Corners/Parmelee Court**	1991	2	Studio	605	$1,000	$1.65	Heat	100%
	1782 Washington Street	4-Story	15	1 Bedroom 1 Bathroom	681	$1,750	$2.57	Hot Water	
	Boston, MA		75	2 Bedroom 1 Bathroom Duplex	935	$2,100	$2.25	Cold Water	
				2 Bedroom 1 Bathroom	1,105	$1,950	$1.76		
				2 Bedroom 1.5 Bathroom Duplex	1,145	$2,100	$1.83		
			33	3 Bedroom 2 Bathroom	1,100	$2,950	$2.68		
				3 Bedroom 1.5 Bathroom	1,245	$2,950	$2.37		
			4	4 Bedroom 2 Bathroom	1,615	$1,597	$0.99		
			129						
6	**Oliver Lofts**	2010	12	1 Bedroom 1 Bathroom	678-1,036	$1,575-$1,650	$1.60-$2.32	Heat	
	166 Terrace Street	5-Story	39	2 Bedroom 1 Bathroom Flat	1,137	$1,875	$1.65	Hot Water	
	Boston, MA		8	2 Bedroom 2 Bathroom TH	1,550	$2,450	$1.58	Cold Water	
				2 Bedroom 2 Bathroom TH	1,629	$2,550	$1.57	Cooking Gas	
				2 Bedroom 2 Bathroom TH Loft	1,213	$2,175	$1.79		
			3	3 Bedroom 2 Bathroom TH Loft	NA	NA	NA		
			62						

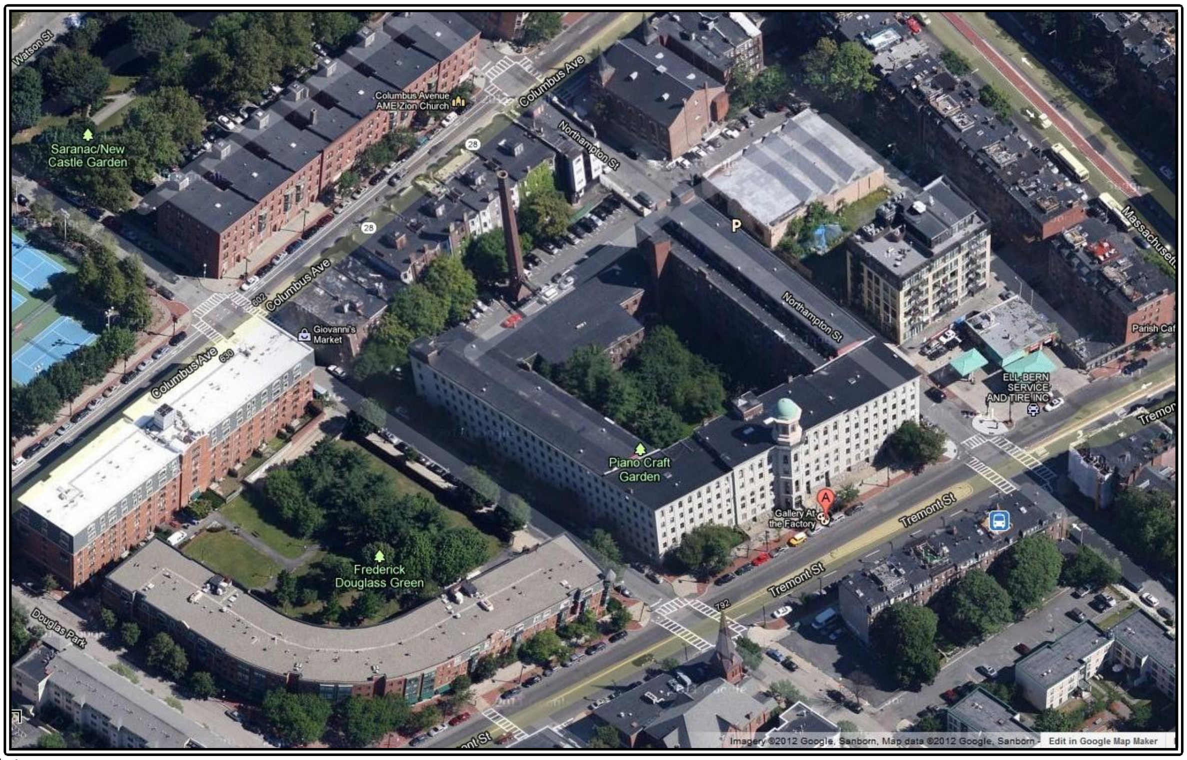

Douglas Park
Piano Craft Guild (Piano Row)
Parmelee Court
Roxbury Corners
Tremont Crossing - P3
Mission Main
CityView at Longwood
Oliver Lofts
Google earth



CityView at Longwood

CityView at Longwood is the former Back Bay Manor, which was acquired by Equity Properties in 2010 and subsequently renamed. The property is a high-rise apartment complex located in the Mission Hill neighborhood of Roxbury across the street from Mission Main. The property was completed in 1968 and consists of 296 studio, one-, two-, and three-bedroom units. Current rental rates for 561-square-foot studio apartments with a balcony and views are $2,195 per month and $3.91 per square foot. One-bedroom units at 771 square feet rent for between $2,155 and $2,255 per month and $2.80 and $2.91 per square foot, depending on floor height and views. Two-bedroom units at 961 square feet rent for $2,630 and $2.74 per square foot and two-bedrooms at 1,150 square feet rent for between $2,965 and $2,990 and $2.58 and $2.60 per square foot, depending on floor height and views. Utilities included in the rent are heat, hot water, air conditioning, and cooking gas. Common and unit amenities include fitness center, swimming pool, picnic areas with outdoor barbecue grills, 24-hour concierge service with dry cleaning, high-speed Internet connection, and garage parking. CityView offers luxury amenities such as hardwood floors, ceramic tile, tall ceilings, large windows with balconies, upgraded finishes and complimentary cocktail parties and social events. The property it is located in a superior neighborhood to that of the subject property because of its distance to the Longwood

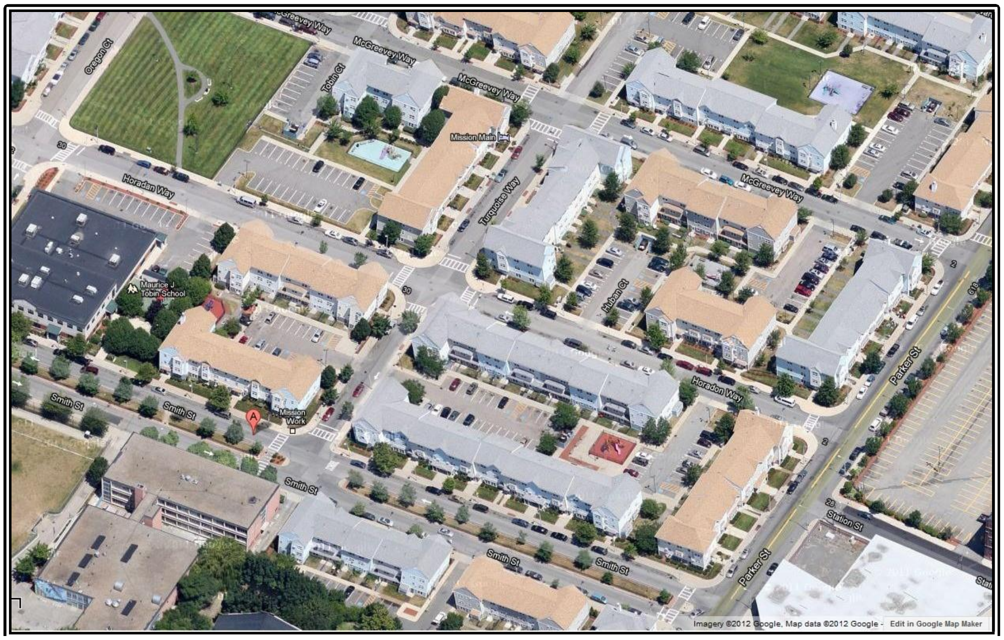
Medical Area and location within Mission Hill, however, it is generally comparable to the



subject.

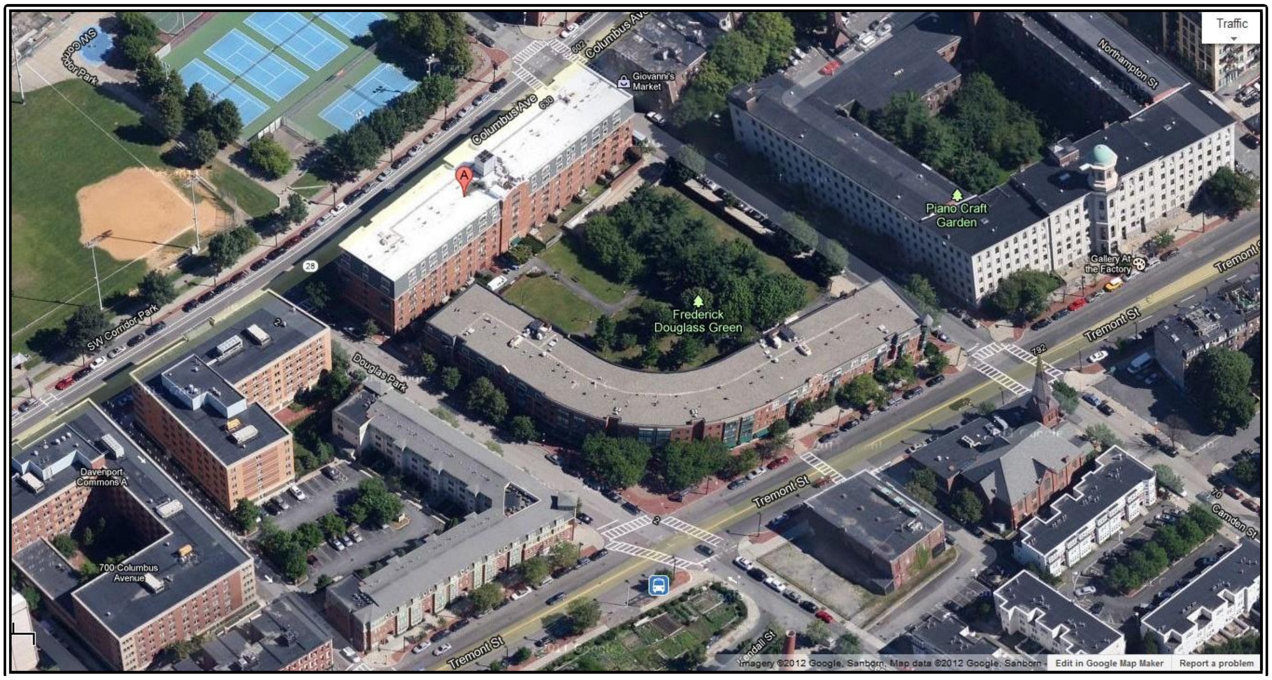
Piano Craft Guild Apartments

Piano Craft Guild was built in 1972 and renovated in 1997 and is located on Tremont Street next to Douglass Park. The project consists of 174 loft units in a former five- and six-story mill building. One-bedroom apartments within this property contain between 550 and 1,100 square feet and currently rent for between $1,800 and $2,600 per month. Two-bedrooms range in size from 800 to 1,600 square feet and currently rent for between $2,400 and $2,900 per month. Three-bedroom apartments range in size from 1,175 to 2,000 square feet and rent for between $3,600 and $4,000 per month. Thus monthly rents are between $1.81 and $3.27 per square foot, based on unit size and configuration. Common and unit amenities include an enclosed courtyard, storage, disposal, and dishwashers. Piano Craft Guild is located in a superior neighborhood than the location of the subject property because of its location further north on Tremont Street, closer to downtown and the Back Bay. Unit amenities are generally similar to those proposed for the subject property and therefore, the project is considered generally comparable to the subject.



Mission Main Apartments

Mission Main is a 535-unit residential apartment community located at 43 Smith Street in the Mission Hill neighborhood of Roxbury. Mission Main includes 445 affordable rental units and 90 market-rate housing units. The property is located in the Mission Hill neighborhood across the street from an elementary school, library, and park. Retail and commercial amenities are located within walking distance and the property is also located within walking distance to the Roxbury Community College. The property features one-, two-, and three-bedroom units in flat and townhouse layouts. Unit amenities include fully-applianced kitchens, carpeting, washer/dryer units in apartments, and dishwashers. Property features include a courtyard, extra storage, a playground, and landscaped grounds. Additionally, full-time management and maintenance is available on-site along with 24-hour emergency maintenance service. Limited parking is available on site and the property features an on-site community center with after-school programs, teen groups, a computer center, and job training. Two-bedroom, one-bath flat units are 959 square feet and currently rent for $1,850 per month, $1.93 per square foot. Two-bedroom, one-bath townhouse units are approximately 1,276 square feet and are currently renting for $1,950 per month, $1.53 per square foot. Three-bedroom, 1.5-bath units of approximately 1,256 square feet are currently renting for $2,200 per month, $1.75 per square foot and three-bedroom, 1.5-bath units of approximately 1,529 square feet are currently renting for $2,500 per month, $1.64 per square foot. Heat, hot water, cold water, sewer, and trash are included in the rent and the property is reportedly 98% occupied.

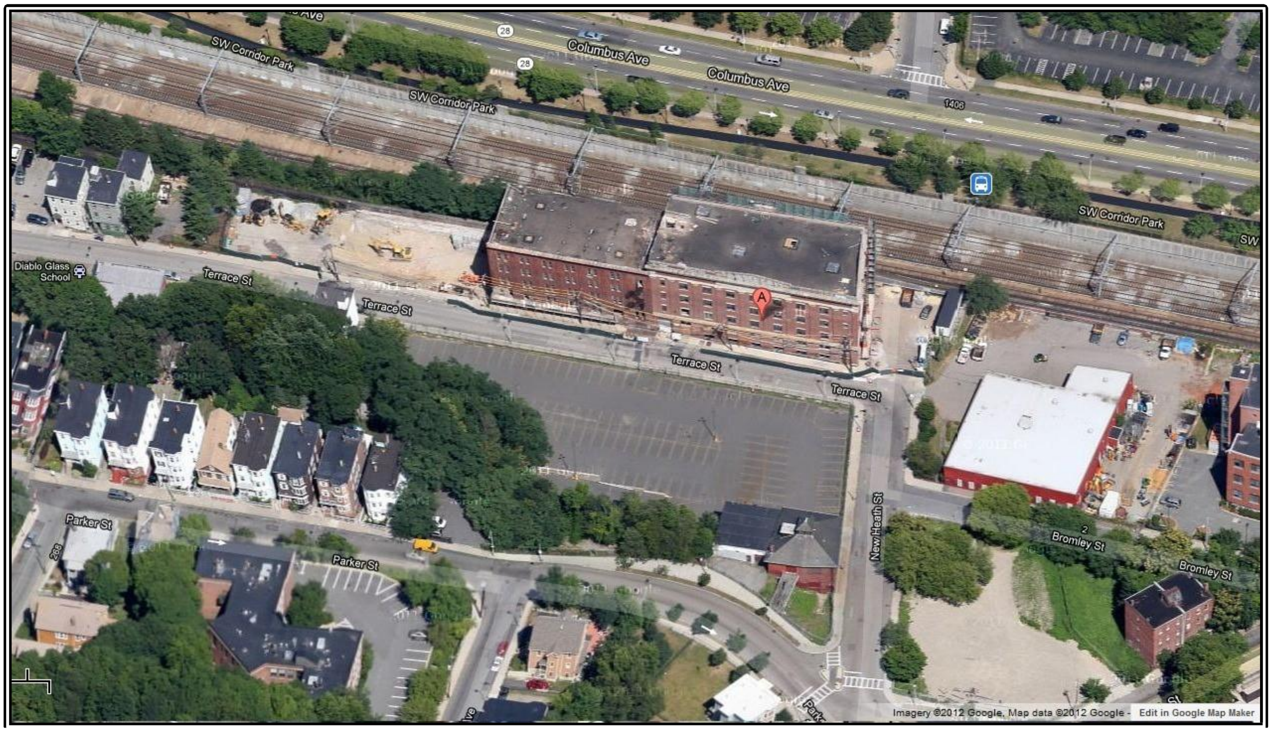


Douglass Park Apartments

Douglass Park is a four- and seven-story elevator brick building with mixed-income occupancy. It was constructed in 1989 and is located between Columbus Avenue and Tremont Street in the South End, near Northeastern University. The property offers 122 units of rental housing and apartments to accommodate 610 students. One-bedroom units of between 702 and 720 square feet are currently renting for $2,050 per month and between $2.85 and $2.92 per square foot. Two-bedroom, two-bath units of approximately 1,056 square feet are currently renting for $2,800 per month, $2.65 per square foot, and two-bedroom, two-bath units of approximately 1,065 square feet are currently renting for $3,000 per month, $2.82 per square foot. Three-bedroom, two-bath units of approximately 1,556 square feet are currently renting for between $3,600 and $3,750 per month, $2.31 to $2.41 per square foot. Unit and common amenities at Douglass Park include a fitness center, covered parking, controlled access, air conditioning, and a 24-hour concierge. These amenities offered are no longer considered luxury and are the expectation of the market for new rental units and projects.

Roxbury Corners Apartments/Parmelee Court Homes

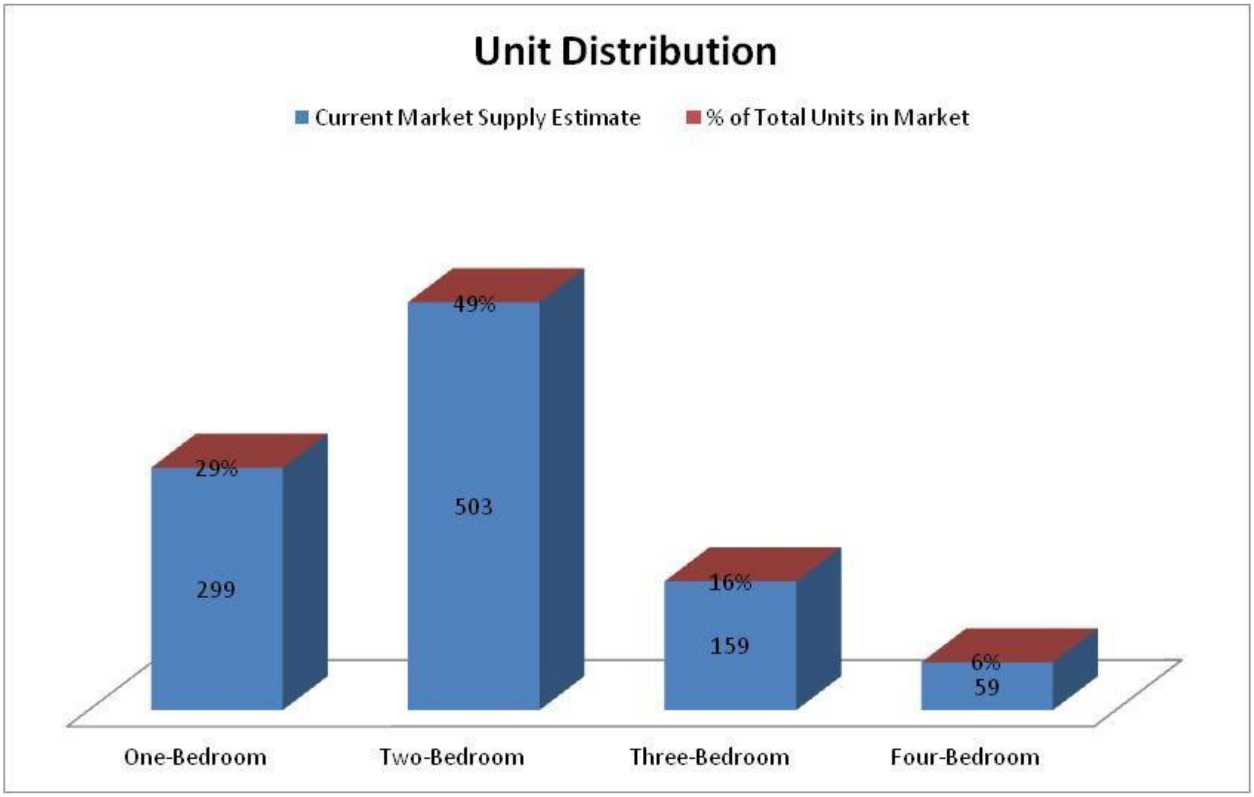
Roxbury Corners Apartments is a rental development of 54 units located at 134 Newhampton Street. The property is located within a neighborhood developed with commercial and medium density residential uses. Unit amenities at Roxbury Corners are limited to a dishwasher and garbage disposal and property amenities include a playground, laundry facilities and on-site parking for an additional monthly charge. Parmelee Court Homes is located in Roxbury on the corner of Massachusetts Avenue and Washington Street at 1782 Washington Street. The property neighborhood is developed with commercial and medium density residential uses. Washington Street has undergone revitalization efforts within the past years to improve streetscapes and pedestrian access. Unit amenities are limited to a dishwasher and garbage disposal and property amenities include a playground, laundry facilities and on-site parking for an additional monthly fee. Studio units of approximately 605 square feet are currently renting for $1,000 per month and $1.65 per square foot. One-bedroom units of approximately 681 square feet are currently renting for $1,750 per month and $2.57 per square foot. Two-bedroom units are between approximately 935 and 1,145 square feet and are currently renting for between $1,950 and $2,100 per month, $1.76 and $2.25 per square foot. Three-bedroom units are between approximately 1,100 and 1,256 square feet and are currently renting for $2,950 per month and $2.37 to $2.68 per square foot. Heat and hot water are included in the rent and the properties are reportedly 100% occupied.



Oliver Lofts

Oliver Lofts is a 62-unit rental development located in the Mission Hill neighborhood of Boston. The recently completed development was the adaptive reuse of a former pickle factory located at 164-166 Terrance Street. One-bedroom units range from 678 square feet and 1,036 square feet and are currently renting for between $1,575 and $1,650 per month and $1.60 and $2.32 per square foot. Two-bedroom, one-bath flat units are 1,137 square feet and currently rent for $1,875 per month, $1.65 per square foot. Two-bedroom, two-bath townhouse units are between 1,550 and 1,629 square feet and are currently renting for between $2,450 and $2,550, $1.57 and $1.58 per square foot. Two-bedroom, two-bath townhouse loft units of approximately 1,213 square feet are currently renting for $2,175 per month, $1.79 per square foot. Unit amenities include fully-applianced kitchens, carpeting, washer/dryer units in apartments, and dishwashers. Property features include garage parking, landscaped grounds, extra storage, bike storage, and an on-site recycling program. Heat, hot water, cold water, gas for cooking, sewer, and trash are included in the rent.

The chart below depicts the estimated unit distribution for surveyed projects within the market area. Not all project unit distributions for all projects described within this report are known



Boston Housing Authority

The Boston Housing Authority (BHA) owns 14,000 units of public housing within 64 projects around the city, with 37 projects designated for elderly/disabled residents and 27 projects reserved for families. According to a representative from the BHA, current occupancy within the entire BHA portfolio is 97% as of the end of 2011. The representative indicated that there are a few long-term vacancies due to modernization of some units in the portfolio from a fire, and when construction on these units is finished, occupancy will increase. The wait list for public housing units has approximately 20,000 names on it and wait times vary from six months to over two years, depending on unit type. The BHA is currently in the process of demolishing the Washington Beach (Phase 2) development to rehabilitate the site and construct 266 units of mixed-income housing under the Hope VI program. The project will utilize LIHTC and will feature low-income, moderate income, and market-rate units. The BHA administers approximately 11,000 Section 8 vouchers and currently the Section 8 wait list has reached the maximum number of applicants and is closed to new applicants. In October 2008, the BHA opened the Section 8 list for two weeks and had over 7,000 applicants. The BHA opens the list every two years or so and, the representative from the BHA indicated that two years is about how long it takes to exhaust the list. According to a representative from the BHA the property typically serves the very lowest-income residents earning less than 30% AMI.

Market Rent Conclusion

Market rents are based upon the market information provided by property management, a survey of comparable properties, and Kirk & Company files. All of the properties surveyed are located within similar neighborhoods of the subject property and include two- and three-bedroom units. Common area designs at the subject are comparable to most of the existing inventory in the subject's market area; however, the subject features new construction and modern, high-quality finishes and features. Professionally managed and operated market-rate studio, one-, two- and three-bedroom residential offerings are limited within the subject's immediate neighborhood; however, comparable properties located within a wider market area have been surveyed. The site has excellent access to public transportation, regional transportation systems, vehicular and pedestrian traffic and centers of employment and services. The recommended common area features, newness of construction, natural amenities of the property, and the high-quality finishes and features offered will provide a market advantage for the property. The market rents were derived through a comparative analysis with the market rents at the comparable properties. Adjustments were made for building design and location, unit amenities, site amenities, and utilities included in the rent. Accordingly, monthly rent for the studio- units of 550 square feet is $1,600 and $2.91 per square foot. Monthly rent for the one-bedroom units of 750 square feet is $2,150 and $2.87 per square foot. Monthly rent for the two-bedroom units of 1,000 square feet is $2,600 and $2.60 per square foot. The market rents at the subject property are considered achievable because of the sufficient demand and the market position is strong enough to enable the project to achieve the projected market rents. Rents at the subject property are assumed to include heat, hot and cold water, and trash pickup. Rent concessions may be necessary during initial rent-up and will impact gross effective rent.

According to the *CBRE/New England 2012 Multi-Housing Market Outlook*, Boston realized gains of 5.3% in effective rental rates in 2011, bolstered by employment growth and consumer confidence within the market. Additionally, according to the *Market Forecast* by Marcus&Millichap overall vacancy is projected to fall below 4.0% in 2012, facilitating healthy rent growth for apartment operators. Marcus&Milichap indicate that effective rents are projected to increase by 5.8% in 2012 over 2011 levels. The current market rents derived above are as of the date of this report. It is reasonable to assume that the proposed units at Tremont Crossing will be constructed over a period in the future and therefore an implied rental range for the proceeding 12- to 18-months has been estimated based on recent and historical pricing trends and current market projections. It is reasonable to project a 5% increase in market rents over the proceeding 12- to 18-months based on current pricing trends and market projections for additions to rental supply within the market.

Market Demand Analysis

The measurement of demand for rental units includes all households in the market that have income levels that are high enough to be able to support the rent level for the maximum affordable rents at the property. Households with incomes in the range are said to be in the ribbon of eligibility. The capture rate for this first measurement of demand is the percentage of existing households within the ribbon of eligibility that would have to move to the subject for the property to reach full occupancy.

The measurement of demand screens for the market-rate units include all rental households within the primary market area that have income levels with a maximum ratio of rent to income of between 30% and 40%. The capture rate for this first measurement of demand is the percentage of existing households in the ribbon of eligibility that would have to move to the subject for it to reach full occupancy. In estimating the capture rate for the market-rate rental units at the property, the maximum income has been calculated on the basis of current market rents as determined within this report. NCAHMA defines capture rate as the percentage of age, size, and income qualified renter households in the primary market area that the property must capture to fill the units. The Capture Rate is calculated by dividing the total number of units at the property by the total number of age, size and income qualified renter households in the primary market area.

Studio and one-bedroom households are typically measured as one- and two-person households, while two-bedroom households are typically measured as one-, two-, three-, and four-person households within the market. In estimating the minimum income in the ribbon that can be absorbed, a maximum ratio of rent to income of between 30% and 40% has been projected. The following chart indicates the range of required income for each unit type at the subject property, based on current estimated market rent and a maximum ratio of rent to income of between 30% and 40%.

Unit Type	Market Rent/Month	% of Income	Range of Required Income
Studio	$1,600	40%	$48,000
		30%	$64,000
One-Bedroom	$2,150	40%	$64,500
		30%	$86,000
Two-Bedroom	$2,600	40%	$78,000
		30%	$104,000

The demand analysis for households within the eligible ribbon indicates that there are a total of 3,021 income-eligible renter households that have incomes that can support monthly rents for a studio unit within the PMA, 2,649 income-eligible renter households that have incomes that can support monthly rents for a one-bedroom unit within the PMA, and 2,477 income-eligible renter households that have incomes that can support monthly rents for a two-bedroom unit within the PMA, as indicated by the Demographic Data charts on the following pages. This measurement of demand indicates required capture rates of 1.69% for approximately 51 studio units, 3.85% for approximately 102 one-bedroom units, and 2.06% for approximately 51 two-bedroom units for the primary, as indicated by the chart below.

Capture Rate Analysis Summary - Market-Rate

Affordable Units	1.0-Mile Radius Renter HH
Studio Units	1.69%
One-Bedroom Units	3.85%
Two-Bedroom Units	2.06%

Demographic Data - Studio Units

Market Area:	*1.0-Mile Radius*	
STDBOnline Estimates*		
Total Households	**Total**	**% Change**
1990 Households	29,431	
2000 Households	30,064	2.2%
2010 Households	31,502	4.8%
2015 Households	32,499	3.2%
2010 Housing Units		
Owner Occupied Units	15.4%	4,848
Renter Occupied Units	84.6%	26,654
Qualified Renter Household Calculations		
FY2012 MFI (HUD)	$97,800	
80% of median	$78,240	76.2%
60% of median	$58,680	66.1%
50% of median	$48,900	58.8%
30% of median	$29,340	36.9%

Income-Housing Data**		**Units:**	51
2010 Household Income Data			
Median Area Income:		$41,102	
from	**to**	**Count**	**%**
$0	$34,999	13867	44.0%
$35,000	$39,999	1485	4.7%
$40,000	$44,999	1658	5.3%
$45,000	$49,999	1932	6.1%
$50,000	$59,999	2118	6.7%
$60,000	$74,999	2549	8.1%
$75,000	$99,999	2989	9.5%
$100,000	$124,999	1859	5.9%
$125,000	$149,999	1249	4.0%
$150,000	$199,999	671	2.1%
$200,000	over	1124	3.6%
Total		**31,501**	**100%**

Projected Demand and Capture Rate from Eligible Ribbon		
1. Minimum Eligible Income		
Minimum eligible household income		$48,000
2. Maximum Eligible Income		
Maximum eligible household income		$64,000
3. Total 2010 Households in Eligible Ribbon	11.3%	3,021
4. Indicated Capture Rate of Renter Households in Eligible Ribbon		1.69%

* *Data provided by STDBOnline with US Census Imputation*

** *Data compiled by Kirk&Company from Census/ACS Data*

Demographic Data - 1-Bedroom Units

Market Area:	*1.0-Mile Radius*	
STDBOnline Estimates*		
Total Households	**Total**	**% Change**
1990 Households	29,431	
2000 Households	30,064	2.2%
2010 Households	31,502	4.8%
2015 Households	32,499	3.2%
2010 Housing Units		
Owner Occupied Units	15.4%	4,848
Renter Occupied Units	84.6%	26,654
Qualified Renter Household Calculations		
FY2012 MFI (HUD)	$97,800	
80% of median	$78,240	76.2%
60% of median	$58,680	66.1%
50% of median	$48,900	58.8%
30% of median	$29,340	36.9%

Income-Housing Data**		**Units:**	102
2010 Household Income Data			
Median Area Income:		$41,102	
from	**to**	**Count**	**%**
$0	$34,999	13867	44.0%
$35,000	$39,999	1485	4.7%
$40,000	$44,999	1658	5.3%
$45,000	$49,999	1932	6.1%
$50,000	$59,999	2118	6.7%
$60,000	$74,999	2549	8.1%
$75,000	$99,999	2989	9.5%
$100,000	$124,999	1859	5.9%
$125,000	$149,999	1249	4.0%
$150,000	$199,999	671	2.1%
$200,000	over	1124	3.6%
Total		**31,501**	**100%**

Projected Demand and Capture Rate from Eligible Ribbon		
1. Minimum Eligible Income		
Minimum eligible household income		$61,500
2. Maximum Eligible Income		
Maximum eligible household income		$82,000
3. Total 2010 Households in Eligible Ribbon	9.9%	2,649
4. Indicated Capture Rate of Renter Households in Eligible Ribbon		3.85%

* *Data provided by STDBOnline with US Census Imputation*

** *Data compiled by Kirk&Company from Census/ACS Data*

Demographic Data - 2-Bedroom Units

Market Area:	*1.0-Mile Radius*	
STDBOnline Estimates*		
Total Households	**Total**	**% Change**
1990 Households	29,431	
2000 Households	30,064	2.2%
2010 Households	31,502	4.8%
2015 Households	32,499	3.2%
2010 Housing Units		
Owner Occupied Units	15.4%	4,848
Renter Occupied Units	84.6%	26,654
Qualified Renter Household Calculations		
FY2012 MFI (HUD)	$97,800	
80% of median	$78,240	76.2%
60% of median	$58,680	66.1%
50% of median	$48,900	58.8%
30% of median	$29,340	36.9%

Income-Housing Data**		**Units:**	51
2010 Household Income Data			
Median Area Income:		$41,102	
from	**to**	**Count**	**%**
$0	$34,999	13867	44.0%
$35,000	$39,999	1485	4.7%
$40,000	$44,999	1658	5.3%
$45,000	$49,999	1932	6.1%
$50,000	$59,999	2118	6.7%
$60,000	$74,999	2549	8.1%
$75,000	$99,999	2989	9.5%
$100,000	$124,999	1859	5.9%
$125,000	$149,999	1249	4.0%
$150,000	$199,999	671	2.1%
$200,000	over	1124	3.6%
Total		**31,501**	**100%**

Projected Demand and Capture Rate from Eligible Ribbon		
1. Minimum Eligible Income		
Minimum eligible household income		$78,000
2. Maximum Eligible Income		
Maximum eligible household income		$104,000
3. Total 2010 Households in Eligible Ribbon	9.3%	2,477
4. Indicated Capture Rate of Renter Households in Eligible Ribbon		2.06%

** Data provided by STDBOnline with US Census Imputation*

*** Data compiled by Kirk&Company from Census/ACS Data*

Affordable Demand Analysis

The Boston Redevelopment Authority requires that 15% of the residential units in an approved development be reserved as affordable to residents earning 70% or less than the Area Median Income (AMI) under the BRA Inclusionary Development Policy. The 2012 income limits, as determined by the office of Housing and Urban Development (HUD), and adopted by the BRA, are as follows.

Federal 2012 Income Limits for Metro Boston

Household size	70% AMI (Rental)	80% AMI (Ownership)	100% AMI (Ownership)
1	$ 47,900	$ 54,750	$ 68,450
2	$ 54,750	$ 62,600	$ 78,250
3	$ 61,600	$ 70,400	$ 88,000
4	$ 68,450	$ 78,250	$ 97,800
5	$ 73,950	$ 84,500	$ 105,600
6	$ 79,400	$ 90,750	$ 113,450
7	$ 84,900	$ 97,000	$ 121,250
8	$ 90,350	$ 103,300	$ 129,100

Maximum Affordable Rents*

Bedrooms	70% AMI
0	$ 1,061
1	$ 1,237
2	$ 1,414
3	$ 1,591
4	$ 1,768
5	$ 1,910
6	$ 2,051
7	$ 2,193

Chart Source: Boston BRA

The measurement of demand for affordable units includes all households in the market that have income levels low enough to qualify under the income limits set out by the BRA and incomes that are high enough to be able to support the rent level for the maximum affordable rents at the property. Households with incomes in the affordable range are said to be in the ribbon of eligibility. The capture rate for this first measurement of demand is the percentage of existing households within the ribbon of eligibility that would have to move to the subject for the property to reach full occupancy.

The measurement of demand screens for the affordable units include all rental households within the primary market area that have income levels at or below 70% AMI in order to qualify for the units at the subject property under the BRA affordability guidelines. The capture rate for this first measurement of demand is the percentage of existing households in the ribbon of eligibility that would have to move to the subject for it to reach full occupancy. In estimating the capture rate for the affordable rental units at the property, the maximum eligible income has been calculated on the basis of current income limits. NCAHMA defines capture rate as the percentage of age, size, and income qualified renter households in the primary market area that the property must capture to fill the units. The Capture Rate is calculated by dividing the total number of units at the property by the total number of age, size and income qualified renter households in the primary market area.

In estimating the capture rate for the property, the maximum eligible income has been calculated on the basis of current income limits. Studio and one-bedroom households are typically measured as one- and two-person households, while two-bedroom households are typically measured as one-, two-, three-, and four-person households within the market. In estimating the minimum income in the ribbon that can be absorbed, a maximum ratio of rent to income of 30% has been projected. The demand analysis for households earning 70% AMI indicates that there are a total of 3,004 income-eligible renter households that qualify for a studio unit within the PMA, 3,594 income-eligible renter households that qualify for a one-bedroom unit within the PMA, and 3,534 income-eligible renter households that qualify for a two-bedroom unit within the PMA, as indicated by the Demographic Data charts on the following pages. This measurement of demand indicates required capture rates of 0.30% for the approximately 9 studio units, 0.50% for the approximately 18 one-bedroom units, and 0.25% for the approximately 9 two-bedroom units for the primary, as indicated by the chart below.

Capture Rate Analysis Summary - 70% AMI

Affordable Units	1.0-Mile Radius Renter HH
Studio Units	0.30%
One-Bedroom Units	0.50%
Two-Bedroom Units	0.25%

Demographic Data - Studio Units - 70% AMI

Market Area:	*1.0-Mile Radius*	
STDBOnline Estimates*		
Total Households	**Total**	**% Change**
1990 Households	29,431	
2000 Households	30,064	2.2%
2010 Households	31,502	4.8%
2015 Households	32,499	3.2%
2010 Housing Units		
Owner Occupied Units	15.4%	4,848
Renter Occupied Units	84.6%	26,654
Qualified Renter Household Calculations		
FY2012 MFI (HUD)	$97,800	
80% of median	$78,240	76.2%
60% of median	$58,680	66.1%
50% of median	$48,900	58.8%
30% of median	$29,340	36.9%

Low Income Housing Data**		**Units:**	9
2010 Household Income Data			
Median Area Income:		$41,102	
from	**to**	**Count**	**%**
$0	$34,999	13867	44.0%
$35,000	$39,999	1485	4.7%
$40,000	$44,999	1658	5.3%
$45,000	$49,999	1932	6.1%
$50,000	$59,999	2118	6.7%
$60,000	$74,999	2549	8.1%
$75,000	$99,999	2989	9.5%
$100,000	$124,999	1859	5.9%
$125,000	$149,999	1249	4.0%
$150,000	$199,999	671	2.1%
$200,000	over	1124	3.6%
Total		**31,501**	**100%**

Projected Demand and Capture Rate from Eligible Ribbon		
1. Minimum Eligible Income		
Minimum eligible household income		$31,830
2. Maximum Eligible Income		
Maximum eligible household income		$42,440
3. Total 2010 Households in Eligible Ribbon	11.3%	3,004
4. Indicated Capture Rate of Renter Households in Eligible Ribbon		0.30%

** Data provided by STDBOnline with US Census Imputation*

*** Data compiled by Kirk&Company from Census/ACS Data*

Demographic Data - 1-Bedroom Units - 70% AMI

Market Area:	*1.0-Mile Radius*	
STDBOnline Estimates*		
Total Households	**Total**	**% Change**
1990 Households	29,431	
2000 Households	30,064	2.2%
2010 Households	31,502	4.8%
2015 Households	32,499	3.2%
2010 Housing Units		
Owner Occupied Units	15.4%	4,848
Renter Occupied Units	84.6%	26,654
Qualified Renter Household Calculations		
FY2012 MFI (HUD)	$97,800	
80% of median	$78,240	76.2%
60% of median	$58,680	66.1%
50% of median	$48,900	58.8%
30% of median	$29,340	36.9%

Low Income Housing Data**		**Units:**	18
2010 Household Income Data			
	Median Area Income:	$41,102	
from	**to**	**Count**	**%**
$0	$34,999	13867	44.0%
$35,000	$39,999	1485	4.7%
$40,000	$44,999	1658	5.3%
$45,000	$49,999	1932	6.1%
$50,000	$59,999	2118	6.7%
$60,000	$74,999	2549	8.1%
$75,000	$99,999	2989	9.5%
$100,000	$124,999	1859	5.9%
$125,000	$149,999	1249	4.0%
$150,000	$199,999	671	2.1%
$200,000	over	1124	3.6%
Total		**31,501**	**100%**

Projected Demand and Capture Rate from Eligible Ribbon		
1. Minimum Eligible Income		
Minimum eligible household income		$37,110
2. Maximum Eligible Income		
Maximum eligible household income		$49,480
3. Total 2010 Households in Eligible Ribbon	13.5%	3,594
4. Indicated Capture Rate of Renter Households in Eligible Ribbon		0.50%

** Data provided by STDBOnline with US Census Imputation*
*** Data compiled by Kirk&Company from Census/ACS Data*

Demographic Data - 2-Bedroom Units - 70% AMI

Market Area:	*1.0-Mile Radius*	
*STDBOnline Estimates**		
Total Households	**Total**	**% Change**
1990 Households	29,431	
2000 Households	30,064	2.2%
2010 Households	31,502	4.8%
2015 Households	32,499	3.2%
2010 Housing Units		
Owner Occupied Units	15.4%	4,848
Renter Occupied Units	84.6%	26,654
Qualified Renter Household Calculations		
FY2012 MFI (HUD)	$97,800	
80% of median	$78,240	76.2%
60% of median	$58,680	66.1%
50% of median	$48,900	58.8%
30% of median	$29,340	36.9%

Low Income Housing Data**		**Units:**	9
2010 Household Income Data			
Median Area Income:		$41,102	
from	**to**	**Count**	**%**
$0	$34,999	13867	44.0%
$35,000	$39,999	1485	4.7%
$40,000	$44,999	1658	5.3%
$45,000	$49,999	1932	6.1%
$50,000	$59,999	2118	6.7%
$60,000	$74,999	2549	8.1%
$75,000	$99,999	2989	9.5%
$100,000	$124,999	1859	5.9%
$125,000	$149,999	1249	4.0%
$150,000	$199,999	671	2.1%
$200,000	over	1124	3.6%
Total		**31,501**	**100%**

Projected Demand and Capture Rate from Eligible Ribbon		
1. Minimum Eligible Income		
Minimum eligible household income		$42,420
2. Maximum Eligible Income		
Maximum eligible household income		$56,560
3. Total 2010 Households in Eligible Ribbon	13.3%	3,534
4. Indicated Capture Rate of Renter Households in Eligible Ribbon		0.25%

** Data provided by STDBOnline with US Census Imputation*

*** Data compiled by Kirk&Company from Census/ACS Data*

Conclusion

The market for housing in the subject neighborhood is growing and it is reasonable to assume that the site can accommodate 240 rental units, 204 of which would be market-rate and 36 of which would be reserved as affordable to residents earning at or below 70% AMI. The safety, security, and services that meet the market and are now expected in new development, include the above mentioned items. The subject neighborhood is considered by many, an interceptor location for many prospective residents and will enhance the marketability of the site. Similar mixed-use neighborhoods within Boston include Chinatown, the Theatre District, the Seaport, and Copley Plaza; all of which feature residential uses coupled with commercial office and retail. The subject property's location and access to local employment at the site and in the surrounding neighborhoods will enhance the project marketability and sustainability. Additionally, the relative lack of smaller unit types within the immediate neighborhood should enhance the marketability and competitiveness of the units at the project. The scale of the development must be large enough to provide the necessary amenities expected in new construction and not so large as to prohibit a reasonable absorption period. Therefore, it is reasonable to assume that a project of 240 rental units is considered appropriate at this time and in this location.

In developing a unit mix, existing and proposed projects were analyzed. Additionally, the Roxbury Strategic Master Plan was referenced in developing an approximate unit mix for the neighborhood. Because of the location, nature of, and density of the proposed development, large family units such as three- and four-bedroom units were not considered appropriate for the development. Large family units typically require additional outdoor space, extra storage, noise barriers, and provisions for increased density that typically are best served by low-rise garden apartments. This location has the potential capacity to absorb additional units and growth because of its central, accessible location and redevelopment activity within the surrounding neighborhoods. The site has excellent access to transportation and employment nodes throughout Boston and the scale of the project is large enough to offer competitive living units and common amenities.

Real conveniences, amenities, services, and enhanced security at the subject property could enhance the market position of the units. The building program and final amenities and features offered at the property will ultimately determine the market position and rent potential of the project. Project amenities at competitive developments include high-speed internet, elevator access, fitness centers, swimming pools, bike storage, garage parking, landscaping, walking trails, and sitting areas. Unit amenities at competitive developments include laundry facilities within rental units, wood flooring, ceramic tile, or natural stone flooring surfaces, hardwood cabinets with natural stone or solid surface counters, top-range appliances including range, range hood, refrigerator, dishwasher, garbage disposal, and microwave oven. Additionally, many units within the market feature tall ceilings, central air conditioning, private patios or balconies, and upgraded fixtures.

Absorption

The market for rental housing is stable in Boston with high occupancy levels and reported rent increases throughout the city. Occupancy in the subject market area is in the 94% to 100% range for comparable market-rate properties and occupancy reported at 100% for affordable properties in the market and long waiting lists. According to research and analysis conducted by *Kirk&Company*, there are currently seven major residential projects currently under construction within Boston, aggregating approximately 1,255 units of rental housing and for-sale condominiums. According to our research, 261 units of housing are expected to be delivered in 2012 within two developments, 932 units are expected to be delivered in 2013 within three developments, 1,145 units are expected to be delivered in 2014 within five developments and approximately 3,000 units are expected to be delivered in 2015 or later. The implied absorption rate of the current pipeline indicates a range of implied absorption of between 10 and 13 units per month for years 2013 and 2014, based on current known data.

It is reasonable to assume a project of 240 residential units with approximately 204 market-rate units, at the subject location could reach full occupancy within eighteen to twenty-four months of opening, based on development of between averaging approximately 8-12 units per month, assuming a professional marketing campaign and professional property management effort is undertaken. Pre-leasing activity may increase the absorption rate and decrease the occupancy time period of the project.

Certification

We hereby certify that:

1. The statements of fact contained in this report are true and correct.

2. The reported analyses, opinions, and conclusions are limited only by the reported assumptions and limiting conditions of the initial appraisal, and are our personal, unbiased professional analyses, opinions and conclusions.

3. We have no present or prospective interest in the property that is the subject of this report, and we have no personal interest or bias with respect to the parties involved.

4. Our compensation is not contingent upon the reporting of a predetermined value or direction in value that favors the cause of the client, the amount of the value estimate, the attainment of a stipulated result, or the occurrence of a subsequent event.

2. The reported analyses, opinions and conclusions were developed and this report has been prepared, in conformity with the requirements of the Code of Professional Ethics and Standards of Professional Practice of the Appraisal Institute and the Uniform Standards of Professional Appraisal Practice, promulgated by the Appraisal Foundation.

6. David S. Kirk and Brett N. Pelletier have made personal inspections of the property that is the subject of this report.

7. Both David S. Kirk and Brett N. Pelletier are competent to appraise the subject property as both have had substantial experience in appraising all types of income producing property. No one provided significant professional assistance to the persons signing this report.

8. Kirk & Company has not previously appraised this property within the past three (3) years.

8. The use of this report is subject to the requirements of the Appraisal Institute relating to review by its duly authorized representatives.

9. The Appraisal Institute conducts a voluntary program of continuing education for its designated members. MAI's and RM's who meet the minimum standards of this program are awarded periodic education certification. David S. Kirk is currently certified under this program through December 31, 2016.

David S. Kirk, MAI, CRE®

Brett N. Pelletier

PART III: APPENDICES

1. Qualifications of the Appraisers

Appendix 1

Qualifications of the Appraisers

David S. Kirk, MAI, CRE

Mr. Kirk is the Principal and Founder of Kirk & Company, a real estate appraisal, consulting and investment counseling company located in Boston, Massachusetts. Kirk & Company offers real estate consulting services to institutions, corporations, investors and developers. Services include advice, analysis and assistance on real estate investment, disposition, and development, including property valuation, marketability and feasibility studies.

Prior to founding Kirk & Company in 1993, he was a Senior Vice-President and Principal of The Boston Financial Group, and the Director of the Boston Financial Consulting Group, a division within the company that offers real estate consulting services. Lend Lease acquired Boston Financial in September of 1999. Prior to 1971, Mr. Kirk was an account executive with Landauer Associates (New York City), real estate consultants, where he was an appraiser of commercial, industrial and residential properties for purposes of financing, joint venture, disposition and corporate merger/acquisition.

Mr. Kirk is a member of the Appraisal Institute (MAI) and the Counselors of Real Estate (CRE). He was the 2001 President of the Counselors of Real Estate and 2001 President of the Greater Boston Chapter of The Appraisal Institute. He is a member of the Greater Boston Real Estate Board, and the National Association of Realtors. Mr. Kirk is a Certified General Real Estate Appraiser in the state of Massachusetts and Connecticut and a licensed real estate broker in the states of Massachusetts and New York.

Mr. Kirk is a graduate of the University of Pennsylvania where he majored in Architecture and the Wharton Graduate School of Business where he majored in Finance. He has been a speaker and a panelist at conferences of, among others, the Urban Land Institute, the National Trust for Historic Preservation, the Mortgage Bankers Association of America, the Society of Real Estate Appraisers, and the Massachusetts Bar Association. He was chairman of an advisory working group on Troubled Properties for the United States Department of Housing and Urban Development.

Mr. Kirk was a member of the Board of Editors of *Banker & Tradesman* and a contributing writer to the *New England Real Estate Journal*, and a co-author of *Real Estate: A Hidden Corporate Asset* (American Society of Real Estate Counselors, 1986). He has written articles which have appeared in national real estate periodicals including *The Appraisal Journal* and *Real Estate Review*. His article, "Using the Reversion/Shelter Approach to Appraise Subsidized Housing," co-authored with David A. Smith, was honored as the best *Appraisal Journal* article written in 1983, recipient of the Robert H. Armstrong Award.

Brett N.
Pelletier

Mr. Pelletier joined Kirk & Company in 2005 to assist in the appraisal and consulting process, which includes narrative appraisal reports, appraisal review reports, feasibility studies, acquisition analysis and customized market research. Mr. Pelletier specializes in appraisal and market study analysis for affordable housing.

Mr. Pelletier received his Bachelor's Degree in Finance with a minor in English from Bentley College where he focused on Corporate Finance and Real Estate with coursework in Real Estate Law, Real Estate Financing and Urban Planning & Development. Mr. Pelletier has successfully completed the Basic Appraisal Principals course (2006), Uniform Standards of Professional Appraisal Practice course (2006), Basic Appraisal Procedures course (2006), Highest & Best Use and Market Studies, and Real Estate Finance, Statistics, and Valuation Modeling courses (2007), General Appraiser Income Approach (Parts 1& 2), Business Practices and Ethics course (2008), General Appraiser Sales Comparison Approach (2008), and General Appraiser Report Writing (2009), provided by the Appraisal Institute.

Mr. Pelletier is a member of the Preservation Society of Newport County and Fall River Historical Society, non-profit organizations that preserve and protect the architectural heritage of Newport County and Fall River.

Appendix 3-A: Traffic Count Data
Appendix 3-B: Crash Rate Worksheets
Appendix 3-C: Trip Generation Calculations
Appendix 3-D: Background Traffic Data
Appendix 3-E: Capacity Analysis Worksheets
Appendix 3-F: Warrant Analysis

Appendix 3-A: Traffic Count Data

N/S: Tremont Street/ Columbus Ave (Rt 28
E/W: Malcom X Blvd/ Tremont Street
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

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Site Code : 23155.00
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Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Tremont Street (Route 28) From North				Malcom X Boulevard From East			Columbus Avenue (Route 28) From South				Tremont Street From West			
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	Right	Thru	Left	U-Turn	Right	Thru	Left	Int. Total
11:00 AM	38	134	44	3	70	44	15	24	158	20	0	23	46	37	656
11:15 AM	40	125	39	4	67	65	18	15	183	21	0	19	62	34	692
11:30 AM	41	138	38	4	55	73	11	19	174	28	1	27	68	34	711
11:45 AM	53	148	36	4	63	72	18	21	187	30	0	17	38	41	728
Total	172	545	157	15	255	254	62	79	702	99	1	86	214	146	2787
12:00 PM	40	134	31	1	57	64	16	10	181	22	0	28	66	36	686
12:15 PM	43	160	28	1	72	60	11	20	182	20	0	15	43	35	690
12:30 PM	44	151	32	1	58	53	14	13	190	25	0	36	44	45	706
12:45 PM	38	173	29	3	66	59	18	10	168	27	1	34	47	40	713
Total	165	618	120	6	253	236	59	53	721	94	1	113	200	156	2795
Grand Total	337	1163	277	21	508	490	121	132	1423	193	2	199	414	302	5582
Apprch %	18.7	64.7	15.4	1.2	45.4	43.8	10.8	7.5	81.3	11	0.1	21.7	45.2	33	
Total %	6	20.8	5	0.4	9.1	8.8	2.2	2.4	25.5	3.5	0	3.6	7.4	5.4	
Cars	333	1134	228	21	462	469	118	130	1389	190	2	192	403	297	5368
% Cars	98.8	97.5	82.3	100	90.9	95.7	97.5	98.5	97.6	98.4	100	96.5	97.3	98.3	96.2
Heavy Vehicles	4	29	49	0	46	21	3	2	34	3	0	7	11	5	214
% Heavy Vehicles	1.2	2.5	17.7	0	9.1	4.3	2.5	1.5	2.4	1.6	0	3.5	2.7	1.7	3.8

	Tremont Street (Route 28) From North					Malcom X Boulevard From East				Columbus Avenue (Route 28) From South					Tremont Street From West				
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																			
Peak Hour for Entire Intersection Begins at 11:15 AM																			
11:15 AM	40	125	**39**	**4**	208	**67**	65	**18**	150	15	183	21	0	219	19	62	34	115	692
11:30 AM	41	138	38	4	221	55	**73**	11	139	19	174	28	**1**	222	27	**68**	34	129	711
11:45 AM	**53**	**148**	36	4	**241**	63	72	18	**153**	**21**	**187**	**30**		**238**	17	38	**41**	96	**728**
12:00 PM	40	134	31	1	206	57	64	16	137	10	181	22	0	213	**28**	66	36	**130**	686
Total Volume	174	545	144	13	876	242	274	63	579	65	725	101	1	892	91	234	145	470	2817
% App. Total	19.9	62.2	16.4	1.5		41.8	47.3	10.9		7.3	81.3	11.3	0.1		19.4	49.8	30.9		
PHF	.821	.921	.923	.813	.909	.903	.938	.875	.946	.774	.969	.842	.250	.937	.813	.860	.884	.904	.967
Cars	173	533	120	13	839	215	262	62	539	64	708	101	1	874	89	228	144	461	2713
% Cars	99.4	97.8	83.3	100	95.8	88.8	95.6	98.4	93.1	98.5	97.7	100	100	98.0	97.8	97.4	99.3	98.1	96.3
Heavy Vehicles	1	12	24	0	37	27	12	1	40	1	17	0	0	18	2	6	1	9	104
% Heavy Vehicles	0.6	2.2	16.7	0	4.2	11.2	4.4	1.6	6.9	1.5	2.3	0	0	2.0	2.2	2.6	0.7	1.9	3.7

N/S: Tremont Street/ Columbus Ave (Rt 28
E/W: Malcom X Blvd/ Tremont Street
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

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Groups Printed- Cars

	Tremont Street (Route 28) From North				Malcom X Boulevard From East			Columbus Avenue (Route 28) From South				Tremont Street From West			
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	Right	Thru	Left	U-Turn	Right	Thru	Left	Int. Total
11:00 AM	38	126	36	3	66	43	13	24	153	19	0	21	44	36	622
11:15 AM	40	124	32	4	63	62	18	15	180	21	0	18	60	34	671
11:30 AM	40	133	32	4	48	71	11	18	169	28	1	26	67	33	681
11:45 AM	53	146	31	4	56	68	18	21	181	30	0	17	37	41	703
Total	171	529	131	15	233	244	60	78	683	98	1	82	208	144	2677
12:00 PM	40	130	25	1	48	61	15	10	178	22	0	28	64	36	658
12:15 PM	42	157	22	1	68	57	11	19	178	20	0	15	41	35	666
12:30 PM	43	148	25	1	53	51	14	13	188	23	0	34	44	44	681
12:45 PM	37	170	25	3	60	56	18	10	162	27	1	33	46	38	686
Total	162	605	97	6	229	225	58	52	706	92	1	110	195	153	2691
Grand Total	333	1134	228	21	462	469	118	130	1389	190	2	192	403	297	5368
Apprch %	19.4	66.1	13.3	1.2	44	44.7	11.2	7.6	81.2	11.1	0.1	21.5	45.2	33.3	
Total %	6.2	21.1	4.2	0.4	8.6	8.7	2.2	2.4	25.9	3.5	0	3.6	7.5	5.5	

	Tremont Street (Route 28) From North					Malcom X Boulevard From East				Columbus Avenue (Route 28) From South					Tremont Street From West				
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																			
Peak Hour for Entire Intersection Begins at 11:15 AM																			
11:15 AM	40	124	**32**	**4**	200	**63**	62	**18**	**143**	15	180	21	0	216	18	60	34	112	671
11:30 AM	40	133	32	4	209	48	**71**	11	130	18	169	28	**1**	216	26	**67**	33	126	681
11:45 AM	**53**	**146**	31	4	**234**	56	68	18	142	**21**	**181**	**30**		**232**	17	37	**41**	95	**703**
12:00 PM	40	130	25	1	196	48	61	15	124	10	178	22	0	210	**28**	64	36	**128**	658
Total Volume	173	533	120	13	839	215	262	62	539	64	708	101	1	874	89	228	144	461	2713
% App. Total	20.6	63.5	14.3	1.5		39.9	48.6	11.5		7.3	81	11.6	0.1		19.3	49.5	31.2		
PHF	.816	.913	.938	.813	.896	.853	.923	.861	.942	.762	.978	.842	.250	.942	.795	.851	.878	.900	.965

N/S: Tremont Street/ Columbus Ave (Rt 28
E/W: Malcom X Blvd/ Tremont Street
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

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Groups Printed- Heavy Vehicles

	Tremont Street (Route 28) From North				Malcom X Boulevard From East			Columbus Avenue (Route 28) From South				Tremont Street From West			
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	Right	Thru	Left	U-Turn	Right	Thru	Left	Int. Total
11:00 AM	0	8	8	0	4	1	2	0	5	1	0	2	2	1	34
11:15 AM	0	1	7	0	4	3	0	0	3	0	0	1	2	0	21
11:30 AM	1	5	6	0	7	2	0	1	5	0	0	1	1	1	30
11:45 AM	0	2	5	0	7	4	0	0	6	0	0	0	1	0	25
Total	1	16	26	0	22	10	2	1	19	1	0	4	6	2	110
12:00 PM	0	4	6	0	9	3	1	0	3	0	0	0	2	0	28
12:15 PM	1	3	6	0	4	3	0	1	4	0	0	0	2	0	24
12:30 PM	1	3	7	0	5	2	0	0	2	2	0	2	0	1	25
12:45 PM	1	3	4	0	6	3	0	0	6	0	0	1	1	2	27
Total	3	13	23	0	24	11	1	1	15	2	0	3	5	3	104
Grand Total	4	29	49	0	46	21	3	2	34	3	0	7	11	5	214
Apprch %	4.9	35.4	59.8	0	65.7	30	4.3	5.1	87.2	7.7	0	30.4	47.8	21.7	
Total %	1.9	13.6	22.9	0	21.5	9.8	1.4	0.9	15.9	1.4	0	3.3	5.1	2.3	

	Tremont Street (Route 28) From North					Malcom X Boulevard From East				Columbus Avenue (Route 28) From South					Tremont Street From West				
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																			
Peak Hour for Entire Intersection Begins at 11:00 AM																			
11:00 AM	0	**8**	**8**	0	**16**	4	1	**2**	7	0	5	**1**	**0**	**6**	**2**	**2**	**1**	**5**	**34**
11:15 AM	0	1	7	0	8	4	3	0	7	0	3	0	0	3	1	2	0	3	21
11:30 AM	**1**	5	6	0	12	**7**	2	0	9	**1**									
11:45 AM	**0**	**2**	**5**	**0**	**7**	**7**	**4**	0	**11**	0	**6**	0	0	6	0	1	0	1	25
Total Volume	1	16	26	0	43	22	10	2	34	1	19	1	0	21	4	6	2	12	110
% App. Total	2.3	37.2	60.5	0		64.7	29.4	5.9		4.8	90.5	4.8	0		33.3	50	16.7		
PHF	.250	.500	.813	.000	.672	.786	.625	.250	.773	.250	.792	.250	.000	.875	.500	.750	.500	.600	.809

N/S: Tremont Street/ Columbus Ave (Rt 28
E/W: Malcom X Blvd/ Tremont Street
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

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Groups Printed- Peds and Bicycles

	Tremont Street (Route 28) From North				Malcom X Boulevard From East				Columbus Avenue (Route 28) From South				Tremont Street From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
11:00 AM	0	0	0	17	0	0	0	20	0	0	0	29	0	0	0	11	77
11:15 AM	0	0	0	29	0	0	0	20	0	0	0	21	0	0	1	12	83
11:30 AM	0	0	0	32	0	0	0	20	0	0	0	17	0	0	0	19	88
11:45 AM	0	0	0	40	0	0	0	19	0	0	0	30	0	1	0	14	104
Total	0	0	0	118	0	0	0	79	0	0	0	97	0	1	1	56	352
12:00 PM	0	0	0	30	1	0	0	21	0	0	0	41	0	1	0	13	107
12:15 PM	0	2	0	31	0	0	0	28	0	0	0	14	0	0	0	19	94
12:30 PM	0	0	0	38	0	0	0	10	0	2	0	49	0	0	0	34	133
12:45 PM	0	0	0	52	0	0	0	12	0	0	0	27	0	1	0	32	124
Total	0	2	0	151	1	0	0	71	0	2	0	131	0	2	0	98	458
Grand Total	0	2	0	269	1	0	0	150	0	2	0	228	0	3	1	154	810
Apprch %	0	0.7	0	99.3	0.7	0	0	99.3	0	0.9	0	99.1	0	1.9	0.6	97.5	
Total %	0	0.2	0	33.2	0.1	0	0	18.5	0	0.2	0	28.1	0	0.4	0.1	19	

	Tremont Street (Route 28) From North					Malcom X Boulevard From East					Columbus Avenue (Route 28) From South					Tremont Street From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 12:00 PM																					
12:00 PM	0	0	0	30	30	**1**	0	0	21	22	0	0	0	41	41	0	**1**	0	13	14	107
12:15 PM	0	**2**	0	31	33	0	0	0	**28**	**28**	0	0	0	14	14	0	0	0	19	19	94
12:30 PM	0	0	0	38	38	0	0	0	10	10	0	**2**		**49**	**51**	0	0	0	**34**	**34**	**133**
12:45 PM	0	0	0	**52**	**52**	0	0	0	12	12	0	0	0	27	27	0	1	0	32	33	124
Total Volume	0	2	0	151	153	1	0	0	71	72	0	2	0	131	133	0	2	0	98	100	458
% App. Total	0	1.3	0	98.7		1.4	0	0	98.6		0	1.5	0	98.5		0	2	0	98		
PHF	.000	.250	.000	.726	.736	.250	.000	.000	.634	.643	.000	.250	.000	.668	.652	.000	.500	.000	.721	.735	.861

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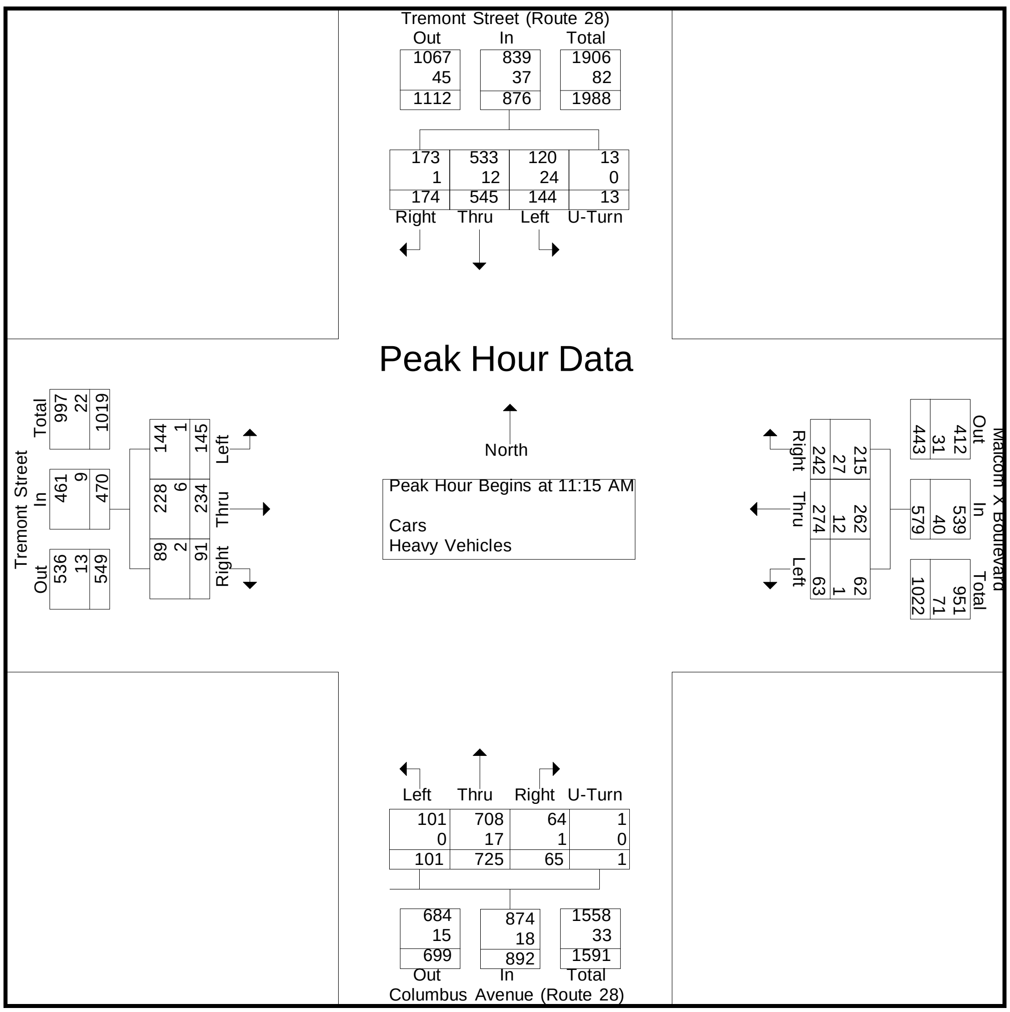
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																			
Peak Hour for Entire Intersection Begins at 11:15 AM																			
11:15 AM	40	125	**39**	**4**	208	**67**	65	**18**	150	15	183	21	0	219	19	62	34	115	692
11:30 AM	41	138	38	4	221	55	**73**	11	139	19	174	28	**1**	222	27	**68**	34	129	711
11:45 AM	**53**	**148**	36	4	**241**	63	72	18	**153**	**21**	**187**	**30**		**238**	17	38	**41**	96	**728**
12:00 PM	40	134	31	1	206	57	64	16	137	10	181	22	0	213	**28**	66	36	**130**	686
Total Volume	174	545	144	13	876	242	274	63	579	65	725	101	1	892	91	234	145	470	2817
% App. Total	19.9	62.2	16.4	1.5		41.8	47.3	10.9		7.3	81.3	11.3	0.1		19.4	49.8	30.9		
PHF	.821	.921	.923	.813	.909	.903	.938	.875	.946	.774	.969	.842	.250	.937	.813	.860	.884	.904	.967
Cars	173	533	120	13	839	215	262	62	539	64	708	101	1	874	89	228	144	461	2713
% Cars	99.4	97.8	83.3	100	95.8	88.8	95.6	98.4	93.1	98.5	97.7	100	100	98.0	97.8	97.4	99.3	98.1	96.3
Heavy Vehicles	1	12	24	0	37	27	12	1	40	1	17	0	0	18	2	6	1	9	104
% Heavy Vehicles	0.6	2.2	16.7	0	4.2	11.2	4.4	1.6	6.9	1.5	2.3	0	0	2.0	2.2	2.6	0.7	1.9	3.7



N/S: Prentis Street/ Driveway
E/W: Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

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Site Code : 23155.00
Start Date : 1/28/2012

Groups Printed- Cars - Heavy Vehicles

	Prentis Street From North		Tremont Street (Route 28) From East			Tremont Street (Route 28) From West			
Start Time	Right	Left	Right	Thru	U-Turn	Thru	Left	U-Turn	Int. Total
11:00 AM	11	13	11	193	12	240	22	1	503
11:15 AM	6	7	13	203	7	274	20	0	530
11:30 AM	5	12	7	220	4	250	16	0	514
11:45 AM	5	13	9	225	1	281	16	0	550
Total	27	45	40	841	24	1045	74	1	2097
12:00 PM	2	20	10	190	5	252	25	0	504
12:15 PM	6	12	12	235	4	278	18	0	565
12:30 PM	5	13	9	201	2	271	18	0	519
12:45 PM	5	11	17	239	2	276	11	0	561
Total	18	56	48	865	13	1077	72	0	2149
Grand Total	45	101	88	1706	37	2122	146	1	4246
Apprch %	30.8	69.2	4.8	93.2	2	93.5	6.4	0	
Total %	1.1	2.4	2.1	40.2	0.9	50	3.4	0	
Cars	44	99	87	1625	37	2035	145	1	4073
% Cars	97.8	98	98.9	95.3	100	95.9	99.3	100	95.9
Heavy Vehicles	1	2	1	81	0	87	1	0	173
% Heavy Vehicles	2.2	2	1.1	4.7	0	4.1	0.7	0	4.1

	Prentis Street From North			Tremont Street (Route 28) From East				Tremont Street (Route 28) From West				
Start Time	Right	Left	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1												
Peak Hour for Entire Intersection Begins at 12:00 PM												
12:00 PM	2	**20**	**22**	10	190	**5**	205	252	**25**	0	277	504
12:15 PM	**6**	12	18	12	235	4	251	**278**	18	0	**296**	**565**
12:30 PM	5	13	18	9	201	2	212	271	18	0	289	519
12:45 PM	5	11	16	**17**	**239**	2	**258**	276	11	0	287	561
Total Volume	18	56	74	48	865	13	926	1077	72	0	1149	2149
% App. Total	24.3	75.7		5.2	93.4	1.4		93.7	6.3	0		
PHF	.750	.700	.841	.706	.905	.650	.897	.969	.720	.000	.970	.951
Cars	18	55	73	47	826	13	886	1032	72	0	1104	2063
% Cars	100	98.2	98.6	97.9	95.5	100	95.7	95.8	100	0	96.1	96.0
Heavy Vehicles	0	1	1	1	39	0	40	45	0	0	45	86
% Heavy Vehicles	0	1.8	1.4	2.1	4.5	0	4.3	4.2	0	0	3.9	4.0

N/S: Prentis Street/ Driveway
E/W: Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

PRECISION
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File Name : 122774 B
Site Code : 23155.00
Start Date : 1/28/2012

Groups Printed- Cars

	Prentis Street From North		Tremont Street (Route 28) From East			Tremont Street (Route 28) From West			
Start Time	Right	Left	Right	Thru	U-Turn	Thru	Left	U-Turn	Int. Total
11:00 AM	10	13	11	179	12	229	22	1	477
11:15 AM	6	6	13	194	7	266	20	0	512
11:30 AM	5	12	7	209	4	238	15	0	490
11:45 AM	5	13	9	217	1	270	16	0	531
Total	26	44	40	799	24	1003	73	1	2010
12:00 PM	2	20	9	181	5	239	25	0	481
12:15 PM	6	12	12	224	4	269	18	0	545
12:30 PM	5	12	9	191	2	264	18	0	501
12:45 PM	5	11	17	230	2	260	11	0	536
Total	18	55	47	826	13	1032	72	0	2063
Grand Total	44	99	87	1625	37	2035	145	1	4073
Apprch %	30.8	69.2	5	92.9	2.1	93.3	6.6	0	
Total %	1.1	2.4	2.1	39.9	0.9	50	3.6	0	

	Prentis Street From North			Tremont Street (Route 28) From East				Tremont Street (Route 28) From West				
Start Time	Right	Left	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1												
Peak Hour for Entire Intersection Begins at 12:00 PM												
12:00 PM	2	**20**	**22**	9	181	**5**	195	239	**25**	0	264	481
12:15 PM	**6**	12	18	12	224	4	240	**269**	18	0	**287**	**545**
12:30 PM	5	12	17	9	191	2	202	264	18	0	282	501
12:45 PM	5	11	16	**17**	**230**	2	**249**	260	11	0	271	536
Total Volume	18	55	73	47	826	13	886	1032	72	0	1104	2063
% App. Total	24.7	75.3		5.3	93.2	1.5		93.5	6.5	0		
PHF	.750	.688	.830	.691	.898	.650	.890	.959	.720	.000	.962	.946

N/S: Prentis Street/ Driveway
E/W: Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

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File Name : 122774 B
Site Code : 23155.00
Start Date : 1/28/2012

Groups Printed- Heavy Vehicles

	Prentis Street From North		Tremont Street (Route 28) From East			Tremont Street (Route 28) From West			
Start Time	Right	Left	Right	Thru	U-Turn	Thru	Left	U-Turn	Int. Total
11:00 AM	1	0	0	14	0	11	0	0	26
11:15 AM	0	1	0	9	0	8	0	0	18
11:30 AM	0	0	0	11	0	12	1	0	24
11:45 AM	0	0	0	8	0	11	0	0	19
Total	1	1	0	42	0	42	1	0	87
12:00 PM	0	0	1	9	0	13	0	0	23
12:15 PM	0	0	0	11	0	9	0	0	20
12:30 PM	0	1	0	10	0	7	0	0	18
12:45 PM	0	0	0	9	0	16	0	0	25
Total	0	1	1	39	0	45	0	0	86
Grand Total	1	2	1	81	0	87	1	0	173
Apprch %	33.3	66.7	1.2	98.8	0	98.9	1.1	0	
Total %	0.6	1.2	0.6	46.8	0	50.3	0.6	0	

	Prentis Street From North			Tremont Street (Route 28) From East				Tremont Street (Route 28) From West				
Start Time	Right	Left	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1												
Peak Hour for Entire Intersection Begins at 11:00 AM												
11:00 AM	**1**	0	**1**	0	**14**	0	**14**	11	0	0	11	**26**
11:15 AM	0	**1**										
11:30 AM	**0**	**0**	**0**	**0**	**11**	**0**	**11**	**12**	**1**	0	**13**	24
11:45 AM	0	0	0	0	8	0	8	11	0	0	11	19
Total Volume	1	1	2	0	42	0	42	42	1	0	43	87
% App. Total	50	50		0	100	0		97.7	2.3	0		
PHF	.250	.250	.500	.000	.750	.000	.750	.875	.250	.000	.827	.837

N/S: Prentis Street/ Driveway
E/W: Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

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File Name : 122774 B
Site Code : 23155.00
Start Date : 1/28/2012

Groups Printed- Peds and Bicycles

	Prentis Street From North			Tremont Street (Route 28) From East			Tremont Street (Route 28) From West			
Start Time	Right	Left	Peds	Right	Thru	Peds	Thru	Left	Peds	Int. Total
11:00 AM	0	0	5	0	0	4	0	0	3	12
11:15 AM	0	1	5	0	0	0	0	0	1	7
11:30 AM	0	0	13	0	0	0	1	0	6	20
11:45 AM	1	0	7	0	0	1	0	0	0	9
Total	1	1	30	0	0	5	1	0	10	48
12:00 PM	0	0	3	0	1	9	0	0	0	13
12:15 PM	0	0	3	0	1	3	1	0	0	8
12:30 PM	0	0	10	0	1	7	0	0	4	22
12:45 PM	0	0	2	0	0	1	0	0	1	4
Total	0	0	18	0	3	20	1	0	5	47
Grand Total	1	1	48	0	3	25	2	0	15	95
Apprch %	2	2	96	0	10.7	89.3	11.8	0	88.2	
Total %	1.1	1.1	50.5	0	3.2	26.3	2.1	0	15.8	

	Prentis Street From North				Tremont Street (Route 28) From East				Tremont Street (Route 28) From West				
Start Time	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 11:45 AM													
11:45 AM	**1**	0	7	8	0	0	1	1	0	0	0	0	9
12:00 PM	0	0	3	3	0	**1**	**9**	**10**	0	0	0	0	13
12:15 PM	0	0	3	3	0	1	3	4	**1**	0	0	1	8
12:30 PM	0	0	**10**	**10**	0	1	7	8	0	0	**4**	**4**	**22**
Total Volume	1	0	23	24	0	3	20	23	1	0	4	5	52
% App. Total	4.2	0	95.8		0	13	87		20	0	80		
PHF	.250	.000	.575	.600	.000	.750	.556	.575	.250	.000	.250	.313	.591

N/S: Prentis Street/ Driveway
E/W: Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

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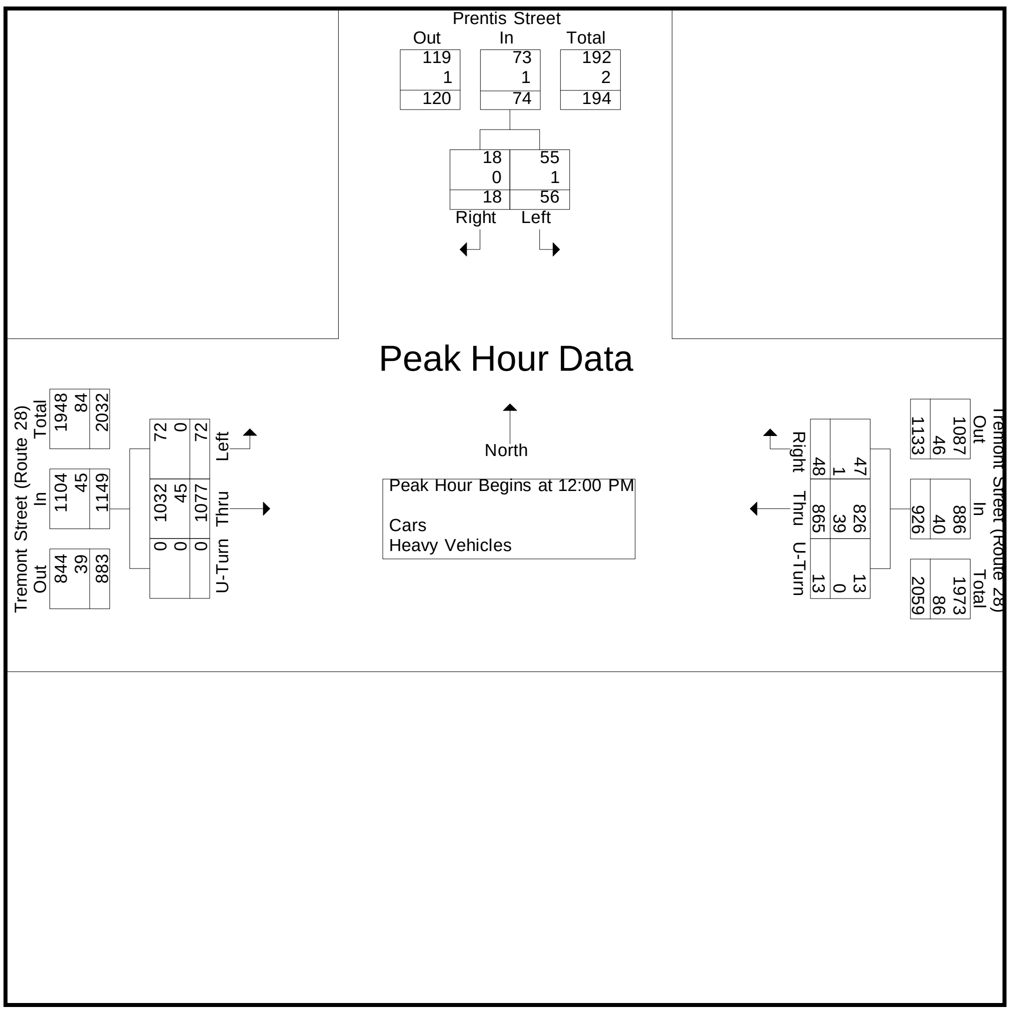
	Prentis Street From North			Tremont Street (Route 28) From East				Tremont Street (Route 28) From West				
Start Time	Right	Left	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1												
Peak Hour for Entire Intersection Begins at 12:00 PM												
12:00 PM	2	**20**	**22**	10	190	**5**	205	252	**25**	0	277	504
12:15 PM	**6**	12	18	12	235	4	251	**278**	18	0	**296**	**565**
12:30 PM	5	13	18	9	201	2	212	271	18	0	289	519
12:45 PM	5	11	16	**17**	**239**	2	**258**	276	11	0	287	561
Total Volume	18	56	74	48	865	13	926	1077	72	0	1149	2149
% App. Total	24.3	75.7		5.2	93.4	1.4		93.7	6.3	0		
PHF	.750	.700	.841	.706	.905	.650	.897	.969	.720	.000	.970	.951
Cars	18	55	73	47	826	13	886	1032	72	0	1104	2063
% Cars	100	98.2	98.6	97.9	95.5	100	95.7	95.8	100	0	96.1	96.0
Heavy Vehicles	0	1	1	1	39	0	40	45	0	0	45	86
% Heavy Vehicles	0	1.8	1.4	2.1	4.5	0	4.3	4.2	0	0	3.9	4.0



N/S: Ruggles Street/ Whittier Street
E/W: Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

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File Name : 122774 C
Site Code : 23155.00
Start Date : 1/28/2012
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Ruggles Street From North			Tremont Street (Route 28) From East				Whittier Street From South			Tremont Street (Route 28) From West				
Start Time	Right	Thru	Left	Right	Thru	Left	U-Turn	Right	Thru	Left	Right	Thru	Left	U-Turn	Int. Total
11:00 AM	25	0	88	84	199	0	4	4	1	1	0	203	28	7	644
11:15 AM	32	0	75	84	178	0	3	3	0	2	0	239	30	9	655
11:30 AM	31	0	92	86	192	0	3	3	0	2	0	250	26	5	690
11:45 AM	19	0	84	88	210	0	5	5	0	4	0	260	26	4	705
Total	107	0	339	342	779	0	15	15	1	9	0	952	110	25	2694
12:00 PM	33	0	90	94	187	0	2	2	0	2	0	257	38	4	709
12:15 PM	35	0	90	87	196	0	8	8	1	2	0	262	36	5	730
12:30 PM	26	0	89	99	179	0	2	3	0	1	0	263	27	8	697
12:45 PM	30	0	92	101	224	0	2	2	0	7	0	259	32	4	753
Total	124	0	361	381	786	0	14	15	1	12	0	1041	133	21	2889
Grand Total	231	0	700	723	1565	0	29	30	2	21	0	1993	243	46	5583
Apprch %	24.8	0	75.2	31.2	67.5	0	1.3	56.6	3.8	39.6	0	87.3	10.6	2	
Total %	4.1	0	12.5	13	28	0	0.5	0.5	0	0.4	0	35.7	4.4	0.8	
Cars	175	0	668	706	1545	0	29	29	2	21	0	1957	191	46	5369
% Cars	75.8	0	95.4	97.6	98.7	0	100	96.7	100	100	0	98.2	78.6	100	96.2
Heavy Vehicles	56	0	32	17	20	0	0	1	0	0	0	36	52	0	214
% Heavy Vehicles	24.2	0	4.6	2.4	1.3	0	0	3.3	0	0	0	1.8	21.4	0	3.8

	Ruggles Street From North				Tremont Street (Route 28) From East					Whittier Street From South				Tremont Street (Route 28) From West					
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																			
Peak Hour for Entire Intersection Begins at 12:00 PM																			
12:00 PM	33	0	90	123	94	187	0	2	283	2	0	2	4	0	257	**38**	4	299	709
12:15 PM	**35**	0	90	**125**	87	196	0	**8**	291	**8**	**1**	2	**11**	0	262	36	5	**303**	730
12:30 PM	26	0	89	115	99	179	0	2	280	3	0	1	4	0	**263**	27	**8**	298	697
12:45 PM	30	0	**92**	122	**101**	**224**	0	2	**327**	2	0	**7**							**753**
Total Volume	124	0	361	485	381	786	0	14	1181	15	1	12	28	0	1041	133	21	1195	2889
% App. Total	25.6	0	74.4		32.3	66.6	0	1.2		53.6	3.6	42.9		0	87.1	11.1	1.8		
PHF	.886	.000	.981	.970	.943	.877	.000	.438	.903	.469	.250	.429	.636	.000	.990	.875	.656	.986	.959
Cars	96	0	342	438	374	776	0	14	1164	14	1	12	27	0	1027	103	21	1151	2780
% Cars	77.4	0	94.7	90.3	98.2	98.7	0	100	98.6	93.3	100	100	96.4	0	98.7	77.4	100	96.3	96.2
Heavy Vehicles	28	0	19	47	7	10	0	0	17	1	0	0	1	0	14	30	0	44	109
% Heavy Vehicles	22.6	0	5.3	9.7	1.8	1.3	0	0	1.4	6.7	0	0	3.6	0	1.3	22.6	0	3.7	3.8

N/S: Ruggles Street/ Whittier Street
E/W: Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

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Site Code : 23155.00
Start Date : 1/28/2012
Page No : 1

Groups Printed- Cars

	Ruggles Street From North			Tremont Street (Route 28) From East				Whittier Street From South			Tremont Street (Route 28) From West				
Start Time	Right	Thru	Left	Right	Thru	Left	U-Turn	Right	Thru	Left	Right	Thru	Left	U-Turn	Int. Total
11:00 AM	16	0	85	81	195	0	4	4	1	1	0	198	21	7	613
11:15 AM	25	0	74	83	177	0	3	3	0	2	0	235	25	9	636
11:30 AM	25	0	87	85	188	0	3	3	0	2	0	242	22	5	662
11:45 AM	13	0	80	83	209	0	5	5	0	4	0	255	20	4	678
Total	79	0	326	332	769	0	15	15	1	9	0	930	88	25	2589
12:00 PM	25	0	87	91	183	0	2	2	0	2	0	255	28	4	679
12:15 PM	26	0	84	85	195	0	8	8	1	2	0	259	30	5	703
12:30 PM	19	0	84	98	177	0	2	2	0	1	0	260	21	8	672
12:45 PM	26	0	87	100	221	0	2	2	0	7	0	253	24	4	726
Total	96	0	342	374	776	0	14	14	1	12	0	1027	103	21	2780
Grand Total	175	0	668	706	1545	0	29	29	2	21	0	1957	191	46	5369
Apprch %	20.8	0	79.2	31	67.8	0	1.3	55.8	3.8	40.4	0	89.2	8.7	2.1	
Total %	3.3	0	12.4	13.1	28.8	0	0.5	0.5	0	0.4	0	36.4	3.6	0.9	

	Ruggles Street From North				Tremont Street (Route 28) From East					Whittier Street From South				Tremont Street (Route 28) From West					
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																			
Peak Hour for Entire Intersection Begins at 12:00 PM																			
12:00 PM	25	0	**87**	112	91	183	0	2	276	2	0	2	4	0	255	28	4	287	679
12:15 PM	**26**	0	84	110	85	195	0	**8**	288	**8**	**1**	2	**11**	0	259	**30**	5	**294**	703
12:30 PM	19	0	84	103	98	177	0	2	277	2	0	1	3	0	**260**	21	**8**	289	672
12:45 PM	26	0	87	**113**	**100**	**221**	0	2	**323**	2	0	**7**							**726**
Total Volume	96	0	342	438	374	776	0	14	1164	14	1	12	27	0	1027	103	21	1151	2780
% App. Total	21.9	0	78.1		32.1	66.7	0	1.2		51.9	3.7	44.4		0	89.2	8.9	1.8		
PHF	.923	.000	.983	.969	.935	.878	.000	.438	.901	.438	.250	.429	.614	.000	.988	.858	.656	.979	.957

N/S: Ruggles Street/ Whittier Street
E/W: Tremont Street (Route 28)
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File Name : 122774 C
Site Code : 23155.00
Start Date : 1/28/2012

Groups Printed- Heavy Vehicles

	Ruggles Street From North			Tremont Street (Route 28) From East				Whittier Street From South			Tremont Street (Route 28) From West				
Start Time	Right	Thru	Left	Right	Thru	Left	U-Turn	Right	Thru	Left	Right	Thru	Left	U-Turn	Int. Total
11:00 AM	9	0	3	3	4	0	0	0	0	0	0	5	7	0	31
11:15 AM	7	0	1	1	1	0	0	0	0	0	0	4	5	0	19
11:30 AM	6	0	5	1	4	0	0	0	0	0	0	8	4	0	28
11:45 AM	6	0	4	5	1	0	0	0	0	0	0	5	6	0	27
Total	28	0	13	10	10	0	0	0	0	0	0	22	22	0	105
12:00 PM	8	0	3	3	4	0	0	0	0	0	0	2	10	0	30
12:15 PM	9	0	6	2	1	0	0	0	0	0	0	3	6	0	27
12:30 PM	7	0	5	1	2	0	0	1	0	0	0	3	6	0	25
12:45 PM	4	0	5	1	3	0	0	0	0	0	0	6	8	0	27
Total	28	0	19	7	10	0	0	1	0	0	0	14	30	0	109
Grand Total	56	0	32	17	20	0	0	1	0	0	0	36	52	0	214
Apprch %	63.6	0	36.4	45.9	54.1	0	0	100	0	0	0	40.9	59.1	0	
Total %	26.2	0	15	7.9	9.3	0	0	0.5	0	0	0	16.8	24.3	0	

Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 11:30 AM

	Ruggles Street From North				Tremont Street (Route 28) From East					Whittier Street From South				Tremont Street (Route 28) From West					
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
11:30 AM	6	0	5	11	1	**4**	0	0	5	0	0	0	0	0	**8**	4	0	**12**	28
11:45 AM	6	0	4	10	**5**	1	0	0	6	0	0	0	0	0	5	6	0	11	27
12:00 PM	8	0	3	11	3	4	0	0	**7**	0	0	0	0	0	2	**10**	0	12	**30**
12:15 PM	**9**	0	**6**	**15**	2	1	0	0	3	0	0	0	0	0	3	6	0	9	27
Total Volume	29	0	18	47	11	10	0	0	21	0	0	0	0	0	18	26	0	44	112
% App. Total	61.7	0	38.3		52.4	47.6	0	0		0	0	0		0	40.9	59.1	0		
PHF	.806	.000	.750	.783	.550	.625	.000	.000	.750	.000	.000	.000	.000	.000	.563	.650	.000	.917	.933

N/S: Ruggles Street/ Whittier Street
E/W: Tremont Street (Route 28)
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Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 122774 C
Site Code : 23155.00
Start Date : 1/28/2012

Groups Printed- Peds and Bicycles

	Ruggles Street From North				Tremont Street (Route 28) From East				Whittier Street From South				Tremont Street (Route 28) From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
11:00 AM	0	0	0	5	0	0	0	2	0	0	0	10	0	0	0	1	18
11:15 AM	0	0	0	4	0	0	0	1	0	1	0	17	0	1	0	4	28
11:30 AM	0	0	1	12	0	0	0	4	0	0	0	18	0	0	0	1	36
11:45 AM	0	0	0	2	0	0	0	1	0	0	0	36	0	0	0	0	39
Total	0	0	1	23	0	0	0	8	0	1	0	81	0	1	0	6	121
12:00 PM	1	0	0	1	0	0	0	3	0	0	0	14	0	0	0	1	20
12:15 PM	0	0	0	3	1	2	0	7	0	1	0	15	0	1	0	2	32
12:30 PM	0	0	0	8	0	0	0	0	0	2	0	6	0	2	0	2	20
12:45 PM	0	0	0	5	1	0	0	1	0	0	0	9	0	0	0	6	22
Total	1	0	0	17	2	2	0	11	0	3	0	44	0	3	0	11	94
Grand Total	1	0	1	40	2	2	0	19	0	4	0	125	0	4	0	17	215
Apprch %	2.4	0	2.4	95.2	8.7	8.7	0	82.6	0	3.1	0	96.9	0	19	0	81	
Total %	0.5	0	0.5	18.6	0.9	0.9	0	8.8	0	1.9	0	58.1	0	1.9	0	7.9	

	Ruggles Street From North					Tremont Street (Route 28) From East					Whittier Street From South					Tremont Street (Route 28) From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 11:30 AM																					
11:30 AM	0	0	**1**	**12**	**13**	0	0	0	4	4	0	0	0	18	18	0	0	0	1	1	36
11:45 AM	0	0	0	2	2	0	0	0	1	1	0	0	0	**36**	**36**	0	0	0	0	0	**39**
12:00 PM	**1**																				
12:15 PM	**0**	**0**	**0**	**3**	**3**	**1**	**2**	**0**	**7**	**10**	0	**1**	**0**	**15**	**16**	**0**	**1**	0	**2**	**3**	32
Total Volume	1	0	1	18	20	1	2	0	15	18	0	1	0	83	84	0	1	0	4	5	127
% App. Total	5	0	5	90		5.6	11.1	0	83.3		0	1.2	0	98.8		0	20	0	80		
PHF	.250	.000	.250	.375	.385	.250	.250	.000	.536	.450	.000	.250	.000	.576	.583	.000	.250	.000	.500	.417	.814

N/S: Ruggles Street/ Whittier Street
E/W: Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

PRECISION
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INDUSTRIES, LLC
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File Name : 122774 C
Site Code : 23155.00
Start Date : 1/28/2012
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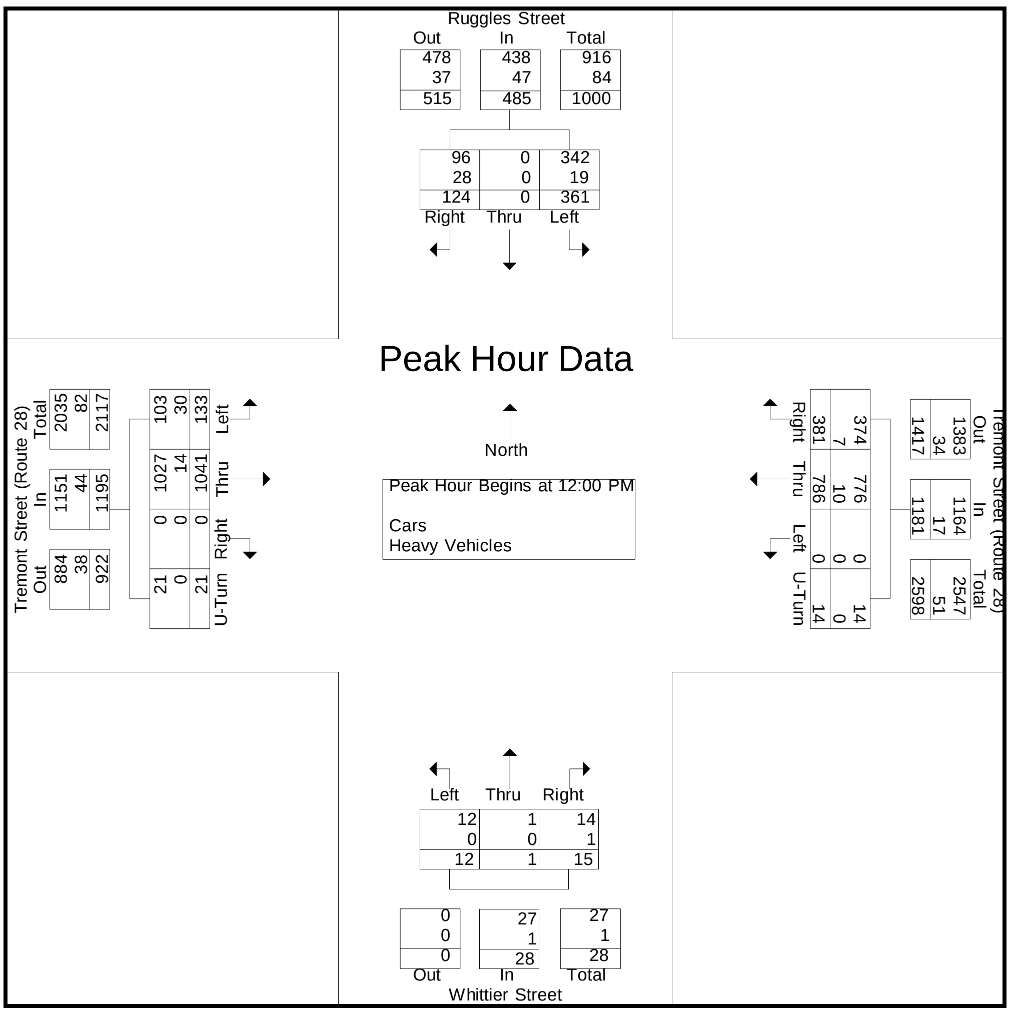
	Ruggles Street From North				Tremont Street (Route 28) From East					Whittier Street From South				Tremont Street (Route 28) From West					
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																			
Peak Hour for Entire Intersection Begins at 12:00 PM																			
12:00 PM	33	0	90	123	94	187	0	2	283	2	0	2	4	0	257	**38**	4	299	709
12:15 PM	**35**	0	90	**125**	87	196	0	**8**	291	**8**	**1**	2	**11**	0	262	36	5	**303**	730
12:30 PM	26	0	89	115	99	179	0	2	280	3	0	1	4	0	**263**	27	**8**	298	697
12:45 PM	30	0	**92**	122	**101**	**224**	0	2	**327**	2	0	**7**							**753**
Total Volume	124	0	361	485	381	786	0	14	1181	15	1	12	28	0	1041	133	21	1195	2889
% App. Total	25.6	0	74.4		32.3	66.6	0	1.2		53.6	3.6	42.9		0	87.1	11.1	1.8		
PHF	.886	.000	.981	.970	.943	.877	.000	.438	.903	.469	.250	.429	.636	.000	.990	.875	.656	.986	.959
Cars	96	0	342	438	374	776	0	14	1164	14	1	12	27	0	1027	103	21	1151	2780
% Cars	77.4	0	94.7	90.3	98.2	98.7	0	100	98.6	93.3	100	100	96.4	0	98.7	77.4	100	96.3	96.2
Heavy Vehicles	28	0	19	47	7	10	0	0	17	1	0	0	1	0	14	30	0	44	109
% Heavy Vehicles	22.6	0	5.3	9.7	1.8	1.3	0	0	1.4	6.7	0	0	3.6	0	1.3	22.6	0	3.7	3.8



N/S: Columbus Avenue/ Ruggles Street
E/W: Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

PRECISION
D A T A
INDUSTRIES, LLC
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File Name : 122774 D
Site Code : 23155.00
Start Date : 1/28/2012
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Columbus Avenue From North			Tremont Street (Route 28) From East			Ruggles Street From South			Tremont Street (Route 28) From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
11:00 AM	8	0	0	0	275	0	0	0	0	18	271	0	572
11:15 AM	8	0	0	0	266	0	0	0	0	19	302	0	595
11:30 AM	3	0	0	0	277	0	0	0	0	26	319	0	625
11:45 AM	11	0	0	0	284	0	0	0	0	21	331	0	647
Total	30	0	0	0	1102	0	0	0	0	84	1223	0	2439
12:00 PM	12	0	0	0	280	0	0	0	0	20	335	0	647
12:15 PM	12	0	0	0	270	0	0	0	0	31	335	0	648
12:30 PM	8	0	0	0	272	0	0	0	0	20	336	0	636
12:45 PM	10	0	0	0	312	0	0	0	0	21	337	0	680
Total	42	0	0	0	1134	0	0	0	0	92	1343	0	2611
Grand Total	72	0	0	0	2236	0	0	0	0	176	2566	0	5050
Apprch %	100	0	0	0	100	0	0	0	0	6.4	93.6	0	
Total %	1.4	0	0	0	44.3	0	0	0	0	3.5	50.8	0	
Cars	71	0	0	0	2201	0	0	0	0	168	2504	0	4944
% Cars	98.6	0	0	0	98.4	0	0	0	0	95.5	97.6	0	97.9
Heavy Vehicles	1	0	0	0	35	0	0	0	0	8	62	0	106
% Heavy Vehicles	1.4	0	0	0	1.6	0	0	0	0	4.5	2.4	0	2.1

	Columbus Avenue From North				Tremont Street (Route 28) From East				Ruggles Street From South				Tremont Street (Route 28) From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:00 PM																	
12:00 PM	**12**	0	0	**12**	0	280	0	280	0	0	0	0	20	335	0	355	647
12:15 PM	12	0	0	12	0	270	0	270	0	0	0	0	**31**	335	0	**366**	648
12:30 PM	8	0	0	8	0	272	0	272	0	0	0	0	20	336	0	356	636
12:45 PM	10	0	0	10	0	**312**	0	**312**	0	0	0	0	21	**337**	0	358	**680**
Total Volume	42	0	0	42	0	1134	0	1134	0	0	0	0	92	1343	0	1435	2611
% App. Total	100	0	0		0	100	0		0	0	0		6.4	93.6	0		
PHF	.875	.000	.000	.875	.000	.909	.000	.909	.000	.000	.000	.000	.742	.996	.000	.980	.960
Cars	41	0	0	41	0	1119	0	1119	0	0	0	0	88	1313	0	1401	2561
% Cars	97.6	0	0	97.6	0	98.7	0	98.7	0	0	0	0	95.7	97.8	0	97.6	98.1
Heavy Vehicles	1	0	0	1	0	15	0	15	0	0	0	0	4	30	0	34	50
% Heavy Vehicles	2.4	0	0	2.4	0	1.3	0	1.3	0	0	0	0	4.3	2.2	0	2.4	1.9

N/S: Columbus Avenue/ Ruggles Street
E/W: Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

PRECISION
DATA
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File Name : 122774 D
Site Code : 23155.00
Start Date : 1/28/2012
Page No : 1

Groups Printed- Cars

	Columbus Avenue From North			Tremont Street (Route 28) From East			Ruggles Street From South			Tremont Street (Route 28) From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
11:00 AM	8	0	0	0	268	0	0	0	0	18	263	0	557
11:15 AM	8	0	0	0	264	0	0	0	0	18	297	0	587
11:30 AM	3	0	0	0	272	0	0	0	0	25	307	0	607
11:45 AM	11	0	0	0	278	0	0	0	0	19	324	0	632
Total	30	0	0	0	1082	0	0	0	0	80	1191	0	2383
12:00 PM	12	0	0	0	274	0	0	0	0	20	330	0	636
12:15 PM	11	0	0	0	268	0	0	0	0	29	328	0	636
12:30 PM	8	0	0	0	269	0	0	0	0	19	328	0	624
12:45 PM	10	0	0	0	308	0	0	0	0	20	327	0	665
Total	41	0	0	0	1119	0	0	0	0	88	1313	0	2561
Grand Total	71	0	0	0	2201	0	0	0	0	168	2504	0	4944
Apprch %	100	0	0	0	100	0	0	0	0	6.3	93.7	0	
Total %	1.4	0	0	0	44.5	0	0	0	0	3.4	50.6	0	

	Columbus Avenue From North				Tremont Street (Route 28) From East				Ruggles Street From South				Tremont Street (Route 28) From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:00 PM																	
12:00 PM	**12**	0	0	**12**	0	274	0	274	0	0	0	0	20	**330**	0	350	636
12:15 PM	11	0	0	11	0	268	0	268	0	0	0	0	**29**	328	0	**357**	636
12:30 PM	8	0	0	8	0	269	0	269	0	0	0	0	19	328	0	347	624
12:45 PM	10	0	0	10	0	**308**	0	**308**	0	0	0	0	20	327	0	347	**665**
Total Volume	41	0	0	41	0	1119	0	1119	0	0	0	0	88	1313	0	1401	2561
% App. Total	100	0	0		0	100	0		0	0	0		6.3	93.7	0		
PHF	.854	.000	.000	.854	.000	.908	.000	.908	.000	.000	.000	.000	.759	.995	.000	.981	.963

N/S: Columbus Avenue/ Ruggles Street
E/W: Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

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File Name : 122774 D
Site Code : 23155.00
Start Date : 1/28/2012

Groups Printed- Heavy Vehicles

	Columbus Avenue From North			Tremont Street (Route 28) From East			Ruggles Street From South			Tremont Street (Route 28) From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
11:00 AM	0	0	0	0	7	0	0	0	0	0	8	0	15
11:15 AM	0	0	0	0	2	0	0	0	0	1	5	0	8
11:30 AM	0	0	0	0	5	0	0	0	0	1	12	0	18
11:45 AM	0	0	0	0	6	0	0	0	0	2	7	0	15
Total	0	0	0	0	20	0	0	0	0	4	32	0	56
12:00 PM	0	0	0	0	6	0	0	0	0	0	5	0	11
12:15 PM	1	0	0	0	2	0	0	0	0	2	7	0	12
12:30 PM	0	0	0	0	3	0	0	0	0	1	8	0	12
12:45 PM	0	0	0	0	4	0	0	0	0	1	10	0	15
Total	1	0	0	0	15	0	0	0	0	4	30	0	50
Grand Total	1	0	0	0	35	0	0	0	0	8	62	0	106
Apprch %	100	0	0	0	100	0	0	0	0	11.4	88.6	0	
Total %	0.9	0	0	0	33	0	0	0	0	7.5	58.5	0	

	Columbus Avenue From North				Tremont Street (Route 28) From East				Ruggles Street From South				Tremont Street (Route 28) From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 11:00 AM																	
11:00 AM	0	0	0	0	0	**7**	0	**7**	0	0	0	0	0	8	0	8	15
11:15 AM	0	0	0	0	0	2	0	2	0	0	0	0	1	5	0	6	8
11:30 AM	0	0	0	0	0	5	0	5	0	0	0	0	1	**12**	0	**13**	**18**
11:45 AM	0	0	0	0	0	6	0	6	0	0	0	0	**2**	7	0	9	15
Total Volume	0	0	0	0	0	20	0	20	0	0	0	0	4	32	0	36	56
% App. Total	0	0	0		0	100	0		0	0	0		11.1	88.9	0		
PHF	.000	.000	.000	.000	.000	.714	.000	.714	.000	.000	.000	.000	.500	.667	.000	.692	.778

N/S: Columbus Avenue/ Ruggles Street
E/W: Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

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Groups Printed- Peds and Bicycles

	Columbus Avenue From North				Tremont Street (Route 28) From East				Ruggles Street From South				Tremont Street (Route 28) From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
11:00 AM	0	0	0	6	0	0	0	10	0	0	0	8	1	0	0	1	26
11:15 AM	0	0	0	4	0	0	0	5	0	0	0	11	0	1	0	1	22
11:30 AM	0	0	0	10	0	0	0	16	0	0	0	18	1	0	0	0	45
11:45 AM	0	0	0	2	0	0	0	8	0	0	0	36	0	0	0	2	48
Total	0	0	0	22	0	0	0	39	0	0	0	73	2	1	0	4	141
12:00 PM	0	0	0	6	0	0	0	13	0	0	0	19	0	0	0	1	39
12:15 PM	2	0	0	6	0	1	0	15	0	0	0	7	0	0	0	8	39
12:30 PM	0	0	0	2	0	0	0	10	0	0	0	7	0	0	0	3	22
12:45 PM	0	0	0	4	0	1	0	11	0	0	0	3	0	0	0	2	21
Total	2	0	0	18	0	2	0	49	0	0	0	36	0	0	0	14	121
Grand Total	2	0	0	40	0	2	0	88	0	0	0	109	2	1	0	18	262
Apprch %	4.8	0	0	95.2	0	2.2	0	97.8	0	0	0	100	9.5	4.8	0	85.7	
Total %	0.8	0	0	15.3	0	0.8	0	33.6	0	0	0	41.6	0.8	0.4	0	6.9	

	Columbus Avenue From North					Tremont Street (Route 28) From East					Ruggles Street From South					Tremont Street (Route 28) From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 11:30 AM																					
11:30 AM	0	0	0	**10**	**10**	0	0	0	**16**	**16**	0	0	0	18	18	**1**	**0**	**0**	**0**	**1**	**45**
11:45 AM	**0**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**8**	**8**	**0**	**0**	**0**	**36**	**36**	0	0	0	2	2	**48**
12:00 PM	0	0	0	6	6	0	0	0	13	13	0	0	0	19	19	0	0	0	1	1	39
12:15 PM	**2**						**1**												**8**	**8**	39
Total Volume	2	0	0	24	26	0	1	0	52	53	0	0	0	80	80	1	0	0	11	12	171
% App. Total	7.7	0	0	92.3		0	1.9	0	98.1		0	0	0	100		8.3	0	0	91.7		
PHF	.250	.000	.000	.600	.650	.000	.250	.000	.813	.828	.000	.000	.000	.556	.556	.250	.000	.000	.344	.375	.891

N/S: Columbus Avenue/ Ruggles Street
E/W: Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

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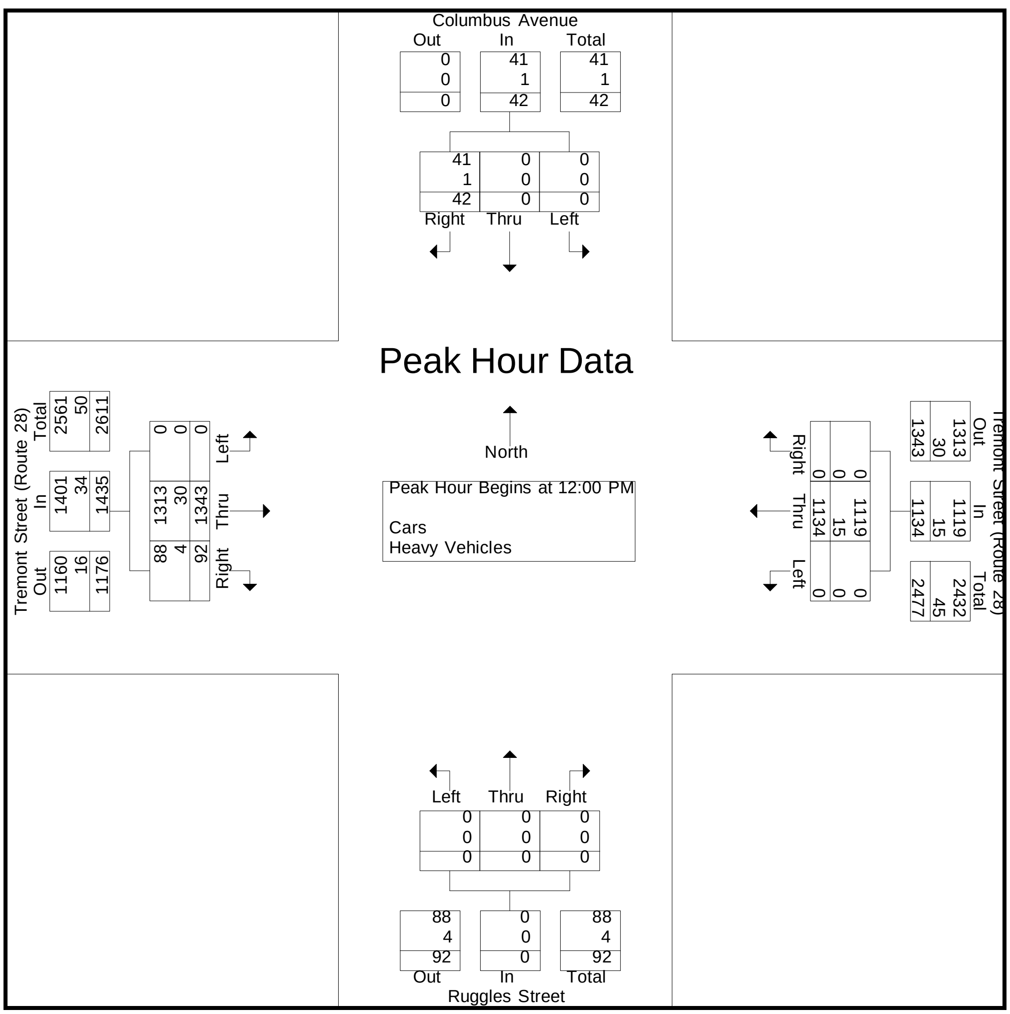
	Columbus Avenue From North				Tremont Street (Route 28) From East				Ruggles Street From South				Tremont Street (Route 28) From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:00 PM																	
12:00 PM	**12**	0	0	**12**	0	280	0	280	0	0	0	0	20	335	0	355	647
12:15 PM	12	0	0	12	0	270	0	270	0	0	0	0	**31**	335	0	**366**	648
12:30 PM	8	0	0	8	0	272	0	272	0	0	0	0	20	336	0	356	636
12:45 PM	10	0	0	10	0	**312**	0	**312**	0	0	0	0	21	**337**	0	358	**680**
Total Volume	42	0	0	42	0	1134	0	1134	0	0	0	0	92	1343	0	1435	2611
% App. Total	100	0	0		0	100	0		0	0	0		6.4	93.6	0		
PHF	.875	.000	.000	.875	.000	.909	.000	.909	.000	.000	.000	.000	.742	.996	.000	.980	.960
Cars	41	0	0	41	0	1119	0	1119	0	0	0	0	88	1313	0	1401	2561
% Cars	97.6	0	0	97.6	0	98.7	0	98.7	0	0	0	0	95.7	97.8	0	97.6	98.1
Heavy Vehicles	1	0	0	1	0	15	0	15	0	0	0	0	4	30	0	34	50
% Heavy Vehicles	2.4	0	0	2.4	0	1.3	0	1.3	0	0	0	0	4.3	2.2	0	2.4	1.9



N/S: Melnea Cass Boulevard
E/W:Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

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

File Name : 122774 E
Site Code : 23155.00
Start Date : 1/28/2012

Groups Printed- Cars - Heavy Vehicles

	Melnea Cass Boulevard From North			Tremont Street From East			Melnea Cass Boulevard (Route 28) From South			Tremont Street (Route 28) From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
11:00 AM	34	7	0	2	67	9	12	15	174	172	85	21	598
11:15 AM	21	5	0	1	83	8	14	16	162	172	99	32	613
11:30 AM	43	8	3	1	73	2	7	14	160	185	94	36	626
11:45 AM	43	14	3	1	76	2	8	22	167	180	112	38	666
Total	141	34	6	5	299	21	41	67	663	709	390	127	2503
12:00 PM	40	12	1	5	78	8	10	22	164	204	89	34	667
12:15 PM	39	12	2	5	75	8	6	19	156	205	102	28	657
12:30 PM	36	16	1	1	81	9	8	21	157	208	109	28	675
12:45 PM	44	10	1	4	89	8	16	13	182	202	98	37	704
Total	159	50	5	15	323	33	40	75	659	819	398	127	2703
Grand Total	300	84	11	20	622	54	81	142	1322	1528	788	254	5206
Apprch %	75.9	21.3	2.8	2.9	89.4	7.8	5.2	9.2	85.6	59.5	30.7	9.9	
Total %	5.8	1.6	0.2	0.4	11.9	1	1.6	2.7	25.4	29.4	15.1	4.9	
Cars	298	80	10	11	614	53	79	127	1294	1490	773	248	5077
% Cars	99.3	95.2	90.9	55	98.7	98.1	97.5	89.4	97.9	97.5	98.1	97.6	97.5
Heavy Vehicles	2	4	1	9	8	1	2	15	28	38	15	6	129
% Heavy Vehicles	0.7	4.8	9.1	45	1.3	1.9	2.5	10.6	2.1	2.5	1.9	2.4	2.5

	Melnea Cass Boulevard From North				Tremont Street From East				Melnea Cass Boulevard (Route 28) From South				Tremont Street (Route 28) From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:00 PM																	
12:00 PM	40	12	1	53	**5**	78	8	91	10	**22**	164	196	204	89	34	327	667
12:15 PM	39	12	**2**	53	5	75	8	88	6	19	156	181	205	102	28	335	657
12:30 PM	36	**16**	1	53	1	81	**9**	91	8	21	157	186	**208**	**109**	28	**345**	675
12:45 PM	**44**	10	1	**55**	4	**89**	8	**101**	**16**	13	**182**	**211**	202	98	**37**	337	**704**
Total Volume	159	50	5	214	15	323	33	371	40	75	659	774	819	398	127	1344	2703
% App. Total	74.3	23.4	2.3		4	87.1	8.9		5.2	9.7	85.1		60.9	29.6	9.4		
PHF	.903	.781	.625	.973	.750	.907	.917	.918	.625	.852	.905	.917	.984	.913	.858	.974	.960
Cars	159	49	4	212	9	319	32	360	40	71	649	760	796	394	125	1315	2647
% Cars	100	98.0	80.0	99.1	60.0	98.8	97.0	97.0	100	94.7	98.5	98.2	97.2	99.0	98.4	97.8	97.9
Heavy Vehicles	0	1	1	2	6	4	1	11	0	4	10	14	23	4	2	29	56
% Heavy Vehicles	0	2.0	20.0	0.9	40.0	1.2	3.0	3.0	0	5.3	1.5	1.8	2.8	1.0	1.6	2.2	2.1

N/S: Melnea Cass Boulevard
E/W:Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

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

File Name : 122774 E
Site Code : 23155.00
Start Date : 1/28/2012

Groups Printed- Cars

	Melnea Cass Boulevard From North			Tremont Street From East			Melnea Cass Boulevard (Route 28) From South			Tremont Street (Route 28) From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
11:00 AM	34	7	0	1	64	9	12	11	168	166	84	21	577
11:15 AM	21	5	0	0	83	8	14	14	160	171	97	31	604
11:30 AM	42	7	3	0	72	2	7	12	156	180	88	34	603
11:45 AM	42	12	3	1	76	2	6	19	161	177	110	37	646
Total	139	31	6	2	295	21	39	56	645	694	379	123	2430
12:00 PM	40	12	0	3	77	8	10	20	159	199	89	34	651
12:15 PM	39	12	2	3	74	8	6	18	155	201	100	27	645
12:30 PM	36	16	1	0	80	9	8	20	155	201	108	28	662
12:45 PM	44	9	1	3	88	7	16	13	180	195	97	36	689
Total	159	49	4	9	319	32	40	71	649	796	394	125	2647
Grand Total	298	80	10	11	614	53	79	127	1294	1490	773	248	5077
Apprch %	76.8	20.6	2.6	1.6	90.6	7.8	5.3	8.5	86.3	59.3	30.8	9.9	
Total %	5.9	1.6	0.2	0.2	12.1	1	1.6	2.5	25.5	29.3	15.2	4.9	

	Melnea Cass Boulevard From North				Tremont Street From East				Melnea Cass Boulevard (Route 28) From South				Tremont Street (Route 28) From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:00 PM																	
12:00 PM	40	12	0	52	**3**	77	8	88	10	**20**	159	189	199	89	34	322	651
12:15 PM	39	12	**2**	53	3	74	8	85	6	18	155	179	**201**	100	27	328	645
12:30 PM	36	**16**	1	53	0	80	**9**	89	8	20	155	183	201	**108**	28	**337**	662
12:45 PM	**44**	9	1	**54**	3	**88**	7	**98**	**16**	13	**180**	**209**	195	97	**36**	328	**689**
Total Volume	159	49	4	212	9	319	32	360	40	71	649	760	796	394	125	1315	2647
% App. Total	75	23.1	1.9		2.5	88.6	8.9		5.3	9.3	85.4		60.5	30	9.5		
PHF	.903	.766	.500	.981	.750	.906	.889	.918	.625	.888	.901	.909	.990	.912	.868	.976	.960

N/S: Melnea Cass Boulevard
E/W:Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

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File Name : 122774 E
Site Code : 23155.00
Start Date : 1/28/2012

Groups Printed- Heavy Vehicles

	Melnea Cass Boulevard From North			Tremont Street From East			Melnea Cass Boulevard (Route 28) From South			Tremont Street (Route 28) From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
11:00 AM	0	0	0	1	3	0	0	4	6	6	1	0	21
11:15 AM	0	0	0	1	0	0	0	2	2	1	2	1	9
11:30 AM	1	1	0	1	1	0	0	2	4	5	6	2	23
11:45 AM	1	2	0	0	0	0	2	3	6	3	2	1	20
Total	2	3	0	3	4	0	2	11	18	15	11	4	73
12:00 PM	0	0	1	2	1	0	0	2	5	5	0	0	16
12:15 PM	0	0	0	2	1	0	0	1	1	4	2	1	12
12:30 PM	0	0	0	1	1	0	0	1	2	7	1	0	13
12:45 PM	0	1	0	1	1	1	0	0	2	7	1	1	15
Total	0	1	1	6	4	1	0	4	10	23	4	2	56
Grand Total	2	4	1	9	8	1	2	15	28	38	15	6	129
Apprch %	28.6	57.1	14.3	50	44.4	5.6	4.4	33.3	62.2	64.4	25.4	10.2	
Total %	1.6	3.1	0.8	7	6.2	0.8	1.6	11.6	21.7	29.5	11.6	4.7	

	Melnea Cass Boulevard From North				Tremont Street From East				Melnea Cass Boulevard (Route 28) From South				Tremont Street (Route 28) From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 11:00 AM																	
11:00 AM	0	0	0	0	**1**	**3**	0	**4**	0	**4**	**6**	10	**6**	1	0	7	21
11:15 AM	0	0	0	0	1	0	0	1	0	2	2	4	1	2	1	4	9
11:30 AM	**1**	1	0	2	1	1	0	2	0	2	4	6	5	**6**	**2**	**13**	**23**
11:45 AM	1	**2**	0	**3**	0	0	0	0	**2**	3	6	**11**	3	2	1	6	20
Total Volume	2	3	0	5	3	4	0	7	2	11	18	31	15	11	4	30	73
% App. Total	40	60	0		42.9	57.1	0		6.5	35.5	58.1		50	36.7	13.3		
PHF	.500	.375	.000	.417	.750	.333	.000	.438	.250	.688	.750	.705	.625	.458	.500	.577	.793

N/S: Melnea Cass Boulevard
E/W:Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

PRECISION
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INDUSTRIES, LLC
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File Name : 122774 E
Site Code : 23155.00
Start Date : 1/28/2012
Page No : 1

Groups Printed- Peds and Bicycles

	Melnea Cass Boulevard From North				Tremont Street From East				Melnea Cass Boulevard (Route 28) From South				Tremont Street (Route 28) From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
11:00 AM	0	0	0	5	0	0	0	1	0	0	0	1	0	0	0	2	9
11:15 AM	0	0	0	6	0	0	0	1	0	0	0	1	1	0	0	2	11
11:30 AM	0	0	0	8	0	0	0	3	0	0	0	4	0	0	0	1	16
11:45 AM	0	0	0	5	0	0	0	5	0	0	0	10	0	0	0	2	22
Total	0	0	0	24	0	0	0	10	0	0	0	16	1	0	0	7	58
12:00 PM	0	0	0	2	0	0	0	2	0	0	0	2	0	0	0	0	6
12:15 PM	0	0	0	5	0	0	0	1	0	0	0	0	0	0	0	1	7
12:30 PM	0	0	0	4	0	0	0	2	0	0	0	2	1	1	0	1	11
12:45 PM	0	0	0	5	0	0	0	4	0	0	0	2	0	0	0	0	11
Total	0	0	0	16	0	0	0	9	0	0	0	6	1	1	0	2	35
Grand Total	0	0	0	40	0	0	0	19	0	0	0	22	2	1	0	9	93
Apprch %	0	0	0	100	0	0	0	100	0	0	0	100	16.7	8.3	0	75	
Total %	0	0	0	43	0	0	0	20.4	0	0	0	23.7	2.2	1.1	0	9.7	

	Melnea Cass Boulevard From North					Tremont Street From East					Melnea Cass Boulevard (Route 28) From South					Tremont Street (Route 28) From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 11:00 AM																					
11:00 AM	0	0	0	5	5	0	0	0	1	1	0	0	0	1	1	0	0	0	**2**	**2**	**9**
11:15 AM	**0**	**0**	**0**	**6**	**6**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**1**	**1**	**1**	**0**	**0**	**2**	**3**	11
11:30 AM	0	0	0	**8**	**8**	0	0	0	3	3	0	0	0	4	4	0	0	0	1	1	16
11:45 AM	0	0	0	5	5	0	0	0	**5**	**5**	0	0	0	**10**	**10**	0	0	0	2	2	**22**
Total Volume	0	0	0	24	24	0	0	0	10	10	0	0	0	16	16	1	0	0	7	8	58
% App. Total	0	0	0	100		0	0	0	100		0	0	0	100		12.5	0	0	87.5		
PHF	.000	.000	.000	.750	.750	.000	.000	.000	.500	.500	.000	.000	.000	.400	.400	.250	.000	.000	.875	.667	.659

N/S: Melnea Cass Boulevard
E/W:Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

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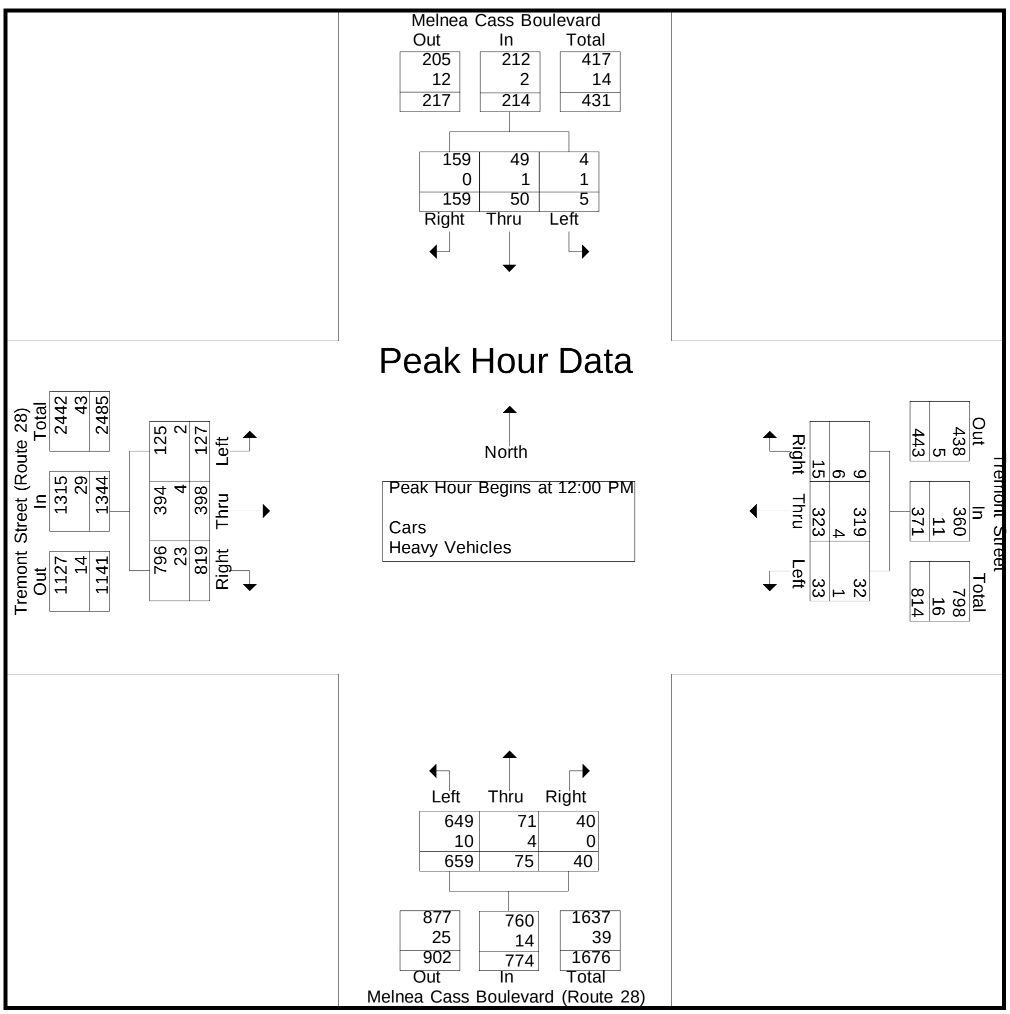
Page No : 1

	Melnea Cass Boulevard From North				Tremont Street From East				Melnea Cass Boulevard (Route 28) From South				Tremont Street (Route 28) From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:00 PM																	
12:00 PM	40	12	1	53	**5**	78	8	91	10	**22**	164	196	204	89	34	327	667
12:15 PM	39	12	**2**	53	5	75	8	88	6	19	156	181	205	102	28	335	657
12:30 PM	36	**16**	1	53	1	81	**9**	91	8	21	157	186	**208**	**109**	28	**345**	675
12:45 PM	**44**	10	1	**55**	4	**89**	8	**101**	**16**	13	**182**	**211**	202	98	**37**	337	**704**
Total Volume	159	50	5	214	15	323	33	371	40	75	659	774	819	398	127	1344	2703
% App. Total	74.3	23.4	2.3		4	87.1	8.9		5.2	9.7	85.1		60.9	29.6	9.4		
PHF	.903	.781	.625	.973	.750	.907	.917	.918	.625	.852	.905	.917	.984	.913	.858	.974	.960
Cars	159	49	4	212	9	319	32	360	40	71	649	760	796	394	125	1315	2647
% Cars	100	98.0	80.0	99.1	60.0	98.8	97.0	97.0	100	94.7	98.5	98.2	97.2	99.0	98.4	97.8	97.9
Heavy Vehicles	0	1	1	2	6	4	1	11	0	4	10	14	23	4	2	29	56
% Heavy Vehicles	0	2.0	20.0	0.9	40.0	1.2	3.0	3.0	0	5.3	1.5	1.8	2.8	1.0	1.6	2.2	2.1



N/S: Prentis Street/ Driveway
E/W: Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

PRECISION
DATA
INDUSTRIES, LLC
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File Name : 122774 F
Site Code : 23155.00
Start Date : 1/28/2012

Groups Printed- Cars - Heavy Vehicles

	Tremont Street (Route 28) From East			Driveway From South			Tremont Street (Route 28) From West			
Start Time	Thru	Left	Peds	Right	Left	Peds	Right	Thru	Peds	Int. Total
11:00 AM	0	0	0	14	0	0	26	0	0	40
11:15 AM	0	0	0	16	0	0	17	0	0	33
11:30 AM	0	0	0	22	0	0	19	0	0	41
11:45 AM	0	0	0	22	0	0	15	0	0	37
Total	0	0	0	74	0	0	77	0	0	151
12:00 PM	0	1	0	22	0	0	10	0	0	33
12:15 PM	0	0	0	44	0	0	16	0	0	60
12:30 PM	0	0	0	24	0	0	11	0	0	35
12:45 PM	0	0	0	30	0	0	9	0	0	39
Total	0	1	0	120	0	0	46	0	0	167
Grand Total	0	1	0	194	0	0	123	0	0	318
Apprch %	0	100	0	100	0	0	100	0	0	
Total %	0	0.3	0	61	0	0	38.7	0	0	
Cars	0	1	0	194	0	0	123	0	0	318
% Cars	0	100	0	100	0	0	100	0	0	100
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0

	Tremont Street (Route 28) From East				Driveway From South				Tremont Street (Route 28) From West				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 11:30 AM													
11:30 AM	0	0	0	0	22	0	0	22	**19**	0	0	**19**	41
11:45 AM	0	0	0	0	22	0	0	22	15	0	0	15	37
12:00 PM	0	**1**		**1**	22	0	0	22	10	0	0	10	33
12:15 PM	0	0	0	0	**44**	0	0	**44**	16	0	0	16	**60**
Total Volume	0	1	0	1	110	0	0	110	60	0	0	60	171
% App. Total	0	100	0		100	0	0		100	0	0		
PHF	.000	.250	.000	.250	.625	.000	.000	.625	.789	.000	.000	.789	.713
Cars	0	1	0	1	110	0	0	110	60	0	0	60	171
% Cars	0	100	0	100	100	0	0	100	100	0	0	100	100
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0

N/S: Prentis Street/ Driveway
E/W: Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

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File Name : 122774 F
Site Code : 23155.00
Start Date : 1/28/2012

Groups Printed- Cars

	Tremont Street (Route 28) From East			Driveway From South			Tremont Street (Route 28) From West			
Start Time	Thru	Left	Peds	Right	Left	Peds	Right	Thru	Peds	Int. Total
11:00 AM	0	0	0	14	0	0	26	0	0	40
11:15 AM	0	0	0	16	0	0	17	0	0	33
11:30 AM	0	0	0	22	0	0	19	0	0	41
11:45 AM	0	0	0	22	0	0	15	0	0	37
Total	0	0	0	74	0	0	77	0	0	151
12:00 PM	0	1	0	22	0	0	10	0	0	33
12:15 PM	0	0	0	44	0	0	16	0	0	60
12:30 PM	0	0	0	24	0	0	11	0	0	35
12:45 PM	0	0	0	30	0	0	9	0	0	39
Total	0	1	0	120	0	0	46	0	0	167
Grand Total	0	1	0	194	0	0	123	0	0	318
Apprch %	0	100	0	100	0	0	100	0	0	
Total %	0	0.3	0	61	0	0	38.7	0	0	

	Tremont Street (Route 28) From East				Driveway From South				Tremont Street (Route 28) From West				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 11:30 AM													
11:30 AM	0	0	0	0	22	0	0	22	**19**	0	0	**19**	41
11:45 AM	0	0	0	0	22	0	0	22	15	0	0	15	37
12:00 PM	0	**1**		**1**	22	0	0	22	10	0	0	10	33
12:15 PM	0	0	0	0	**44**	0	0	**44**	16	0	0	16	**60**
Total Volume	0	1	0	1	110	0	0	110	60	0	0	60	171
% App. Total	0	100	0		100	0	0		100	0	0		
PHF	.000	.250	.000	.250	.625	.000	.000	.625	.789	.000	.000	.789	.713

N/S: Prentis Street/ Driveway
E/W: Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

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

File Name : 122774 F
Site Code : 23155.00
Start Date : 1/28/2012

Groups Printed- Heavy Vehicles

	Tremont Street (Route 28) From East			Driveway From South			Tremont Street (Route 28) From West			
Start Time	Thru	Left	Peds	Right	Left	Peds	Right	Thru	Peds	Int. Total
11:00 AM	0	0	0	0	0	0	0	0	0	0
11:15 AM	0	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0	0	0	0	0	0	0	
Total %										

	Tremont Street (Route 28) From East				Driveway From South				Tremont Street (Route 28) From West				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 11:00 AM													
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0		0	0	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

N/S: Prentis Street/ Driveway
E/W: Tremont Street (Route 28)
City, State: Roxbury, MA
Client: BSC Group, Inc/ J. Lunsford

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

File Name : 122774 F
Site Code : 23155.00
Start Date : 1/28/2012

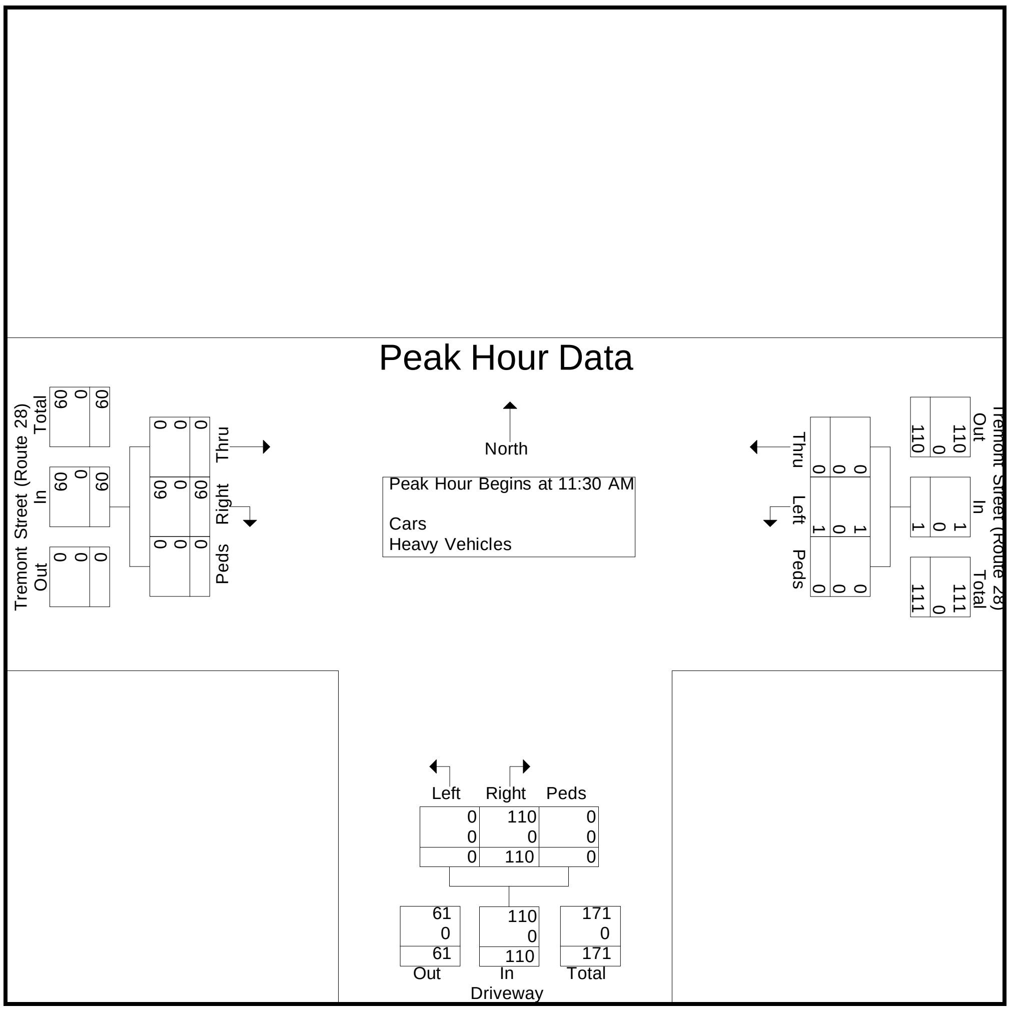
Groups Printed- Peds and Bicycles

	Tremont Street (Route 28) From East			Driveway From South			Tremont Street (Route 28) From West			
Start Time	Thru	Left	Peds	Right	Left	Peds	Right	Thru	Peds	Int. Total
11:00 AM	0	0	0	0	0	31	0	0	0	31
11:15 AM	0	0	0	0	0	36	0	0	0	36
11:30 AM	0	0	0	0	0	70	0	0	0	70
11:45 AM	0	0	0	0	0	71	0	0	0	71
Total	0	0	0	0	0	208	0	0	0	208
12:00 PM	0	0	0	0	0	65	0	0	0	65
12:15 PM	0	0	0	0	0	55	0	0	0	55
12:30 PM	0	0	0	0	0	54	0	0	0	54
12:45 PM	0	0	0	0	0	41	0	0	0	41
Total	0	0	0	0	0	215	0	0	0	215
Grand Total	0	0	0	0	0	423	0	0	0	423
Apprch %	0	0	0	0	0	100	0	0	0	
Total %	0	0	0	0	0	100	0	0	0	

	Tremont Street (Route 28) From East				Driveway From South				Tremont Street (Route 28) From West				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 11:30 AM													
11:30 AM	0	0	0	0	0	0	70	70	0	0	0	0	70
11:45 AM	0	0	0	0	0	0	**71**	**71**	0	0	0	0	**71**
12:00 PM	0	0	0	0	0	0	65	65	0	0	0	0	65
12:15 PM	0	0	0	0	0	0	55	55	0	0	0	0	55
Total Volume	0	0	0	0	0	0	261	261	0	0	0	0	261
% App. Total	0	0	0		0	0	100		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.919	.919	.000	.000	.000	.000	.919

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

	Tremont Street (Route 28) From East				Driveway From South				Tremont Street (Route 28) From West				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 11:30 AM													
11:30 AM	0	0	0	0	22	0	0	22	**19**	0	0	**19**	41
11:45 AM	0	0	0	0	22	0	0	22	15	0	0	15	37
12:00 PM	0	**1**		**1**	22	0	0	22	10	0	0	10	33
12:15 PM	0	0	0	0	**44**	0	0	**44**	16	0	0	16	**60**
Total Volume	0	1	0	1	110	0	0	110	60	0	0	60	171
% App. Total	0	100	0		100	0	0		100	0	0		
PHF	.000	.250	.000	.250	.625	.000	.000	.625	.789	.000	.000	.789	.713
Cars	0	1	0	1	110	0	0	110	60	0	0	60	171
% Cars	0	100	0	100	100	0	0	100	100	0	0	100	100
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0



Appendix 3-B: Crash Rate Worksheets

MassHigh
way

CITY/TOWN : Boston

COUNT DATE :

MHD USE ONLY

DISTRICT : 6

UNSIGNALIZED :

SIGNALIZED : X

Source #

~ INTERSECTION DATA ~

MAJOR STREET : Tremont Street ST

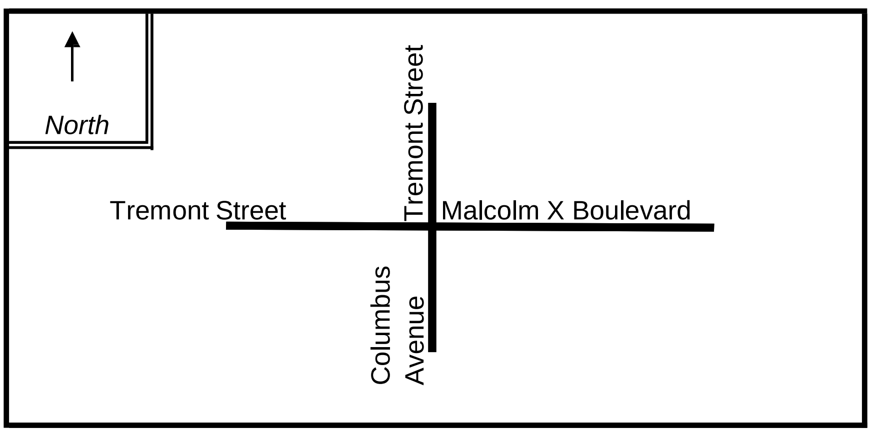
MINOR STREET(S) : Malcolm X Boulevard ST

Columbus Avenue ST

ST

ST

INTERSECTION DIAGRAM (Label Approaches)



INTERSECTION REF #

Peak Hour Volumes

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	EB	WB	NB	SB		
VOLUMES (PM) :	711	721	1,010	1,124		**3,566**

" K " FACTOR : **0.066**

APPROACH ADT : **54,030** **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS : 22

OF YEARS : 3

AVERAGE # OF ACCIDENTS (**A**) : **7.33**

CRASH RATE CALCULATION :

RATE = $\frac{(A * 1,000,000)}{(ADT * 365)}$

Comments :

MassHighway

CITY/TOWN : Boston COUNT DATE : ____________

DISTRICT : 6 UNSIGNALIZED : [ ] SIGNALIZED : X

MHD USE ONLY

Source # [ ]

~ INTERSECTION DATA ~

MAJOR STREET : Tremont Street ST [ ]

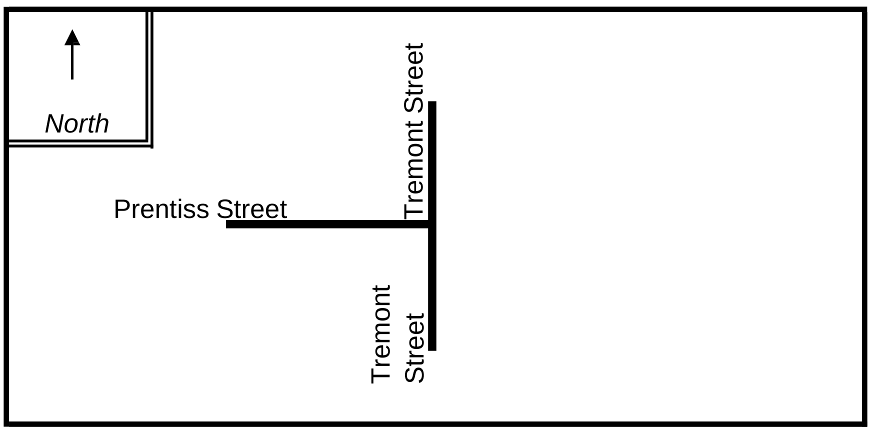
MINOR STREET(S) : Prentiss Street ST [ ]

ST [ ]

ST [ ]

ST [ ]

INTERSECTION DIAGRAM (Label Approaches)



INTERSECTION REF # [ ]

Peak Hour Volumes

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	EB	NB	SB			
VOLUMES (PM) :	289	1,218	1,110			**2,617**

" K " FACTOR : **0.066** APPROACH ADT : **39,652** **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS : 6 # OF YEARS : 3 AVERAGE # OF ACCIDENTS (**A**) : **2.00**

CRASH RATE CALCULATION : [ ] RATE = $\frac{(A * 1,000,000)}{(ADT * 365)}$

Comments : ____________

MassHighway

CITY/TOWN : Boston COUNT DATE : ______

DISTRICT : 6 UNSIGNALIZED : [ ] SIGNALIZED : X

MHD USE ONLY

Source # [ ]

~ INTERSECTION DATA ~

MAJOR STREET : Tremont Street ST [ ]

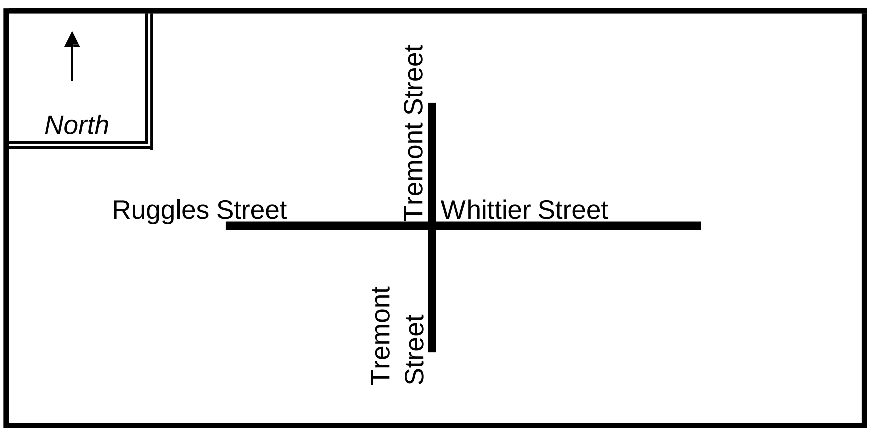
MINOR STREET(S) : Ruggles Street ST [ ]

Whittier Street ST [ ]

ST [ ]

ST [ ]

INTERSECTION DIAGRAM
(Label Approaches)



INTERSECTION REF # [ ]

Peak Hour Volumes

APPROACH :	**1**	**2**	**3**	**4**	**5**	**Total Entering Vehicles**
DIRECTION :	EB	WB	NB	SB		
VOLUMES (PM) :	862	99	1,398	1,253		**3,612**

" K " FACTOR : **0.066** APPROACH ADT : **54,727** **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS : 2 # OF YEARS : 3 AVERAGE # OF ACCIDENTS (**A**) : **0.67**

CRASH RATE CALCULATION : [ ] RATE = $\frac{(A * 1,000,000)}{(ADT * 365)}$

Comments : ______

MassHigh
way

CITY/TOWN : Boston COUNT DATE :

DISTRICT : 6 UNSIGNALIZED : SIGNALIZED : X

MHD USE ONLY

Source #

~ INTERSECTION DATA ~

MAJOR STREET : Tremont Street ST

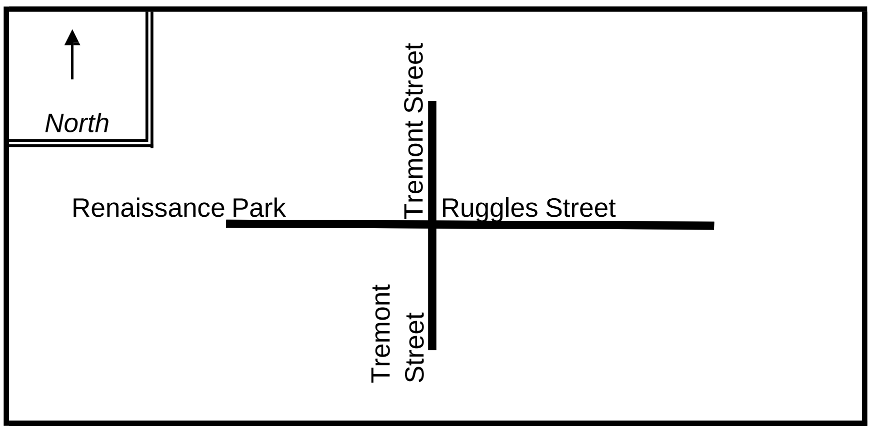
MINOR STREET(S) : Ruggles Street ST

Renaissance Park ST

ST

ST

INTERSECTION DIAGRAM (Label Approaches)



INTERSECTION REF #

Peak Hour Volumes

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	EB	NB	SB			
VOLUMES (PM) :	106	1,797	1,081			**2,984**

" K " FACTOR : **0.066** APPROACH ADT : **45,212** **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS : 15 # OF YEARS : 3 AVERAGE # OF ACCIDENTS (**A**) : **5.00**

CRASH RATE CALCULATION : RATE = $\frac{(A * 1{,}000{,}000)}{(ADT * 365)}$

Comments :

MassHigh
way

CITY/TOWN : Boston COUNT DATE : ______

DISTRICT : 6 UNSIGNALIZED : [ ] SIGNALIZED : X

MHD USE ONLY

Source # [ ]

~ INTERSECTION DATA ~

MAJOR STREET : Tremont Street ST [ ]

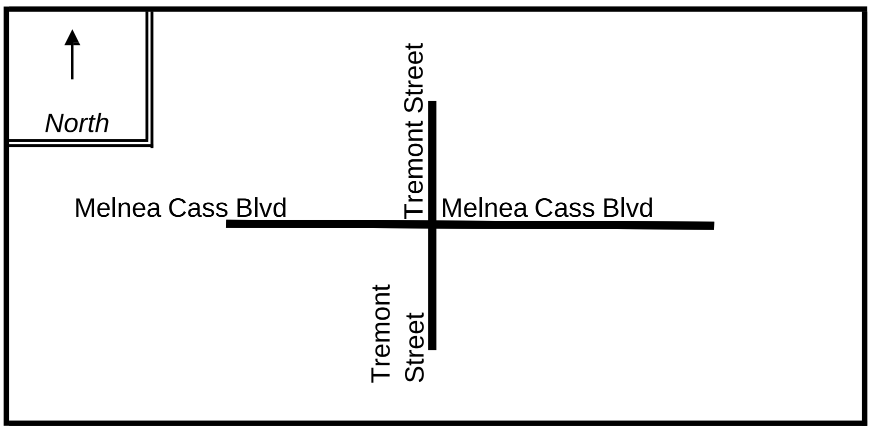
MINOR STREET(S) : Melnea Cass Boulevard ST [ ]

ST [ ]

ST [ ]

ST [ ]

INTERSECTION DIAGRAM (Label Approaches)



INTERSECTION REF # [ ]

Peak Hour Volumes

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	EB	WB	NB	SB		
VOLUMES (PM) :	497	825	1,742	545		3,609

" K " FACTOR : **0.066** APPROACH ADT : **54,682** **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS : 17 # OF YEARS : 3 AVERAGE # OF ACCIDENTS (**A**) : **5.67**

CRASH RATE CALCULATION : [ ] RATE = $\frac{(A * 1{,}000{,}000)}{(ADT * 365)}$

Comments : ______

Appendix 3-C: Trip Generation Calculations

Summary of Trip Generation Calculation
For 612.5 Th.Sq.Ft. GLA of Shopping Center
February 03, 2012

	Average Rate	Standard Deviation	Adjustment Factor	Driveway Volume
Avg. Weekday 2-Way Volume	36.01	0.00	1.00	22057
7-9 AM Peak Hour Enter	0.45	0.00	1.00	274
7-9 AM Peak Hour Exit	0.29	0.00	1.00	175
7-9 AM Peak Hour Total	0.73	0.00	1.00	449
4-6 PM Peak Hour Enter	1.71	0.00	1.00	1050
4-6 PM Peak Hour Exit	1.78	0.00	1.00	1093
4-6 PM Peak Hour Total	3.50	0.00	1.00	2143
Saturday 2-Way Volume	47.25	0.00	1.00	28942
Saturday Peak Hour Enter	2.36	0.00	1.00	1447
Saturday Peak Hour Exit	2.18	0.00	1.00	1336
Saturday Peak Hour Total	4.54	0.00	1.00	2783

Note: A zero indicates no data available.
The above rates were calculated from these equations:

```
24-Hr. 2-Way Volume:    LN(T) =  .65LN(X) +  5.83, R^2 =  0.78
7-9 AM Peak Hr. Total:  LN(T) =  .59LN(X) +  2.32
                        R^2 =  0.52 ,  0.61  Enter,  0.39  Exit
4-6 PM Peak Hr. Total:  LN(T) =  .67LN(X) +  3.37
                        R^2 =  0.81 ,  0.49  Enter,  0.51  Exit
AM Gen Pk Hr. Total:    0
                        R^2 =  0 ,  0  Enter,  0  Exit
PM Gen Pk Hr. Total:    0
                        R^2 =  0 ,  0  Enter,  0  Exit
Sat. 2-Way Volume:      LN(T) =  .63LN(X) +  6.23, R^2 =  0.82
Sat. Pk Hr. Total:      LN(T) =  .65LN(X) +  3.76
                        R^2 =  0.83 ,  0.52  Enter,  0.48  Exit
Sun. 2-Way Volume:      T =  15.63(X) +  4214.46, R^2 =  0.52
Sun. Pk Hr. Total:      0
                        R^2 =  0 ,  0  Enter,  0  Exit
```

Source: Institute of Transportation Engineers
Trip Generation, 8th Edition, 2008.

TRIP GENERATION BY MICROTRANS

Summary of Trip Generation Calculation
For 200 Th.Sq.Ft. GFA of General Office Building
February 21, 2012

	Average Rate	Standard Deviation	Adjustment Factor	Driveway Volume
Avg. Weekday 2-Way Volume	11.37	0.00	1.00	2275
7-9 AM Peak Hour Enter	1.44	0.00	1.00	287
7-9 AM Peak Hour Exit	0.20	0.00	1.00	39
7-9 AM Peak Hour Total	1.63	0.00	1.00	327
4-6 PM Peak Hour Enter	0.26	0.00	1.00	51
4-6 PM Peak Hour Exit	1.26	0.00	1.00	251
4-6 PM Peak Hour Total	1.51	0.00	1.00	303
Saturday 2-Way Volume	2.23	0.00	1.00	446
Saturday Peak Hour Enter	0.18	0.00	1.00	35
Saturday Peak Hour Exit	0.15	0.00	1.00	30
Saturday Peak Hour Total	0.32	0.00	1.00	65

Note: A zero indicates no data available.
The above rates were calculated from these equations:

24-Hr. 2-Way Volume:	LN(T) = .77LN(X) + 3.65, R^2 = 0.8
7-9 AM Peak Hr. Total:	LN(T) = .8LN(X) + 1.55
	R^2 = 0.83 , 0.88 Enter, 0.12 Exit
4-6 PM Peak Hr. Total:	T = 1.12(X) + 78.81
	R^2 = 0.82 , 0.17 Enter, 0.83 Exit
AM Gen Pk Hr. Total:	LN(T) = .8LN(X) + 1.55
	R^2 = 0.83 , 0.88 Enter, 0.12 Exit
PM Gen Pk Hr. Total:	T = 1.12(X) + 78.81
	R^2 = 0.82 , 0.17 Enter, 0.83 Exit
Sat. 2-Way Volume:	T = 2.14(X) + 18.47, R^2 = 0.66
Sat. Pk Hr. Total:	LN(T) = .81LN(X) + -.12
	R^2 = 0.59 , 0.54 Enter, 0.46 Exit
Sun. 2-Way Volume:	LN(T) = .86LN(X) + .31, R^2 = 0.5
Sun. Pk Hr. Total:	LN(T) = .61LN(X) + -.23
	R^2 = 0.56 , 0.58 Enter, 0.42 Exit

Source: Institute of Transportation Engineers
Trip Generation, 8th Edition, 2008.

TRIP GENERATION BY MICROTRANS

Summary of Trip Generation Calculation
For 200 Dwelling Units of Apartments
February 21, 2012

	Average Rate	Standard Deviation	Adjustment Factor	Driveway Volume
Avg. Weekday 2-Way Volume	6.68	0.00	1.00	1336
7-9 AM Peak Hour Enter	0.10	0.00	1.00	20
7-9 AM Peak Hour Exit	0.41	0.00	1.00	81
7-9 AM Peak Hour Total	0.51	0.00	1.00	102
4-6 PM Peak Hour Enter	0.41	0.00	1.00	83
4-6 PM Peak Hour Exit	0.22	0.00	1.00	45
4-6 PM Peak Hour Total	0.64	0.00	1.00	128
Saturday 2-Way Volume	6.57	0.00	1.00	1314
Saturday Peak Hour Enter	0.00	0.00	1.00	0
Saturday Peak Hour Exit	0.00	0.00	1.00	0
Saturday Peak Hour Total	0.51	0.00	1.00	101

Note: A zero indicates no data available.
The above rates were calculated from these equations:

```
24-Hr. 2-Way Volume:    T =  6.06(X) +  123.56, R^2 =  0.87
7-9 AM Peak Hr. Total:  T =  .49(X) +  3.73
                        R^2 =  0.83 ,  0.2  Enter,  0.8  Exit
4-6 PM Peak Hr. Total:  T =  .55(X) +  17.65
                        R^2 =  0.77 ,  0.65  Enter,  0.35  Exit
AM Gen Pk Hr. Total:    T =  .54(X) +  2.45
                        R^2 =  0.82 ,  0.29  Enter,  0.71  Exit
PM Gen Pk Hr. Total:    T =  .6(X) +  14.91
                        R^2 =  0.8 ,  0.61  Enter,  0.39  Exit
Sat. 2-Way Volume:      T =  7.85(X) + -256.19, R^2 =  0.85
Sat. Pk Hr. Total:      T =  .41(X) +  19.23
                        R^2 =  0.56 ,  0  Enter,  0  Exit
Sun. 2-Way Volume:      T =  6.42(X) + -101.12, R^2 =  0.82
Sun. Pk Hr. Total:      0
                        R^2 =  0 ,  0  Enter,  0  Exit
```

Source: Institute of Transportation Engineers
Trip Generation, 8th Edition, 2008.

TRIP GENERATION BY MICROTRANS

Appendix 3-D: Background Traffic Data

Background Trip Estimation

Growth Rate 0.25%
Years 5

		Whittier Street 2010 Existing		Whittier Street 2015 No Build		5-Year Growth at 0.25 Percent		Estimated Project Trips	
Intersection	**MOVE**	**AM**	**PM**	**AM**	**PM**	**AM**	**PM**	**AM**	**PM**
Tremont Street at	**EB L**	2	20	2	20	0	0	0	0
Melnea Cass Boulevard / Columbus Avenue	**EB T**	55	252	56	255	1	3	0	0
	EB R	200	337	203	341	3	4	0	0
	WB L	812	859	1116	1093	10	11	294	223
	WB T	176	160	180	162	2	2	2	0
	WB R	41	50	42	51	1	1	0	0
	NB L	354	262	358	265	4	3	0	0
	NB T	783	639	801	649	10	8	8	2
	NB R	875	914	997	1301	11	11	111	376
	SB L	25	70	25	71	0	1	0	0
	SB T	382	684	400	708	5	9	13	15
	SB R	15	15	15	15	0	0	0	0
	TOTAL	*3720*	*4262*	*4195*	*4931*	*47*	*53*	*428*	*616*
Tremont Street at	**EB R**	35	60	35	61	0	1	0	0
Ruggles Street / Renaissance Park	**NB T**	2010	1830	2153	2231	25	23	118	378
	NB R	166	232	170	239	2	3	2	4
	SB R	26	20	26	20	0	0	0	0
	SB T	1307	1825	1631	2086	16	23	308	238
	TOTAL	*3544*	*3967*	*4015*	*4637*	*43*	*50*	*428*	*620*
Tremont Street at	**EB L**	658	744	738	1045	8	9	72	292
Ruggles Street / Whittier Street	**EB T**	0	0	0	0	0	0	0	0
	EB R	190	232	241	353	2	3	49	118
	WB L	42	60	43	61	1	1	0	0
	WB T	23	20	23	20	0	0	0	0
	WB R	32	35	32	35	0	0	0	0
	NB U	11	22	11	22	0	0	0	0
	NB L	174	100	269	142	2	1	93	41

Background Trip Estimation

Growth Rate	0.25%
Years	5

Intersection	MOVE	Whittier Street 2010 Existing		Whittier Street 2015 No Build		5-Year Growth at 0.25 Percent		Estimated Project Trips	
		AM	PM	AM	PM	AM	PM	AM	PM
	NB T	1510	1311	1591	1417	19	16	62	90
	SB U	8	8	24	48	0	0	16	40
	SB L	0	0	0	0	0	0	0	0
	SB T	805	1176	848	1308	10	15	33	117
	SB R	524	704	806	834	7	9	275	121
	TOTAL	*3977*	*4412*	*4626*	*5285*	*49*	*54*	*600*	*819*
Tremont Street at	EB L	32	161	32	163	0	2	0	0
Prentiss Street	EB R	9	50	10	51	0	1	1	0
	NB U	1	0	1	0	0	0	0	0
	NB L	243	104	261	105	3	1	15	0
	NB T	1715	1266	1892	1413	22	16	155	131
	SB U	33	9	35	9	0	0	2	0
	SB T	819	1361	911	1612	10	17	82	234
	SB R	89	62	95	63	1	1	5	0
	TOTAL	*2941*	*3013*	*3237*	*3416*	*36*	*38*	*260*	*365*
Tremont Street at	EB L	181	194	183	221	2	2	0	25
Malcolm X Boulevard	EB T	266	390	305	452	3	5	36	57
	EB R	124	229	187	320	2	3	61	88
	WB L	53	91	60	255	1	1	6	163
	WB T	433	402	452	439	5	5	14	32
	WB R	474	319	568	417	6	4	88	94
	NB L	183	168	198	251	2	2	13	81
	NB T	1537	882	1658	1018	19	11	102	125
	NB R	72	109	89	272	1	1	16	162
	SB L	94	177	118	299	1	2	23	120
	SB T	505	1005	571	1227	6	13	60	209
	SB R	220	164	223	177	3	2	0	11

Background Trip Estimation

Growth Rate	0.25%
Years	5

Intersection	MOVE	Whittier Street 2010 Existing AM	Whittier Street 2010 Existing PM	Whittier Street 2015 No Build AM	Whittier Street 2015 No Build PM	5-Year Growth at 0.25 Percent AM	5-Year Growth at 0.25 Percent PM	Estimated Project Trips AM	Estimated Project Trips PM
	TOTAL	*4142*	*4130*	*4612*	*5348*	*51*	*51*	*419*	*1167*
Tremont Street at	**WB L**					0	0	0	0
Site Driveway	**WB R**	10	87	11	91	0	1	1	3
	NB T	1549	1412	1750	1560	19	18	182	130
	NB R	199	24	209	25	2	0	8	1
	SB L					0	0	0	0
	SB T	941	1423	1041	1684	12	18	88	243
	TOTAL	*2699*	*2946*	*3011*	*3360*	*33*	*37*	*279*	*377*

Summary of Trip Generation Calculation
For 150 Rooms of Hotel
February 02, 2012

	Average Rate	Standard Deviation	Adjustment Factor	Driveway Volume
Avg. Weekday 2-Way Volume	8.17	3.38	1.00	1226
7-9 AM Peak Hour Enter	0.34	0.00	1.00	51
7-9 AM Peak Hour Exit	0.22	0.00	1.00	33
7-9 AM Peak Hour Total	0.56	0.78	1.00	84
4-6 PM Peak Hour Enter	0.31	0.00	1.00	47
4-6 PM Peak Hour Exit	0.28	0.00	1.00	42
4-6 PM Peak Hour Total	0.59	0.80	1.00	89
Saturday 2-Way Volume	8.19	3.13	1.00	1229
Saturday Peak Hour Enter	0.40	0.00	1.00	60
Saturday Peak Hour Exit	0.32	0.00	1.00	48
Saturday Peak Hour Total	0.72	0.87	1.00	108

Note: A zero indicates no data available.
Source: Institute of Transportation Engineers
Trip Generation, 8th Edition, 2008.

TRIP GENERATION BY MICROTRANS

Summary of Trip Generation Calculation
For 52 Dwelling Units of Apartments
February 02, 2012

	Average Rate	Standard Deviation	Adjustment Factor	Driveway Volume
Avg. Weekday 2-Way Volume	8.44	0.00	1.00	439
7-9 AM Peak Hour Enter	0.11	0.00	1.00	6
7-9 AM Peak Hour Exit	0.45	0.00	1.00	23
7-9 AM Peak Hour Total	0.56	0.00	1.00	29
4-6 PM Peak Hour Enter	0.58	0.00	1.00	30
4-6 PM Peak Hour Exit	0.31	0.00	1.00	16
4-6 PM Peak Hour Total	0.89	0.00	1.00	46
Saturday 2-Way Volume	2.92	0.00	1.00	152
Saturday Peak Hour Enter	0.00	0.00	1.00	0
Saturday Peak Hour Exit	0.00	0.00	1.00	0
Saturday Peak Hour Total	0.78	0.00	1.00	41

Note: A zero indicates no data available.
The above rates were calculated from these equations:

```
24-Hr. 2-Way Volume:    T =  6.06(X) +  123.56, R^2 =  0.87
7-9 AM Peak Hr. Total:  T =  .49(X) +  3.73
                        R^2 =  0.83 ,  0.2  Enter,  0.8  Exit
4-6 PM Peak Hr. Total:  T =  .55(X) +  17.65
                        R^2 =  0.77 ,  0.65  Enter,  0.35  Exit
AM Gen Pk Hr. Total:    T =  .54(X) +  2.45
                        R^2 =  0.82 ,  0.29  Enter,  0.71  Exit
PM Gen Pk Hr. Total:    T =  .6(X) +  14.91
                        R^2 =  0.8 ,  0.61  Enter,  0.39  Exit
Sat. 2-Way Volume:      T =  7.85(X) + -256.19, R^2 =  0.85
Sat. Pk Hr. Total:      T =  .41(X) +  19.23
                        R^2 =  0.56 ,  0  Enter,  0  Exit
Sun. 2-Way Volume:      T =  6.42(X) + -101.12, R^2 =  0.82
Sun. Pk Hr. Total:      0
                        R^2 =  0 ,  0  Enter,  0  Exit
```

Source: Institute of Transportation Engineers
Trip Generation, 8th Edition, 2008.

TRIP GENERATION BY MICROTRANS

Summary of Trip Generation Calculation
For 20.39 Th.Sq.Ft. GLA of Shopping Center
February 02, 2012

	Average Rate	Standard Deviation	Adjustment Factor	Driveway Volume
Avg. Weekday 2-Way Volume	118.48	0.00	1.00	2416
7-9 AM Peak Hour Enter	1.80	0.00	1.00	37
7-9 AM Peak Hour Exit	1.15	0.00	1.00	24
7-9 AM Peak Hour Total	2.96	0.00	1.00	60
4-6 PM Peak Hour Enter	5.27	0.00	1.00	107
4-6 PM Peak Hour Exit	5.48	0.00	1.00	112
4-6 PM Peak Hour Total	10.75	0.00	1.00	219
Saturday 2-Way Volume	166.41	0.00	1.00	3393
Saturday Peak Hour Enter	7.77	0.00	1.00	159
Saturday Peak Hour Exit	7.18	0.00	1.00	146
Saturday Peak Hour Total	14.95	0.00	1.00	305

Note: A zero indicates no data available.
The above rates were calculated from these equations:

24-Hr. 2-Way Volume:	LN(T) = .65LN(X) + 5.83, R^2 = 0.78
7-9 AM Peak Hr. Total:	LN(T) = .59LN(X) + 2.32
	R^2 = 0.52 , 0.61 Enter, 0.39 Exit
4-6 PM Peak Hr. Total:	LN(T) = .67LN(X) + 3.37
	R^2 = 0.81 , 0.49 Enter, 0.51 Exit
AM Gen Pk Hr. Total:	0
	R^2 = 0 , 0 Enter, 0 Exit
PM Gen Pk Hr. Total:	0
	R^2 = 0 , 0 Enter, 0 Exit
Sat. 2-Way Volume:	LN(T) = .63LN(X) + 6.23, R^2 = 0.82
Sat. Pk Hr. Total:	LN(T) = .65LN(X) + 3.76
	R^2 = 0.83 , 0.52 Enter, 0.48 Exit
Sun. 2-Way Volume:	T = 15.63(X) + 4214.46, R^2 = 0.52
Sun. Pk Hr. Total:	0
	R^2 = 0 , 0 Enter, 0 Exit

Source: Institute of Transportation Engineers
Trip Generation, 8th Edition, 2008.

TRIP GENERATION BY MICROTRANS

Summary of Trip Generation Calculation
For 11.2 Th.Sq.Ft. GFA of General Office Building
February 02, 2012

	Average Rate	Standard Deviation	Adjustment Factor	Driveway Volume
Avg. Weekday 2-Way Volume	22.07	0.00	1.00	247
7-9 AM Peak Hour Enter	2.56	0.00	1.00	29
7-9 AM Peak Hour Exit	0.35	0.00	1.00	4
7-9 AM Peak Hour Total	2.91	0.00	1.00	33
4-6 PM Peak Hour Enter	1.39	0.00	1.00	16
4-6 PM Peak Hour Exit	6.77	0.00	1.00	76
4-6 PM Peak Hour Total	8.16	0.00	1.00	91
Saturday 2-Way Volume	3.79	0.00	1.00	42
Saturday Peak Hour Enter	0.30	0.00	1.00	3
Saturday Peak Hour Exit	0.26	0.00	1.00	3
Saturday Peak Hour Total	0.56	0.00	1.00	6

Note: A zero indicates no data available.
The above rates were calculated from these equations:

```
24-Hr. 2-Way Volume:    LN(T) =  .77LN(X) +  3.65, R^2 =  0.8
7-9 AM Peak Hr. Total:  LN(T) =  .8LN(X) +  1.55
                        R^2 =  0.83 ,  0.88  Enter,  0.12  Exit
4-6 PM Peak Hr. Total:  T =  1.12(X) +  78.81
                        R^2 =  0.82 ,  0.17  Enter,  0.83  Exit
AM Gen Pk Hr. Total:    LN(T) =  .8LN(X) +  1.55
                        R^2 =  0.83 ,  0.88  Enter,  0.12  Exit
PM Gen Pk Hr. Total:    T =  1.12(X) +  78.81
                        R^2 =  0.82 ,  0.17  Enter,  0.83  Exit
Sat. 2-Way Volume:      T =  2.14(X) +  18.47, R^2 =  0.66
Sat. Pk Hr. Total:      LN(T) =  .81LN(X) + -.12
                        R^2 =  0.59 ,  0.54  Enter,  0.46  Exit
Sun. 2-Way Volume:      LN(T) =  .86LN(X) +  .31, R^2 =  0.5
Sun. Pk Hr. Total:      LN(T) =  .61LN(X) + -.23
                        R^2 =  0.56 ,  0.58  Enter,  0.42  Exit
```

Source: Institute of Transportation Engineers
Trip Generation, 8th Edition, 2008.

TRIP GENERATION BY MICROTRANS

Summary of Trip Generation Calculation
For 40 Th.Sq.Ft. GFA of Supermarket
February 02, 2012

	Average Rate	Standard Deviation	Adjustment Factor	Driveway Volume
Avg. Weekday 2-Way Volume	102.24	31.73	1.00	4090
7-9 AM Peak Hour Enter	2.19	0.00	1.00	88
7-9 AM Peak Hour Exit	1.40	0.00	1.00	56
7-9 AM Peak Hour Total	3.59	3.18	1.00	144
4-6 PM Peak Hour Enter	5.36	0.00	1.00	214
4-6 PM Peak Hour Exit	5.15	0.00	1.00	206
4-6 PM Peak Hour Total	10.50	4.97	1.00	420
Saturday 2-Way Volume	177.59	0.00	1.00	7104
Saturday Peak Hour Enter	5.53	0.00	1.00	221
Saturday Peak Hour Exit	5.32	0.00	1.00	213
Saturday Peak Hour Total	10.85	4.93	1.00	434

Note: A zero indicates no data available.
Source: Institute of Transportation Engineers
Trip Generation, 8th Edition, 2008.

TRIP GENERATION BY MICROTRANS

Summary of Trip Generation Calculation
For 25.6 Th.Sq.Ft. GLA of Shopping Center
February 02, 2012

	Average Rate	Standard Deviation	Adjustment Factor	Driveway Volume
Avg. Weekday 2-Way Volume	109.41	0.00	1.00	2801
7-9 AM Peak Hour Enter	1.64	0.00	1.00	42
7-9 AM Peak Hour Exit	1.05	0.00	1.00	27
7-9 AM Peak Hour Total	2.69	0.00	1.00	69
4-6 PM Peak Hour Enter	4.89	0.00	1.00	125
4-6 PM Peak Hour Exit	5.09	0.00	1.00	130
4-6 PM Peak Hour Total	9.97	0.00	1.00	255
Saturday 2-Way Volume	152.97	0.00	1.00	3916
Saturday Peak Hour Enter	7.18	0.00	1.00	184
Saturday Peak Hour Exit	6.63	0.00	1.00	170
Saturday Peak Hour Total	13.81	0.00	1.00	353

Note: A zero indicates no data available.
The above rates were calculated from these equations:

```
24-Hr. 2-Way Volume:    LN(T) =  .65LN(X) +  5.83, R^2 =  0.78
7-9 AM Peak Hr. Total:  LN(T) =  .59LN(X) +  2.32
                        R^2 =  0.52 ,  0.61  Enter,  0.39  Exit
4-6 PM Peak Hr. Total:  LN(T) =  .67LN(X) +  3.37
                        R^2 =  0.81 ,  0.49  Enter,  0.51  Exit
AM Gen Pk Hr. Total:    0
                        R^2 =  0 ,  0  Enter,  0  Exit
PM Gen Pk Hr. Total:    0
                        R^2 =  0 ,  0  Enter,  0  Exit
Sat. 2-Way Volume:      LN(T) =  .63LN(X) +  6.23, R^2 =  0.82
Sat. Pk Hr. Total:      LN(T) =  .65LN(X) +  3.76
                        R^2 =  0.83 ,  0.52  Enter,  0.48  Exit
Sun. 2-Way Volume:      T =  15.63(X) +  4214.46, R^2 =  0.52
Sun. Pk Hr. Total:      0
                        R^2 =  0 ,  0  Enter,  0  Exit
```

Source: Institute of Transportation Engineers
Trip Generation, 8th Edition, 2008.

TRIP GENERATION BY MICROTRANS

Summary of Trip Generation Calculation
For 66 Dwelling Units of Apartments
February 02, 2012

	Average Rate	Standard Deviation	Adjustment Factor	Driveway Volume
Avg. Weekday 2-Way Volume	7.93	0.00	1.00	524
7-9 AM Peak Hour Enter	0.11	0.00	1.00	7
7-9 AM Peak Hour Exit	0.44	0.00	1.00	29
7-9 AM Peak Hour Total	0.55	0.00	1.00	36
4-6 PM Peak Hour Enter	0.53	0.00	1.00	35
4-6 PM Peak Hour Exit	0.29	0.00	1.00	19
4-6 PM Peak Hour Total	0.82	0.00	1.00	54
Saturday 2-Way Volume	3.97	0.00	1.00	262
Saturday Peak Hour Enter	0.00	0.00	1.00	0
Saturday Peak Hour Exit	0.00	0.00	1.00	0
Saturday Peak Hour Total	0.70	0.00	1.00	46

Note: A zero indicates no data available.
The above rates were calculated from these equations:

```
24-Hr. 2-Way Volume:    T =  6.06(X) +  123.56, R^2 =  0.87
7-9 AM Peak Hr. Total:  T =  .49(X) +  3.73
                        R^2 =  0.83 ,  0.2  Enter,  0.8  Exit
4-6 PM Peak Hr. Total:  T =  .55(X) +  17.65
                        R^2 =  0.77 ,  0.65  Enter,  0.35  Exit
AM Gen Pk Hr. Total:    T =  .54(X) +  2.45
                        R^2 =  0.82 ,  0.29  Enter,  0.71  Exit
PM Gen Pk Hr. Total:    T =  .6(X) +  14.91
                        R^2 =  0.8 ,  0.61  Enter,  0.39  Exit
Sat. 2-Way Volume:      T =  7.85(X) + -256.19, R^2 =  0.85
Sat. Pk Hr. Total:      T =  .41(X) +  19.23
                        R^2 =  0.56 ,  0  Enter,  0  Exit
Sun. 2-Way Volume:      T =  6.42(X) + -101.12, R^2 =  0.82
Sun. Pk Hr. Total:      0
                        R^2 =  0 ,  0  Enter,  0  Exit
```

Source: Institute of Transportation Engineers
Trip Generation, 8th Edition, 2008.

TRIP GENERATION BY MICROTRANS

Appendix 3-E: Capacity Analysis Worksheets

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Volume (vph)	157	272	118	57	387	306	157	1266	64	4	110	542
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor		0.95			0.95	1.00	1.00	0.91			1.00	0.91
Frt		0.97			1.00	0.85	1.00	0.99			1.00	0.97
Flt Protected		0.99			0.99	1.00	0.95	1.00			0.95	1.00
Satd. Flow (prot)		2922			2955	1232	1577	4454			1171	3910
Flt Permitted		0.56			0.76	1.00	0.95	1.00			0.95	1.00
Satd. Flow (perm)		1661			2263	1232	1577	4454			1171	3910
Peak-hour factor, PHF	0.86	0.86	0.86	0.96	0.96	0.96	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	183	316	137	59	403	319	167	1347	68	4	117	577
RTOR Reduction (vph)	0	0	0	0	0	263	0	0	0	0	0	0
Lane Group Flow (vph)	0	636	0	0	462	56	167	1415	0	0	121	738
Heavy Vehicles (%)	8%	5%	6%	11%	9%	18%	3%	4%	5%	0%	40%	8%
Parking (#/hr)												20
Turn Type	pm+pt	NA		Perm	NA	Prot	Prot	NA		Prot	Prot	NA
Protected Phases	3	3 4			4	4	5	1		5	5	1
Permitted Phases	3 4			4								
Actuated Green, G (s)		30.0			21.0	21.0	11.0	39.0			11.0	39.0
Effective Green, g (s)		32.0			21.0	21.0	12.0	39.0			12.0	39.0
Actuated g/C Ratio		0.27			0.18	0.18	0.10	0.32			0.10	0.32
Clearance Time (s)					4.0	4.0	5.0	4.0			5.0	4.0
Vehicle Extension (s)					2.0	2.0	2.0	2.0			2.0	2.0
Lane Grp Cap (vph)		548			396	216	158	1448			117	1271
v/s Ratio Prot		c0.10				0.05	c0.11	c0.32			0.10	0.19
v/s Ratio Perm		c0.21			0.20							
v/c Ratio		1.16			1.17	0.26	1.06	0.98			1.03	0.58
Uniform Delay, d1		44.0			49.5	42.8	54.0	40.1			54.0	33.7
Progression Factor		0.99			1.00	1.00	1.06	0.67			1.17	1.17
Incremental Delay, d2		85.8			99.1	0.2	74.9	14.8			69.1	1.0
Delay (s)		129.2			148.6	43.0	132.0	41.8			132.1	40.6
Level of Service		F			F	D	F	D			F	D
Approach Delay (s)		129.2			105.5			51.3				53.5
Approach LOS		F			F			D				D

Intersection Summary			
HCM Average Control Delay	75.6	HCM Level of Service	E
HCM Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	38.0
Intersection Capacity Utilization	87.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBR
Lane Configurations	
Volume (vph)	151
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.94
Adj. Flow (vph)	161
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Heavy Vehicles (%)	7%
Parking (#/hr)	
Turn Type Protected	
Phases Permitted	
Phases Actuated	
Green, G (s) Effective	
Green, g (s) Actuated	
g/C Ratio Clearance	
Time (s) Vehicle	
Extension (s) Lane	
Grp Cap (vph) v/s	
Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Volume (vph)	536	0	135	28	15	21	11	198	1372	0	1	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	12	16	12	12	11	11	12	12	12
Total Lost time (s)	4.0		4.0		4.0			4.0	4.0			
Lane Util. Factor	0.97		1.00		1.00			1.00	0.91			
Frpb, ped/bikes	1.00		1.00		0.99			1.00	1.00			
Flpb, ped/bikes	1.00		1.00		0.99			1.00	1.00			
Frt	1.00		0.85		0.96			1.00	1.00			
Flt Protected	0.95		1.00		0.98			0.95	1.00			
Satd. Flow (prot)	2865		989		1612			1280	4257			
Flt Permitted	0.95		1.00		0.98			0.18	1.00			
Satd. Flow (perm)	2865		989		1612			245	4257			
Peak-hour factor, PHF	0.88	0.88	0.88	0.70	0.70	0.70	0.92	0.92	0.92	0.92	0.96	0.96
Adj. Flow (vph)	609	0	153	40	21	30	12	215	1491	0	1	0
RTOR Reduction (vph)	0	0	125	0	15	0	0	0	0	0	0	0
Lane Group Flow (vph)	609	0	28	0	76	0	0	227	1491	0	0	0
Confl. Peds. (#/hr)	8		9	9		8		20				
Heavy Vehicles (%)	10%	0%	42%	14%	0%	14%	0%	24%	6%	67%	0%	0%
Parking (#/hr)				15		0						
Turn Type	Prot		Over	Perm	NA		custom	Prot	NA		Perm	
Protected Phases	3		1!		4			1	6			
Permitted Phases				4			1!				2	
Actuated Green, G (s)	26.0		22.0		22.0			22.0	60.0			
Effective Green, g (s)	26.0		22.0		22.0			22.0	60.0			
Actuated g/C Ratio	0.22		0.18		0.18			0.18	0.50			
Clearance Time (s)	4.0		4.0		4.0			4.0	4.0			
Vehicle Extension (s)	2.0		2.0		2.0			2.0	2.0			
Lane Grp Cap (vph)	621		181		296			45	2129			
v/s Ratio Prot	c0.21		0.03						0.35			
v/s Ratio Perm					0.05			c0.93				
v/c Ratio	0.98		0.15		0.26			5.04	0.70			
Uniform Delay, d1	46.8		41.2		42.0			49.0	23.1			
Progression Factor	1.05		1.83		1.00			0.85	1.08			
Incremental Delay, d2	30.2		0.1		2.1			1845.5	1.0			
Delay (s)	79.5		75.7		44.1			1887.0	26.0			
Level of Service	E		E		D			F	C			
Approach Delay (s)		78.8			44.1				271.9			
Approach LOS		E			D				F			

Intersection Summary			
HCM Average Control Delay	153.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.67		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	95.5%	ICU Level of Service	F
Analysis Period (min)	15		

! Phase conflict between lane groups.

c Critical Lane Group

Movement	SWT	SWR
Lane Configurations		
Volume (vph)	706	520
Ideal Flow (vphpl)	1900	1900
Lane Width	11	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frpb, ped/bikes	1.00	0.95
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	2935	1276
Flt Permitted	0.95	1.00
Satd. Flow (perm)	2799	1276
Peak-hour factor, PHF	0.96	0.96
Adj. Flow (vph)	735	542
RTOR Reduction (vph)	0	0
Lane Group Flow (vph)	736	542
Confl. Peds. (#/hr)		20
Heavy Vehicles (%)	7%	5%
Parking (#/hr)		
Turn Type	NA	pm+ov
Protected Phases	2	3
Permitted Phases		2
Actuated Green, G (s)	34.0	60.0
Effective Green, g (s)	34.0	60.0
Actuated g/C Ratio	0.28	0.50
Clearance Time (s)	4.0	4.0
Vehicle Extension (s)	2.0	2.0
Lane Grp Cap (vph)	793	681
v/s Ratio Prot		0.17
v/s Ratio Perm	c0.26	0.25
v/c Ratio	0.93	0.80
Uniform Delay, d1	41.8	24.9
Progression Factor	0.90	1.25
Incremental Delay, d2	17.9	5.7
Delay (s)	55.6	36.9
Level of Service	E	D
Approach Delay (s)	47.7	
Approach LOS	D	

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	23	0	0	0	0	1783	121	0	1245	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	16	12	11	12	12	11	12
Total Lost time (s)			4.0					4.0			4.0	
Lane Util. Factor			1.00					0.91			0.91	
Frpb, ped/bikes			1.00					1.00			1.00	
Flpb, ped/bikes			1.00					1.00			1.00	
Frt			0.86					0.99			1.00	
Flt Protected			1.00					1.00			1.00	
Satd. Flow (prot)			1174					4134			4257	
Flt Permitted			1.00					1.00			1.00	
Satd. Flow (perm)			1174					4134			4257	
Peak-hour factor, PHF	0.72	0.72	0.72	0.92	0.92	0.92	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	0	32	0	0	0	0	1838	125	0	1284	0
RTOR Reduction (vph)	0	0	28	0	0	0	0	3	0	0	0	0
Lane Group Flow (vph)	0	0	4	0	0	0	0	1960	0	0	1284	0
Confl. Peds. (#/hr)									12			
Heavy Vehicles (%)	0%	0%	26%	0%	0%	0%	0%	7%	18%	0%	6%	0%
Turn Type			custom					NA			NA	
Protected Phases			5					1			1	
Permitted Phases												
Actuated Green, G (s)			15.0					97.0			97.0	
Effective Green, g (s)			15.0					97.0			97.0	
Actuated g/C Ratio			0.12					0.81			0.81	
Clearance Time (s)			4.0					4.0			4.0	
Vehicle Extension (s)			2.0					2.0			2.0	
Lane Grp Cap (vph)			147					3342			3441	
v/s Ratio Prot			c0.00					c0.47			0.30	
v/s Ratio Perm												
v/c Ratio			0.03					0.59			0.37	
Uniform Delay, d1			46.1					4.2			3.2	
Progression Factor			1.00					0.96			1.00	
Incremental Delay, d2			0.0					0.5			0.3	
Delay (s)			46.1					4.5			3.5	
Level of Service			D					A			A	
Approach Delay (s)		46.1			0.0			4.5			3.5	
Approach LOS		D			A			A			A	

Intersection Summary			
HCM Average Control Delay	4.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	44.7%	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												
Volume (vph)	6	47	164	835	187	26	364	670	950	15	370	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	13	12	13	13	12	12	11	16	12	14	12
Total Lost time (s)		4.0	4.0	4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor		1.00	1.00	0.97	1.00			0.95	1.00		0.95	
Frpb, ped/bikes		1.00	1.00	1.00	1.00			1.00	0.99		1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt		1.00	0.85	1.00	0.98			1.00	0.85		0.99	
Flt Protected		0.99	1.00	0.95	1.00			0.98	1.00		1.00	
Satd. Flow (prot)		1633	1398	3015	1542			2921	1532		3251	
Flt Permitted		0.99	1.00	0.95	1.00			0.63	1.00		0.69	
Satd. Flow (perm)		1633	1398	3015	1542			1866	1532		2235	
Peak-hour factor, PHF	0.38	0.84	0.83	0.96	0.86	0.81	0.82	0.83	0.88	0.54	0.93	0.55
Adj. Flow (vph)	16	56	198	870	217	32	444	807	1080	28	398	20
RTOR Reduction (vph)	0	0	177	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	72	21	870	249	0	0	1251	1080	0	443	0
Confl. Peds. (#/hr)									8			
Heavy Vehicles (%)	0%	9%	4%	8%	12%	15%	5%	6%	6%	20%	3%	36%
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA	Free	Perm	NA	
Protected Phases	5	5		6	6		7	1 7			1	
Permitted Phases			5				1 7		Free	1		
Actuated Green, G (s)		10.4	10.4	25.0	25.0			48.6	100.0		31.6	
Effective Green, g (s)		10.4	10.4	25.0	25.0			48.6	100.0		31.6	
Actuated g/C Ratio		0.10	0.10	0.25	0.25			0.49	1.00		0.32	
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	
Lane Grp Cap (vph)		170	145	754	386			1086	1532		706	
v/s Ratio Prot		0.04		c0.29	0.16			c0.20				
v/s Ratio Perm			0.01					c0.36	c0.71		0.20	
v/c Ratio		0.42	0.14	1.15	0.65			1.15	0.70		0.63	
Uniform Delay, d1		42.0	40.7	37.5	33.5			25.7	0.0		29.2	
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		0.6	0.2	84.0	2.8			79.2	2.8		4.2	
Delay (s)		42.6	40.9	121.5	36.3			104.9	2.8		33.4	
Level of Service		D	D	F	D			F	A		C	
Approach Delay (s)		41.4			102.5			57.6			33.4	
Approach LOS		D			F			E			C	

Intersection Summary			
HCM Average Control Delay	66.0	HCM Level of Service	E
HCM Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	87.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	122	27	245	1505	33	732	138
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	11	12	11	12
Total Lost time (s)	4.0			4.0		4.0	
Lane Util. Factor	1.00			0.91		0.95	
Frt	0.98			1.00		0.98	
Flt Protected	0.96			0.99		1.00	
Satd. Flow (prot)	1502			4210		2459	
Flt Permitted	0.96			0.67		0.75	
Satd. Flow (perm)	1502			2821		1836	
Peak-hour factor, PHF	0.77	0.77	0.89	0.89	0.92	0.97	0.97
Adj. Flow (vph)	158	35	275	1691	36	755	142
RTOR Reduction (vph)	8	0	0	0	0	9	0
Lane Group Flow (vph)	185	0	0	1966	0	924	0
Heavy Vehicles (%)	11%	7%	3%	7%	2%	13%	10%
Parking (#/hr)						20	
Turn Type	NA		pm+pt	NA	Perm	NA	
Protected Phases	5		6	1 6		1	
Permitted Phases			1 6		1		
Actuated Green, G (s)	19.1			79.1		63.1	
Effective Green, g (s)	19.1			81.1		64.1	
Actuated g/C Ratio	0.16			0.68		0.53	
Clearance Time (s)	4.0					5.0	
Vehicle Extension (s)	2.0					2.0	
Lane Grp Cap (vph)	239			2103		981	
v/s Ratio Prot	c0.12			c0.13			
v/s Ratio Perm				0.50		c0.50	
v/c Ratio	0.78			0.93		0.94	
Uniform Delay, d1	48.4			17.1		26.2	
Progression Factor	1.00			1.50		1.34	
Incremental Delay, d2	13.4			4.6		10.6	
Delay (s)	61.7			30.3		45.6	
Level of Service	E			C		D	
Approach Delay (s)	61.7			30.3		45.6	
Approach LOS	E			C		D	

Intersection Summary			
HCM Average Control Delay	36.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.8
Intersection Capacity Utilization	85.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	ø2
Lane Configurations										
Volume (vph)	157	272	57	387	306	157	1266	110	542	
Lane Group Flow (vph)	0	636	0	462	319	167	1415	121	738	
Turn Type	pm+pt	NA	Perm	NA	Prot	Prot	NA	Prot	NA	
Protected Phases	3	3 4		4	4	5	1	5	1	2
Permitted Phases	3 4		4							
Detector Phase	3	3 4	4	4	4	5	1	5	1	
Switch Phase										
Minimum Initial (s)	4.0		8.0	8.0	8.0	4.0	12.0	4.0	12.0	8.0
Minimum Split (s)	10.0		14.0	14.0	14.0	13.0	18.0	13.0	18.0	22.0
Total Split (s)	14.0		25.0	25.0	25.0	16.0	43.0	16.0	43.0	22.0
Total Split (%)	11.7%		20.8%	20.8%	20.8%	13.3%	35.8%	13.3%	35.8%	18%
Yellow Time (s)	4.0		3.0	3.0	3.0	4.0	3.0	4.0	3.0	2.0
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0
Lost Time Adjust (s)				0.0	0.0	-1.0	0.0	-1.0	0.0	
Total Lost Time (s)				4.0	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead		Lag	Lag	Lag		Lead		Lead	Lag
Lead-Lag Optimize?										
Recall Mode	None		None	None	None	None	C-Max	None	C-Max	None
v/c Ratio		1.19		1.17	0.67	1.06	0.98	1.03	0.58	
Control Delay		134.0		142.9	12.2	129.0	42.8	128.9	40.9	
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		134.0		142.9	12.2	129.0	42.8	128.9	40.9	
Queue Length 50th (ft)		~246		~224	0	~141	405	~104	145	
Queue Length 95th (ft)		#400		#332	92	m#244	#521	m#132	m170	
Internal Link Dist (ft)		381		1183			1304		709	
Turn Bay Length (ft)						205		205		
Base Capacity (vph)		535		396	479	158	1448	117	1270	
Starvation Cap Reductn		0		0	0	0	0	0	0	
Spillback Cap Reductn		0		0	0	0	0	0	0	
Storage Cap Reductn		0		0	0	0	0	0	0	
Reduced v/c Ratio		1.19		1.17	0.67	1.06	0.98	1.03	0.58	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 93 (78%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 192: Columbus Avenue /Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

Lane Group	EBL	EBR	WBT	NEU	NEL	NET	SWU	SWT	SWR
Lane Configurations									
Volume (vph)	536	135	15	11	198	1372	1	706	520
Lane Group Flow (vph)	609	153	91	0	227	1491	0	736	542
Turn Type	Prot	Over	NA	custom	Prot	NA	Perm	NA	pm+ov
Protected Phases	3	1!	4		1	6		2	3
Permitted Phases				1!			2		2
Detector Phase	3	1	4	1	1	6	2	2	3
Switch Phase									
Minimum Initial (s)	8.0	4.0	8.0	4.0	4.0	8.0	8.0	8.0	8.0
Minimum Split (s)	13.0	12.0	26.0	12.0	12.0	24.0	24.0	24.0	13.0
Total Split (s)	30.0	26.0	26.0	26.0	26.0	64.0	38.0	38.0	30.0
Total Split (%)	25.0%	21.7%	21.7%	21.7%	21.7%	53.3%	31.7%	31.7%	25.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lead/Lag	Lead	Lead	Lag	Lead	Lead		Lag	Lag	Lead
Lead-Lag Optimize?									
Recall Mode	None	Min	Max	Min	Min	C-Max	C-Max	C-Max	None
v/c Ratio	0.98	0.50	0.29		5.04	0.70		0.93	0.85
Control Delay	80.3	18.4	36.7		1856.7	26.3		56.3	44.2
Queue Delay	0.0	0.0	0.8		0.0	0.0		17.5	44.1
Total Delay	80.3	18.4	37.5		1856.7	26.3		73.8	88.4
Queue Length 50th (ft)	260	18	49		~302	328		292	395
Queue Length 95th (ft)	#360	99	73		m#345	m460		#412	#595
Internal Link Dist (ft)			271			682		238	
Turn Bay Length (ft)					200				
Base Capacity (vph)	621	306	310		45	2129		793	638
Starvation Cap Reductn	0	0	0		0	0		74	19
Spillback Cap Reductn	0	0	82		0	0		0	138
Storage Cap Reductn	0	0	0		0	0		0	0
Reduced v/c Ratio	0.98	0.50	0.40		5.04	0.70		1.02	1.08

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 48 (40%), Referenced to phase 2:SWTU and 6:NET, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.
! Phase conflict between lane groups.

Splits and Phases: 611: Tremont Street & Ruggles St/Whittier St

Lane Group	EBR	NET	SWT
Lane Configurations			
Volume (vph)	23	1783	1245
Lane Group Flow (vph)	32	1963	1284
Turn Type	custom	NA	NA
Protected Phases	5	1	1
Permitted Phases			
Detector Phase	5	1	1
Switch Phase			
Minimum Initial (s)	6.0	10.0	10.0
Minimum Split (s)	27.0	27.0	27.0
Total Split (s)	38.0	82.0	82.0
Total Split (%)	31.7%	68.3%	68.3%
Yellow Time (s)	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0
Lead/Lag			
Lead-Lag Optimize?			
Recall Mode	None	C-Max	C-Max
v/c Ratio	0.14	0.58	0.37
Control Delay	1.3	5.7	4.4
Queue Delay	0.0	0.1	0.2
Total Delay	1.3	5.8	4.6
Queue Length 50th (ft)	0	176	117
Queue Length 95th (ft)	0	m187	139
Internal Link Dist (ft)		238	380
Turn Bay Length (ft)			
Base Capacity (vph)	389	3399	3498
Starvation Cap Reductn	0	307	1225
Spillback Cap Reductn	16	0	640
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.09	0.63	0.56

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 14 (12%), Referenced to phase 1:NESW, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3082: Tremont Street & Renaissance Park/Ruggles St

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Volume (vph)	47	164	835	187	364	670	950	15	370
Lane Group Flow (vph)	72	198	870	249	0	1251	1080	0	446
Turn Type	NA	Perm	Split	NA	pm+pt	NA	Free	Perm	NA
Protected Phases	5		6	6	7	1 7			1
Permitted Phases		5			1 7		Free	1	
Detector Phase	5	5	6	6	1 7	1 7		1	1
Switch Phase									
Minimum Initial (s)	8.0	8.0	10.0	10.0	4.0			10.0	10.0
Minimum Split (s)	25.0	25.0	22.0	22.0	9.0			29.0	29.0
Total Split (s)	21.0	21.0	29.0	29.0	21.0			29.0	29.0
Total Split (%)	21.0%	21.0%	29.0%	29.0%	21.0%			29.0%	29.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0			3.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0			1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0					0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0					4.0
Lead/Lag	Lead	Lead	Lag	Lag					
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	Max			C-Max	C-Max
v/c Ratio	0.42	0.61	1.15	0.65		1.15	0.70		0.63
Control Delay	48.5	14.4	119.4	42.5		102.4	2.8		34.8
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Delay	48.5	14.4	119.4	42.5		102.4	2.8		34.8
Queue Length 50th (ft)	45	0	~339	142		~393	0		122
Queue Length 95th (ft)	76	47	#459	215		#423	0		#215
Internal Link Dist (ft)	34			60		380			216
Turn Bay Length (ft)			350						
Base Capacity (vph)	278	402	754	386		1086	1532		707
Starvation Cap Reductn	0	0	0	0		0	0		0
Spillback Cap Reductn	0	0	0	0		0	0		0
Storage Cap Reductn	0	0	0	0		0	0		0
Reduced v/c Ratio	0.26	0.49	1.15	0.65		1.15	0.70		0.63

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 145
Control Type: Actuated-Coordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

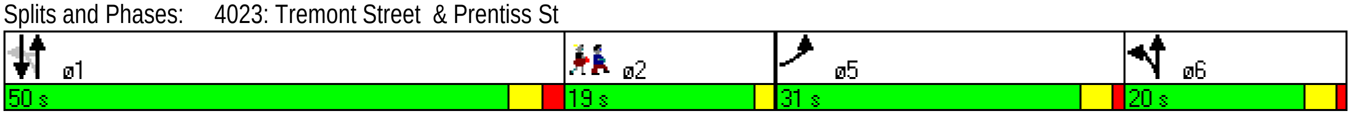
Splits and Phases: 3098: Tremont Street /Tremont St & Melnea Cass Boulevard

Lane Group	EBL	NBL	NBT	SBU	SBT	ø2
Lane Configurations						
Volume (vph)	122	245	1505	33	732	
Lane Group Flow (vph)	193	0	1966	0	933	
Turn Type	NA	pm+pt	NA	Perm	NA	
Protected Phases	5	6	1 6		1	2
Permitted Phases		1 6		1		
Detector Phase	5	6	1 6	1	1	
Switch Phase						
Minimum Initial (s)	8.0	4.0		8.0	8.0	8.0
Minimum Split (s)	14.0	8.0		25.0	25.0	19.0
Total Split (s)	31.0	20.0		50.0	50.0	19.0
Total Split (%)	25.8%	16.7%		41.7%	41.7%	16%
Yellow Time (s)	3.0	3.0		3.0	3.0	2.0
All-Red Time (s)	1.0	1.0		2.0	2.0	0.0
Lost Time Adjust (s)	0.0				-1.0	
Total Lost Time (s)	4.0				4.0	
Lead/Lag	Lead	Lag		Lead	Lead	Lag
Lead-Lag Optimize?						
Recall Mode	None	Max		C-Max	C-Max	None
v/c Ratio	0.78		0.94		0.93	
Control Delay	66.8		27.3		42.8	
Queue Delay	0.0		0.0		0.0	
Total Delay	66.8		27.3		42.8	
Queue Length 50th (ft)	139		194		387	
Queue Length 95th (ft)	171		m#499		m#560	
Internal Link Dist (ft)	258		709		105	
Turn Bay Length (ft)						
Base Capacity (vph)	345		2096		1008	
Starvation Cap Reductn	0		0		0	
Spillback Cap Reductn	0		0		0	
Storage Cap Reductn	0		0		0	
Reduced v/c Ratio	0.56		0.94		0.93	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 99 (83%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4023: Tremont Street & Prentiss St



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	10	1460	200	0	903
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	11	1587	217	0	982
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			185			762
pX, platoon unblocked	0.85	0.74			0.74	
vC, conflicting volume	2186	638			1804	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	477	0			870	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			100	
cM capacity (veh/h)	438	805			572	

Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	11	635	635	535	491	491
Volume Left	0	0	0	0	0	0
Volume Right	11	0	0	217	0	0
cSH	805	1700	1700	1700	1700	1700
Volume to Capacity	0.01	0.37	0.37	0.31	0.29	0.29
Queue Length 95th (ft)	1	0	0	0	0	0
Control Delay (s)	9.5	0.0	0.0	0.0	0.0	0.0
Lane LOS	A					
Approach Delay (s)	9.5	0.0			0.0	
Approach LOS	A					

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	42.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (vph)	178	347	186	73	369	279	1	157	767	85	2	165
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0		4.0	4.0			4.0
Lane Util. Factor		0.95			0.95	1.00		1.00	0.91			1.00
Frt		0.96			1.00	0.85		1.00	0.99			1.00
Flt Protected		0.99			0.99	1.00		0.95	1.00			0.95
Satd. Flow (prot)		2936			3064	1275		1577	4363			1345
Flt Permitted		0.60			0.64	1.00		0.95	1.00			0.95
Satd. Flow (perm)		1777			1991	1275		1577	4363			1345
Peak-hour factor, PHF	0.97	0.97	0.97	0.92	0.92	0.92	0.86	0.86	0.86	0.86	0.97	0.97
Adj. Flow (vph)	184	358	192	79	401	303	1	183	892	99	2	170
RTOR Reduction (vph)	0	0	0	0	0	232	0	0	0	0	0	0
Lane Group Flow (vph)	0	734	0	0	480	71	0	184	991	0	0	172
Heavy Vehicles (%)	5%	5%	5%	6%	5%	14%	0%	3%	5%	9%	0%	21%
Parking (#/hr)												
Turn Type	pm+pt	NA		Perm	NA	Perm	Prot	Prot	NA		Prot	Prot
Protected Phases	3	3 4			4		5	5	1		5	5
Permitted Phases	3 4			4		4						
Actuated Green, G (s)		34.0			27.0	27.0		17.3	31.7			17.3
Effective Green, g (s)		36.0			28.0	28.0		18.3	31.7			18.3
Actuated g/C Ratio		0.30			0.23	0.23		0.15	0.26			0.15
Clearance Time (s)					5.0	5.0		5.0	4.0			5.0
Vehicle Extension (s)					3.0	3.0		2.0	2.0			2.0
Lane Grp Cap (vph)		610			465	298		240	1153			205
v/s Ratio Prot		c0.08						0.12	0.23			c0.13
v/s Ratio Perm		c0.28			0.24	0.06						
v/c Ratio		1.20			1.03	0.24		0.77	0.86			0.84
Uniform Delay, d1		42.0			46.0	37.3		48.8	42.0			49.4
Progression Factor		1.07			1.00	1.00		0.69	1.03			0.80
Incremental Delay, d2		101.5			50.3	0.4		9.5	6.5			13.3
Delay (s)		146.2			96.3	37.7		43.2	49.8			52.9
Level of Service		F			F	D		D	D			D
Approach Delay (s)		146.2			73.6				48.8			
Approach LOS		F			E				D			

Intersection Summary			
HCM Average Control Delay	70.1	HCM Level of Service	E
HCM Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	34.0
Intersection Capacity Utilization	84.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBT	SBR
Lane Configurations		
Volume (vph)	861	96
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	4.0	
Lane Util. Factor	0.91	
Frt	0.98	
Flt Protected	1.00	
Satd. Flow (prot)	4208	
Flt Permitted	1.00	
Satd. Flow (perm)	4208	
Peak-hour factor, PHF	0.97	0.97
Adj. Flow (vph)	888	99
RTOR Reduction (vph)	0	0
Lane Group Flow (vph)	987	0
Heavy Vehicles (%)	3%	2%
Parking (#/hr)	15	
Turn Type	NA	
Protected Phases	1	
Permitted Phases		
Actuated Green, G (s)	31.7	
Effective Green, g (s)	31.7	
Actuated g/C Ratio	0.26	
Clearance Time (s)	4.0	
Vehicle Extension (s)	2.0	
Lane Grp Cap (vph)	1112	
v/s Ratio Prot	c0.23	
v/s Ratio Perm		
v/c Ratio	0.89	
Uniform Delay, d1	42.4	
Progression Factor	0.78	
Incremental Delay, d2	5.7	
Delay (s)	38.9	
Level of Service	D	
Approach Delay (s)	41.0	
Approach LOS	D	

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Volume (vph)	653	0	209	47	14	38	22	160	1219	0	10	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	12	16	12	12	11	11	12	12	12
Total Lost time (s)	4.0		4.0		4.0			4.0	4.0			
Lane Util. Factor	0.97		1.00		1.00			1.00	0.91			
Frpb, ped/bikes	1.00		1.00		0.99			1.00	1.00			
Flpb, ped/bikes	1.00		1.00		0.99			0.99	1.00			
Frt	1.00		0.85		0.95			1.00	1.00			
Flt Protected	0.95		1.00		0.98			0.95	1.00			
Satd. Flow (prot)	3001		1171		1734			1299	4298			
Flt Permitted	0.95		1.00		0.98			0.27	1.00			
Satd. Flow (perm)	3001		1171		1734			365	4298			
Peak-hour factor, PHF	0.88	0.88	0.88	0.83	0.83	0.83	0.89	0.89	0.89	0.89	0.96	0.96
Adj. Flow (vph)	742	0	238	57	17	46	25	180	1370	0	10	0
RTOR Reduction (vph)	0	0	206	0	16	0	0	0	0	0	0	0
Lane Group Flow (vph)	742	0	32	0	104	0	0	205	1370	0	0	0
Confl. Peds. (#/hr)	13		16	16		13		23				
Heavy Vehicles (%)	5%	0%	20%	2%	0%	0%	0%	22%	5%	0%	0%	0%
Parking (#/hr)				15		0						
Turn Type	Prot		Over	Perm	NA		custom	Prot	NA		Perm	
Protected Phases	3		1!		4			1	6			
Permitted Phases				4			1!				2	
Actuated Green, G (s)	30.0		15.0		22.0			15.0	56.0			
Effective Green, g (s)	30.0		15.0		22.0			15.0	56.0			
Actuated g/C Ratio	0.25		0.12		0.18			0.12	0.47			
Clearance Time (s)	4.0		4.0		4.0			4.0	4.0			
Vehicle Extension (s)	3.0		2.0		2.0			2.0	2.0			
Lane Grp Cap (vph)	750		146		318			46	2006			
v/s Ratio Prot	c0.25		0.03						0.32			
v/s Ratio Perm					0.06			c0.56				
v/c Ratio	0.99		0.22		0.33			4.46	0.68			
Uniform Delay, d1	44.8		47.2		42.6			52.5	25.1			
Progression Factor	0.83		3.42		1.00			1.21	0.90			
Incremental Delay, d2	29.3		0.3		2.7			1592.0	1.4			
Delay (s)	66.3		162.1		45.3			1655.3	23.9			
Level of Service	E		F		D			F	C			
Approach Delay (s)		89.6			45.3				236.3			
Approach LOS		F			D				F			

Intersection Summary			
HCM Average Control Delay	132.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.35		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	99.2%	ICU Level of Service	F
Analysis Period (min)	15		
! Phase conflict between lane groups.			
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
611: Tremont Street & Ruggles St/Whittier St

Movement	SWT	SWR
Lane Configurations		
Volume (vph)	817	426
Ideal Flow (vphpl)	1900	1900
Lane Width	11	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frpb, ped/bikes	1.00	0.95
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	3078	1283
Flt Permitted	0.93	1.00
Satd. Flow (perm)	2860	1283
Peak-hour factor, PHF	0.96	0.96
Adj. Flow (vph)	851	444
RTOR Reduction (vph)	0	0
Lane Group Flow (vph)	861	444
Confl. Peds. (#/hr)		23
Heavy Vehicles (%)	2%	4%
Parking (#/hr)		
Turn Type	NA	pm+ov
Protected Phases	2	3
Permitted Phases		2
Actuated Green, G (s)	37.0	67.0
Effective Green, g (s)	37.0	67.0
Actuated g/C Ratio	0.31	0.56
Clearance Time (s)	4.0	4.0
Vehicle Extension (s)	2.0	3.0
Lane Grp Cap (vph)	882	759
v/s Ratio Prot		0.15
v/s Ratio Perm	c0.30	0.20
v/c Ratio	0.98	0.58
Uniform Delay, d1	41.1	17.4
Progression Factor	0.91	0.81
Incremental Delay, d2	24.4	1.1
Delay (s)	61.8	15.2
Level of Service	E	B
Approach Delay (s)	45.9	
Approach LOS	D	

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	106	0	0	0	0	1622	175	0	1081	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	16	12	11	12	12	11	12
Total Lost time (s)			4.0					4.0			4.0	
Lane Util. Factor			1.00					0.91			0.91	
Frpb, ped/bikes			1.00					0.99			1.00	
Flpb, ped/bikes			1.00					1.00			1.00	
Frt			0.86					0.99			1.00	
Flt Protected			1.00					1.00			1.00	
Satd. Flow (prot)			1286					4137			4381	
Flt Permitted			1.00					1.00			1.00	
Satd. Flow (perm)			1286					4137			4381	
Peak-hour factor, PHF	0.94	0.94	0.94	0.92	0.92	0.92	0.97	0.97	0.97	0.89	0.89	0.89
Adj. Flow (vph)	0	0	113	0	0	0	0	1672	180	0	1215	0
RTOR Reduction (vph)	0	0	74	0	0	0	0	6	0	0	0	0
Lane Group Flow (vph)	0	0	39	0	0	0	0	1846	0	0	1215	0
Confl. Peds. (#/hr)									26			
Heavy Vehicles (%)	0%	0%	15%	0%	0%	0%	0%	6%	10%	0%	3%	0%
Turn Type			custom					NA			NA	
Protected Phases			5					1			1	
Permitted Phases												
Actuated Green, G (s)			16.2					95.8			95.8	
Effective Green, g (s)			16.2					95.8			95.8	
Actuated g/C Ratio			0.13					0.80			0.80	
Clearance Time (s)			4.0					4.0			4.0	
Vehicle Extension (s)			2.0					2.0			2.0	
Lane Grp Cap (vph)			174					3303			3497	
v/s Ratio Prot			c0.03					c0.45			0.28	
v/s Ratio Perm												
v/c Ratio			0.23					0.56			0.35	
Uniform Delay, d1			46.3					4.4			3.4	
Progression Factor			1.00					0.08			1.00	
Incremental Delay, d2			0.2					0.4			0.3	
Delay (s)			46.6					0.8			3.7	
Level of Service			D					A			A	
Approach Delay (s)		46.6			0.0			0.8			3.7	
Approach LOS		D			A			A			A	

Intersection Summary			
HCM Average Control Delay	3.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	42.7%	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												
Volume (vph)	8	182	307	690	99	36	187	587	968	40	495	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	13	12	13	13	12	12	11	16	12	14	12
Total Lost time (s)		4.0	4.0	4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor		1.00	1.00	0.97	1.00			0.95	1.00		0.95	
Frt		1.00	0.85	1.00	0.96			1.00	0.85		1.00	
Flt Protected		1.00	1.00	0.95	1.00			0.99	1.00		0.99	
Satd. Flow (prot)		1626	1398	3015	1501			2934	1554		3237	
Flt Permitted		1.00	1.00	0.95	1.00			0.58	1.00		0.59	
Satd. Flow (perm)		1626	1398	3015	1501			1712	1554		1921	
Peak-hour factor, PHF	0.38	0.84	0.83	0.96	0.86	0.81	0.82	0.83	0.88	0.54	0.93	0.55
Adj. Flow (vph)	21	217	370	719	115	44	228	707	1100	74	532	18
RTOR Reduction (vph)	0	0	190	0	0	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	238	180	719	159	0	0	935	1100	0	622	0
Heavy Vehicles (%)	0%	9%	4%	8%	12%	15%	5%	6%	6%	20%	3%	36%
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA	Free	Perm	NA	
Protected Phases	5	5		6	6		7	1 7			1	
Permitted Phases			5				1 7		Free	1		
Actuated Green, G (s)		17.6	17.6	25.4	25.4			41.0	100.0		30.0	
Effective Green, g (s)		17.6	17.6	25.4	25.4			41.0	100.0		30.0	
Actuated g/C Ratio		0.18	0.18	0.25	0.25			0.41	1.00		0.30	
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	
Lane Grp Cap (vph)		286	246	766	381			836	1554		576	
v/s Ratio Prot		0.15		c0.24	0.11			c0.12				
v/s Ratio Perm			0.13					c0.34	c0.71		0.32	
v/c Ratio		0.83	0.73	0.94	0.42			1.12	0.71		1.17dl	
Uniform Delay, d1		39.8	39.0	36.5	31.1			29.5	0.0		35.0	
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		17.6	9.2	18.7	0.3			69.0	2.7		60.8	
Delay (s)		57.3	48.2	55.3	31.4			98.5	2.7		95.8	
Level of Service		E	D	E	C			F	A		F	
Approach Delay (s)		51.8			50.9			46.7			95.8	
Approach LOS		D			D			D			F	

Intersection Summary			
HCM Average Control Delay	55.8	HCM Level of Service	E
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	87.2%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	150	139	103	1115	9	1020	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	11	12	11	12
Total Lost time (s)	4.0			4.0		4.0	
Lane Util. Factor	1.00			0.91		0.95	
Frt	0.93			1.00		0.99	
Flt Protected	0.97			1.00		1.00	
Satd. Flow (prot)	1475			4174		2665	
Flt Permitted	0.97			0.68		0.94	
Satd. Flow (perm)	1475			2835		2500	
Peak-hour factor, PHF	0.85	0.85	0.94	0.94	0.92	0.96	0.96
Adj. Flow (vph)	176	164	110	1186	10	1062	84
RTOR Reduction (vph)	30	0	0	0	0	4	0
Lane Group Flow (vph)	310	0	0	1296	0	1152	0
Heavy Vehicles (%)	13%	5%	4%	8%	2%	6%	11%
Parking (#/hr)						15	
Turn Type	NA		pm+pt	NA	Perm	NA	
Protected Phases	5		6	1 6		1	
Permitted Phases			1 6		1		
Actuated Green, G (s)	28.6			66.2		62.2	
Effective Green, g (s)	28.6			68.2		63.2	
Actuated g/C Ratio	0.24			0.57		0.53	
Clearance Time (s)	4.0					5.0	
Vehicle Extension (s)	2.0					2.0	
Lane Grp Cap (vph)	352			1667		1317	
v/s Ratio Prot	c0.21			c0.03			
v/s Ratio Perm				0.41		c0.46	
v/c Ratio	0.88			0.78		0.87	
Uniform Delay, d1	44.1			20.0		24.9	
Progression Factor	1.00			1.32		0.85	
Incremental Delay, d2	21.3			1.9		3.2	
Delay (s)	65.4			28.5		24.4	
Level of Service	E			C		C	
Approach Delay (s)	65.4			28.5		24.4	
Approach LOS	E			C		C	

Intersection Summary			
HCM Average Control Delay	31.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	24.2
Intersection Capacity Utilization	89.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	ø2
Lane Configurations										
Volume (vph)	178	347	73	369	279	157	767	165	861	
Lane Group Flow (vph)	0	734	0	480	303	184	991	172	987	
Turn Type	pm+pt	NA	Perm	NA	Perm	Prot	NA	Prot	NA	
Protected Phases	3	3 4		4		5	1	5	1	2
Permitted Phases	3 4		4		4					
Detector Phase	3	3 4	4	4	4	5	1	5	1	
Switch Phase										
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0	12.0	4.0	12.0	8.0
Minimum Split (s)	10.0		14.0	14.0	14.0	13.0	18.0	13.0	18.0	22.0
Total Split (s)	12.0		32.0	32.0	32.0	24.0	30.0	24.0	30.0	22.0
Total Split (%)	10.0%		26.7%	26.7%	26.7%	20.0%	25.0%	20.0%	25.0%	18%
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0	3.0	4.0	3.0	2.0
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0
Lost Time Adjust (s)				-1.0	-1.0	-1.0	0.0	-1.0	0.0	
Total Lost Time (s)				4.0	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead		Lag	Lag	Lag		Lead		Lead	Lag
Lead-Lag Optimize?										
Recall Mode	None		None	None	None	None	C-Max	None	C-Max	None
v/c Ratio		1.20		1.03	0.57	0.76	0.85	0.84	0.88	
Control Delay		137.8		96.2	8.9	50.0	51.0	58.5	41.1	
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		137.8		96.2	8.9	50.0	51.0	58.5	41.1	
Queue Length 50th (ft)		~295		~210	0	122	~313	112	~324	
Queue Length 95th (ft)		m#476		#319	79	m205	#378	m135	m#418	
Internal Link Dist (ft)		381		1186			1304		709	
Turn Bay Length (ft)						205		205		
Base Capacity (vph)		611		464	530	263	1167	224	1126	
Starvation Cap Reductn		0		0	0	0	0	0	0	
Spillback Cap Reductn		0		0	0	0	0	0	0	
Storage Cap Reductn		0		0	0	0	0	0	0	
Reduced v/c Ratio		1.20		1.03	0.57	0.70	0.85	0.77	0.88	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 119 (99%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 192: Columbus Avenue/Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

Lane Group	EBL	EBR	WBT	NEU	NEL	NET	SWU	SWT	SWR
Lane Configurations									
Volume (vph)	653	209	14	22	160	1219	10	817	426
Lane Group Flow (vph)	742	238	120	0	205	1370	0	861	444
Turn Type	Prot	Over	NA	custom	Prot	NA	Perm	NA	pm+ov
Protected Phases	3	1!	4		1	6		2	3
Permitted Phases				1!			2		2
Detector Phase	3	1	4	1	1	6	2	2	3
Switch Phase									
Minimum Initial (s)	8.0	4.0	8.0	4.0	4.0	8.0	8.0	8.0	8.0
Minimum Split (s)	13.0	12.0	26.0	12.0	12.0	24.0	24.0	24.0	13.0
Total Split (s)	34.0	19.0	26.0	19.0	19.0	60.0	41.0	41.0	34.0
Total Split (%)	28.3%	15.8%	21.7%	15.8%	15.8%	50.0%	34.2%	34.2%	28.3%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lead/Lag	Lead	Lead	Lag	Lead	Lead		Lag	Lag	Lead
Lead-Lag Optimize?									
Recall Mode	None	Min	Max	Min	Min	C-Max	C-Max	C-Max	None
v/c Ratio	0.99	0.68	0.36		4.46	0.68		0.98	0.62
Control Delay	67.8	33.3	39.4		1605.6	24.2		62.4	17.3
Queue Delay	3.1	0.6	0.0		0.0	0.0		29.7	0.2
Total Delay	70.9	33.8	39.4		1605.6	24.2		92.1	17.5
Queue Length 50th (ft)	301	54	69		~302	204		347	202
Queue Length 95th (ft)	#413	158	115		m#403	258		#487	309
Internal Link Dist (ft)			271			704		238	
Turn Bay Length (ft)					200				
Base Capacity (vph)	750	352	333		46	2006		882	716
Starvation Cap Reductn	10	14	0		0	0		81	16
Spillback Cap Reductn	0	0	0		0	0		0	30
Storage Cap Reductn	0	0	0		0	0		0	0
Reduced v/c Ratio	1.00	0.70	0.36		4.46	0.68		1.07	0.65

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 63 (53%), Referenced to phase 2:SWTU and 6:NET, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.
! Phase conflict between lane groups.

Splits and Phases: 611: Tremont Street & Ruggles St/Whittier St

Lane Group	EBR	NET	SWT
Lane Configurations			
Volume (vph)	106	1622	1081
Lane Group Flow (vph)	113	1852	1215
Turn Type	custom	NA	NA
Protected Phases	5	1	1
Permitted Phases			
Detector Phase	5	1	1
Switch Phase			
Minimum Initial (s)	6.0	10.0	10.0
Minimum Split (s)	27.0	27.0	27.0
Total Split (s)	40.0	80.0	80.0
Total Split (%)	33.3%	66.7%	66.7%
Yellow Time (s)	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0
Lead/Lag			
Lead-Lag Optimize?			
Recall Mode	None	C-Max	C-Max
v/c Ratio	0.46	0.56	0.35
Control Delay	20.1	0.9	4.4
Queue Delay	0.1	0.3	0.2
Total Delay	20.2	1.1	4.7
Queue Length 50th (ft)	18	9	106
Queue Length 95th (ft)	72	m11	126
Internal Link Dist (ft)		238	380
Turn Bay Length (ft)			
Base Capacity (vph)	445	3307	3497
Starvation Cap Reductn	0	667	1335
Spillback Cap Reductn	33	0	506
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.27	0.70	0.56

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 65 (54%), Referenced to phase 1:NESW, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

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

Splits and Phases: 3082: Tremont Street & Renaissance Park/Ruggles St

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Volume (vph)	182	307	690	99	187	587	968	40	495
Lane Group Flow (vph)	238	370	719	159	0	935	1100	0	624
Turn Type	NA	Perm	Split	NA	pm+pt	NA	Free	Perm	NA
Protected Phases	5		6	6	7	1 7			1
Permitted Phases		5			1 7		Free	1	
Detector Phase	5	5	6	6	7	1 7		1	1
Switch Phase									
Minimum Initial (s)	8.0	8.0	10.0	10.0	4.0			10.0	10.0
Minimum Split (s)	25.0	25.0	22.0	22.0	9.0			29.0	29.0
Total Split (s)	24.0	24.0	30.0	30.0	15.0			31.0	31.0
Total Split (%)	24.0%	24.0%	30.0%	30.0%	15.0%			31.0%	31.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0			3.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0			1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0					0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0					4.0
Lead/Lag	Lead	Lead	Lag	Lag					
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	Max			C-Max	C-Max
v/c Ratio	0.83	0.85	0.94	0.42		1.12	0.71		1.17dl
Control Delay	63.8	33.6	57.8	34.8		95.4	2.7		95.7
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Delay	63.8	33.6	57.8	34.8		95.4	2.7		95.7
Queue Length 50th (ft)	145	85	229	84		~323	0		~251
Queue Length 95th (ft)	#214	#167	#339	137		#425	0		#370
Internal Link Dist (ft)	51			68		380			136
Turn Bay Length (ft)			350						
Base Capacity (vph)	325	464	784	390		838	1554		579
Starvation Cap Reductn	0	0	0	0		0	0		0
Spillback Cap Reductn	0	0	0	0		0	0		0
Storage Cap Reductn	0	0	0	0		0	0		0
Reduced v/c Ratio	0.73	0.80	0.92	0.41		1.12	0.71		1.08

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 135
Control Type: Actuated-Coordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 3098: Tremont Street/Tremont St & Melnea Cass Boulevard

Lane Group	EBL	NBL	NBT	SBU	SBT	ø2
Lane Configurations						
Volume (vph)	150	103	1115	9	1020	
Lane Group Flow (vph)	340	0	1296	0	1156	
Turn Type	NA	pm+pt	NA	Perm	NA	
Protected Phases	5	6	1 6		1	2
Permitted Phases		1 6		1		
Detector Phase	5	6	1 6	1	1	
Switch Phase						
Minimum Initial (s)	8.0	4.0		8.0	8.0	8.0
Minimum Split (s)	14.0	8.0		25.0	25.0	19.0
Total Split (s)	38.0	8.0		55.0	55.0	19.0
Total Split (%)	31.7%	6.7%		45.8%	45.8%	16%
Yellow Time (s)	3.0	3.0		3.0	3.0	2.0
All-Red Time (s)	1.0	1.0		2.0	2.0	0.0
Lost Time Adjust (s)	0.0				-1.0	
Total Lost Time (s)	4.0				4.0	
Lead/Lag	Lead	Lag		Lead	Lead	Lag
Lead-Lag Optimize?						
Recall Mode	None	Max		C-Max	C-Max	None
v/c Ratio	0.89		0.78		0.86	
Control Delay	64.0		31.9		27.5	
Queue Delay	0.0		0.0		0.0	
Total Delay	64.0		31.9		27.5	
Queue Length 50th (ft)	226		317		~373	
Queue Length 95th (ft)	304		m#368		m#541	
Internal Link Dist (ft)	258		709		84	
Turn Bay Length (ft)						
Base Capacity (vph)	446		1651		1337	
Starvation Cap Reductn	0		0		0	
Spillback Cap Reductn	0		0		0	
Storage Cap Reductn	0		0		0	
Reduced v/c Ratio	0.76		0.78		0.86	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 55 (46%), Referenced to phase 1:NBSB, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

Splits and Phases: 4023: Tremont Street & Prentiss St

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	87	1249	24	0	1110
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	95	1358	26	0	1207
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			164			784
pX, platoon unblocked	0.84	0.82			0.82	
vC, conflicting volume	1974	466			1384	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	518	0			709	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	89			100	
cM capacity (veh/h)	411	891			728	

Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	95	543	543	298	603	603
Volume Left	0	0	0	0	0	0
Volume Right	95	0	0	26	0	0
cSH	891	1700	1700	1700	1700	1700
Volume to Capacity	0.11	0.32	0.32	0.18	0.35	0.35
Queue Length 95th (ft)	9	0	0	0	0	0
Control Delay (s)	9.5	0.0	0.0	0.0	0.0	0.0
Lane LOS	A					
Approach Delay (s)	9.5	0.0			0.0	
Approach LOS	A					

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	36.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (vph)	145	234	91	63	274	242	1	101	725	65	13	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0		4.0	4.0			4.0
Lane Util. Factor		0.95			0.95	1.00		1.00	0.91			1.00
Frt		0.97			1.00	0.85		1.00	0.99			1.00
Flt Protected		0.98			0.99	1.00		0.95	1.00			0.95
Satd. Flow (prot)		3046			3008	1358		1593	4520			1562
Flt Permitted		0.65			0.76	1.00		0.95	1.00			0.95
Satd. Flow (perm)		2007			2314	1358		1593	4520			1562
Peak-hour factor, PHF	0.90	0.90	0.90	0.95	0.95	0.95	0.94	0.94	0.94	0.94	0.91	0.91
Adj. Flow (vph)	161	260	101	66	288	255	1	107	771	69	14	158
RTOR Reduction (vph)	0	0	0	0	0	206	0	0	0	0	0	0
Lane Group Flow (vph)	0	522	0	0	354	49	0	108	840	0	0	172
Heavy Vehicles (%)	2%	2%	2%	7%	7%	7%	2%	2%	2%	2%	4%	4%
Parking (#/hr)												
Turn Type	pm+pt	NA		Perm	NA	Perm	Prot	Prot	NA		Prot	Prot
Protected Phases	3	3 4			4		5	5	1		5	5
Permitted Phases	3 4			4		4						
Actuated Green, G (s)		25.2			18.2	18.2		12.4	25.4			12.4
Effective Green, g (s)		27.2			19.2	19.2		13.4	25.4			13.4
Actuated g/C Ratio		0.27			0.19	0.19		0.13	0.25			0.13
Clearance Time (s)					5.0	5.0		5.0	4.0			5.0
Vehicle Extension (s)					3.0	3.0		2.0	2.0			2.0
Lane Grp Cap (vph)		629			444	261		213	1148			209
v/s Ratio Prot		c0.07						0.07	0.19			c0.11
v/s Ratio Perm		c0.16			0.15	0.04						
v/c Ratio		0.83			0.80	0.19		0.51	0.73			0.82
Uniform Delay, d1		34.2			38.5	33.9		40.2	34.2			42.1
Progression Factor		1.13			1.00	1.00		1.12	0.81			0.70
Incremental Delay, d2		7.3			9.6	0.3		0.7	3.9			17.7
Delay (s)		46.0			48.2	34.2		45.9	31.5			47.3
Level of Service		D			D	C		D	C			D
Approach Delay (s)		46.0			42.3				33.2			
Approach LOS		D			D				C			

Intersection Summary			
HCM Average Control Delay	38.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	34.0
Intersection Capacity Utilization	71.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBT	SBR
Lane Configurations		
Volume (vph)	545	174
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	4.0	
Lane Util. Factor	0.91	
Frt	0.96	
Flt Protected	1.00	
Satd. Flow (prot)	4110	
Flt Permitted	1.00	
Satd. Flow (perm)	4110	
Peak-hour factor, PHF	0.91	0.91
Adj. Flow (vph)	599	191
RTOR Reduction (vph)	0	0
Lane Group Flow (vph)	790	0
Heavy Vehicles (%)	4%	4%
Parking (#/hr)	10	
Turn Type	NA	
Protected Phases	1	
Permitted Phases		
Actuated Green, G (s)	25.4	
Effective Green, g (s)	25.4	
Actuated g/C Ratio	0.25	
Clearance Time (s)	4.0	
Vehicle Extension (s)	2.0	
Lane Grp Cap (vph)	1044	
v/s Ratio Prot	c0.19	
v/s Ratio Perm		
v/c Ratio	0.76	
Uniform Delay, d1	34.4	
Progression Factor	0.93	
Incremental Delay, d2	4.1	
Delay (s)	36.1	
Level of Service	D	
Approach Delay (s)	38.1	
Approach LOS	D	

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Volume (vph)	361	0	124	12	1	15	21	133	1041	0	14	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	12	16	12	12	11	11	12	12	12
Total Lost time (s)	4.0		4.0		4.0			4.0	4.0			
Lane Util. Factor	0.97		1.00		1.00			1.00	0.91			
Frpb, ped/bikes	1.00		1.00		0.99			1.00	1.00			
Flpb, ped/bikes	1.00		1.00		1.00			0.98	1.00			
Frt	1.00		0.85		0.93			1.00	1.00			
Flt Protected	0.95		1.00		0.98			0.95	1.00			
Satd. Flow (prot)	2789		1243		1671			1480	4339			
Flt Permitted	0.95		1.00		0.98			0.36	1.00			
Satd. Flow (perm)	2789		1243		1671			566	4339			
Peak-hour factor, PHF	0.96	0.96	0.96	0.64	0.64	0.64	0.99	0.99	0.99	0.99	0.90	0.90
Adj. Flow (vph)	376	0	129	19	2	23	21	134	1052	0	16	0
RTOR Reduction (vph)	0	0	115	0	18	0	0	0	0	0	0	0
Lane Group Flow (vph)	376	0	14	0	26	0	0	155	1052	0	0	0
Confl. Peds. (#/hr)	7		6	6		7		37				
Heavy Vehicles (%)	13%	13%	13%	4%	4%	4%	4%	4%	4%	4%	1%	1%
Parking (#/hr)				5								
Turn Type	Prot		Over	Perm	NA		custom	Prot	NA		Perm	
Protected Phases	3		1!		4			1	6			
Permitted Phases				4			1!				2	
Actuated Green, G (s)	17.0		11.0		22.0			11.0	49.0			
Effective Green, g (s)	17.0		11.0		22.0			11.0	49.0			
Actuated g/C Ratio	0.17		0.11		0.22			0.11	0.49			
Clearance Time (s)	4.0		4.0		4.0			4.0	4.0			
Vehicle Extension (s)	3.0		2.0		2.0			2.0	2.0			
Lane Grp Cap (vph)	474		137		368			62	2126			
v/s Ratio Prot	c0.13		0.01						0.24			
v/s Ratio Perm					0.02			c0.27				
v/c Ratio	0.79		0.10		0.07			2.50	0.49			
Uniform Delay, d1	39.8		40.1		30.9			44.5	17.2			
Progression Factor	0.70		3.11		1.00			1.29	0.46			
Incremental Delay, d2	8.7		0.1		0.4			717.1	0.8			
Delay (s)	36.7		124.8		31.3			774.3	8.7			
Level of Service	D		F		C			F	A			
Approach Delay (s)		59.2			31.3				107.1			
Approach LOS		E			C				F			

Intersection Summary			
HCM Average Control Delay	67.6	HCM Level of Service	E
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	87.8%	ICU Level of Service	E
Analysis Period (min)	15		

! Phase conflict between lane groups.

c Critical Lane Group

Movement	SWT	SWR
Lane Configurations		
Volume (vph)	786	381
Ideal Flow (vphpl)	1900	1900
Lane Width	11	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frpb, ped/bikes	1.00	0.92
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	3107	1284
Flt Permitted	0.92	1.00
Satd. Flow (perm)	2872	1284
Peak-hour factor, PHF	0.90	0.90
Adj. Flow (vph)	873	423
RTOR Reduction (vph)	0	0
Lane Group Flow (vph)	889	423
Confl. Peds. (#/hr)		37
Heavy Vehicles (%)	1%	1%
Parking (#/hr)		
Turn Type	NA	pm+ov
Protected Phases	2	3
Permitted Phases		2
Actuated Green, G (s)	34.0	51.0
Effective Green, g (s)	34.0	51.0
Actuated g/C Ratio	0.34	0.51
Clearance Time (s)	4.0	4.0
Vehicle Extension (s)	2.0	3.0
Lane Grp Cap (vph)	976	706
v/s Ratio Prot		0.10
v/s Ratio Perm	c0.31	0.23
v/c Ratio	0.91	0.60
Uniform Delay, d1	31.6	17.3
Progression Factor	0.97	0.95
Incremental Delay, d2	13.7	1.3
Delay (s)	44.3	17.7
Level of Service	D	B
Approach Delay (s)	35.7	
Approach LOS	D	

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	42	0	0	0	0	1343	92	0	1134	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	16	12	11	12	12	11	12
Total Lost time (s)			4.0					4.0			4.0	
Lane Util. Factor			1.00					0.91			0.91	
Frpb, ped/bikes			1.00					1.00			1.00	
Flpb, ped/bikes			1.00					1.00			1.00	
Frt			0.86					0.99			1.00	
Flt Protected			1.00					1.00			1.00	
Satd. Flow (prot)			1450					4371			4468	
Flt Permitted			1.00					1.00			1.00	
Satd. Flow (perm)			1450					4371			4468	
Peak-hour factor, PHF	0.88	0.88	0.88	0.92	0.92	0.92	0.98	0.98	0.98	0.91	0.91	0.91
Adj. Flow (vph)	0	0	48	0	0	0	0	1370	94	0	1246	0
RTOR Reduction (vph)	0	0	46	0	0	0	0	2	0	0	0	0
Lane Group Flow (vph)	0	0	2	0	0	0	0	1462	0	0	1246	0
Confl. Peds. (#/hr)									7			
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	2%	2%	2%	1%	1%	1%
Turn Type			custom					NA			NA	
Protected Phases			5					1			1	
Permitted Phases												
Actuated Green, G (s)			3.8					88.2			88.2	
Effective Green, g (s)			3.8					88.2			88.2	
Actuated g/C Ratio			0.04					0.88			0.88	
Clearance Time (s)			4.0					4.0			4.0	
Vehicle Extension (s)			2.0					2.0			2.0	
Lane Grp Cap (vph)			55					3855			3941	
v/s Ratio Prot			c0.00					c0.33			0.28	
v/s Ratio Perm												
v/c Ratio			0.03					0.38			0.32	
Uniform Delay, d1			46.3					1.0			1.0	
Progression Factor			1.00					0.07			1.00	
Incremental Delay, d2			0.1					0.2			0.2	
Delay (s)			46.4					0.3			1.2	
Level of Service			D					A			A	
Approach Delay (s)		46.4			0.0			0.3			1.2	
Approach LOS		D			A			A			A	

Intersection Summary			
HCM Average Control Delay	1.5	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	36.0%	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												
Volume (vph)	5	50	159	659	75	40	127	398	819	33	323	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	13	12	13	13	12	12	11	16	12	14	12
Total Lost time (s)		4.0	4.0	4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor		1.00	1.00	0.97	1.00			0.95	1.00		0.95	
Frpb, ped/bikes		1.00	1.00	1.00	1.00			1.00	0.98		1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt		1.00	0.85	1.00	0.95			1.00	0.85		0.99	
Flt Protected		1.00	1.00	0.95	1.00			0.99	1.00		1.00	
Satd. Flow (prot)		1742	1439	3193	1643			3042	1586		3330	
Flt Permitted		1.00	1.00	0.95	1.00			0.73	1.00		0.88	
Satd. Flow (perm)		1742	1439	3193	1643			2260	1586		2928	
Peak-hour factor, PHF	0.97	0.97	0.97	0.92	0.92	0.92	0.97	0.97	0.97	0.92	0.92	0.92
Adj. Flow (vph)	5	52	164	716	82	43	131	410	844	36	351	16
RTOR Reduction (vph)	0	0	145	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	57	19	716	125	0	0	541	844	0	400	0
Confl. Peds. (#/hr)									20			
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	2%	2%	2%	3%	3%	3%
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA	Free	Perm	NA	
Protected Phases	5	5		6	6		7	1 7			1	
Permitted Phases			5				1 7		Free	1		
Actuated Green, G (s)		10.5	10.5	21.6	21.6			41.9	90.0		35.9	
Effective Green, g (s)		10.5	10.5	21.6	21.6			41.9	90.0		35.9	
Actuated g/C Ratio		0.12	0.12	0.24	0.24			0.47	1.00		0.40	
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	
Lane Grp Cap (vph)		203	168	766	394			1104	1586		1168	
v/s Ratio Prot		0.03		c0.22	0.08			0.03				
v/s Ratio Perm			0.01					0.20	c0.53		0.14	
v/c Ratio		0.28	0.11	0.93	0.32			0.49	0.53		0.34	
Uniform Delay, d1		36.3	35.6	33.5	28.1			16.7	0.0		18.8	
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		0.3	0.1	18.2	0.2			1.6	1.3		0.8	
Delay (s)		36.6	35.7	51.7	28.3			18.2	1.3		19.6	
Level of Service		D	D	D	C			B	A		B	
Approach Delay (s)		35.9			48.2			7.9			19.6	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM Average Control Delay	23.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	67.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	56	18	72	1077	13	865	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	11	12	11	12
Total Lost time (s)	4.0			4.0		4.0	
Lane Util. Factor	1.00			0.91		0.95	
Frt	0.97			1.00		0.99	
Flt Protected	0.96			1.00		1.00	
Satd. Flow (prot)	1631			4326		2771	
Flt Permitted	0.96			0.80		0.93	
Satd. Flow (perm)	1631			3467		2579	
Peak-hour factor, PHF	0.84	0.84	0.97	0.97	0.92	0.90	0.90
Adj. Flow (vph)	67	21	74	1110	14	961	53
RTOR Reduction (vph)	12	0	0	0	0	3	0
Lane Group Flow (vph)	76	0	0	1184	0	1025	0
Heavy Vehicles (%)	1%	1%	4%	4%	2%	4%	4%
Parking (#/hr)						10	
Turn Type	NA		pm+pt	NA	Perm	NA	
Protected Phases	5		6	1 6		1	
Permitted Phases			1 6		1		
Actuated Green, G (s)	8.0			66.8		62.8	
Effective Green, g (s)	8.0			68.8		63.8	
Actuated g/C Ratio	0.08			0.69		0.64	
Clearance Time (s)	4.0					5.0	
Vehicle Extension (s)	2.0					2.0	
Lane Grp Cap (vph)	130			2428		1645	
v/s Ratio Prot	c0.05			c0.02			
v/s Ratio Perm				0.31		c0.40	
v/c Ratio	0.58			0.49		0.62	
Uniform Delay, d1	44.4			7.3		10.9	
Progression Factor	1.00			0.98		1.39	
Incremental Delay, d2	4.3			0.5		0.9	
Delay (s)	48.7			7.6		16.0	
Level of Service	D			A		B	
Approach Delay (s)	48.7			7.6		16.0	
Approach LOS	D			A		B	

Intersection Summary			
HCM Average Control Delay	12.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	24.2
Intersection Capacity Utilization	70.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	ø2
Lane Configurations										
Volume (vph)	145	234	63	274	242	101	725	144	545	
Lane Group Flow (vph)	0	522	0	354	255	108	840	172	790	
Turn Type	pm+pt	NA	Perm	NA	Perm	Prot	NA	Prot	NA	
Protected Phases	3	3 4		4		5	1	5	1	2
Permitted Phases	3 4		4		4					
Detector Phase	3	3 4	4	4	4	5	1	5	1	
Switch Phase										
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0	12.0	4.0	12.0	8.0
Minimum Split (s)	10.0		14.0	14.0	14.0	13.0	18.0	13.0	18.0	22.0
Total Split (s)	12.0		24.0	24.0	24.0	18.0	24.0	18.0	24.0	22.0
Total Split (%)	12.0%		24.0%	24.0%	24.0%	18.0%	24.0%	18.0%	24.0%	22%
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0	3.0	4.0	3.0	2.0
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0
Lost Time Adjust (s)				-1.0	-1.0	-1.0	0.0	-1.0	0.0	
Total Lost Time (s)				4.0	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead		Lag	Lag	Lag		Lead		Lead	Lag
Lead-Lag Optimize?										
Recall Mode	None		None	None	None	None	C-Max	None	C-Max	None
v/c Ratio		0.83		0.80	0.54	0.51	0.72	0.82	0.75	
Control Delay		45.9		52.6	9.3	53.5	33.9	55.8	38.7	
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		45.9		52.6	9.3	53.5	33.9	55.8	38.7	
Queue Length 50th (ft)		141		113	0	72	146	92	198	
Queue Length 95th (ft)		#191		#178	68	129	#263	#217	#277	
Internal Link Dist (ft)		381		1188			1304		709	
Turn Bay Length (ft)						205		205		
Base Capacity (vph)		645		463	476	223	1165	219	1060	
Starvation Cap Reductn		0		0	0	0	0	0	0	
Spillback Cap Reductn		0		0	0	0	0	0	0	
Storage Cap Reductn		0		0	0	0	0	0	0	
Reduced v/c Ratio		0.81		0.76	0.54	0.48	0.72	0.79	0.75	

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 34 (34%), Referenced to phase 1:NBSB, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

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

Splits and Phases: 192: Columbus Avenue/Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

Lane Group	EBL	EBR	WBT	NEU	NEL	NET	SWU	SWT	SWR
Lane Configurations									
Volume (vph)	361	124	1	21	133	1041	14	786	381
Lane Group Flow (vph)	376	129	44	0	155	1052	0	889	423
Turn Type	Prot	Over	NA	custom	Prot	NA	Perm	NA	pm+ov
Protected Phases	3	1!	4		1	6		2	3
Permitted Phases				1!			2		2
Detector Phase	3	1	4	1	1	6	2	2	3
Switch Phase									
Minimum Initial (s)	8.0	4.0	8.0	4.0	4.0	8.0	8.0	8.0	8.0
Minimum Split (s)	13.0	12.0	26.0	12.0	12.0	24.0	24.0	24.0	13.0
Total Split (s)	22.0	15.0	26.0	15.0	15.0	52.0	37.0	37.0	22.0
Total Split (%)	22.0%	15.0%	26.0%	15.0%	15.0%	52.0%	37.0%	37.0%	22.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lead/Lag	Lead	Lead	Lag	Lead	Lead		Lag	Lag	Lead
Lead-Lag Optimize?									
Recall Mode	None	Min	Max	Min	Min	C-Max	C-Max	C-Max	None
v/c Ratio	0.79	0.51	0.11		2.50	0.50		0.91	0.65
Control Delay	40.8	32.2	19.3		740.6	8.9		45.5	20.3
Queue Delay	0.0	0.0	0.0		0.0	0.0		11.8	0.1
Total Delay	40.8	32.2	19.3		740.6	8.9		57.3	20.5
Queue Length 50th (ft)	120	17	11		~166	50		286	165
Queue Length 95th (ft)	#170	92	24		#303	89		#416	260
Internal Link Dist (ft)			271			682		238	
Turn Bay Length (ft)					200				
Base Capacity (vph)	502	252	385		62	2125		976	669
Starvation Cap Reductn	0	0	0		0	0		88	15
Spillback Cap Reductn	0	0	0		0	0		0	0
Storage Cap Reductn	0	0	0		0	0		0	0
Reduced v/c Ratio	0.75	0.51	0.11		2.50	0.50		1.00	0.65

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 73 (73%), Referenced to phase 2:SWTU and 6:NET, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
! Phase conflict between lane groups.

Splits and Phases: 611: Tremont Street & Ruggles St/Whittier St

Lane Group	EBR	NET	SWT
Lane Configurations			
Volume (vph)	42	1343	1134
Lane Group Flow (vph)	48	1464	1246
Turn Type	custom	NA	NA
Protected Phases	5	1	1
Permitted Phases			
Detector Phase	5	1	1
Switch Phase			
Minimum Initial (s)	6.0	10.0	10.0
Minimum Split (s)	27.0	27.0	27.0
Total Split (s)	37.0	63.0	63.0
Total Split (%)	37.0%	63.0%	63.0%
Yellow Time (s)	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0
Lead/Lag			
Lead-Lag Optimize?			
Recall Mode	None	C-Max	C-Max
v/c Ratio	0.32	0.37	0.31
Control Delay	12.9	0.3	1.2
Queue Delay	0.0	0.0	0.1
Total Delay	12.9	0.3	1.3
Queue Length 50th (ft)	0	2	35
Queue Length 95th (ft)	23	m4	48
Internal Link Dist (ft)		238	380
Turn Bay Length (ft)			
Base Capacity (vph)	522	3995	4084
Starvation Cap Reductn	0	499	1547
Spillback Cap Reductn	56	0	641
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.10	0.42	0.49

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 76 (76%), Referenced to phase 1:NESW, Start of Green

Natural Cycle: 55

Control Type: Actuated-Coordinated

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

Splits and Phases: 3082: Tremont Street & Renaissance Park/Ruggles St

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Volume (vph)	50	159	659	75	127	398	819	33	323
Lane Group Flow (vph)	57	164	716	125	0	541	844	0	403
Turn Type	NA	Perm	Split	NA	pm+pt	NA	Free	Perm	NA
Protected Phases	5		6	6	7	1 7			1
Permitted Phases		5			1 7		Free	1	
Detector Phase	5	5	6	6	1 7	1 7		1	1
Switch Phase									
Minimum Initial (s)	8.0	8.0	10.0	10.0	4.0			10.0	10.0
Minimum Split (s)	25.0	25.0	22.0	22.0	9.0			29.0	29.0
Total Split (s)	25.0	25.0	26.0	26.0	10.0			29.0	29.0
Total Split (%)	27.8%	27.8%	28.9%	28.9%	11.1%			32.2%	32.2%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0			3.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0			1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0					0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0					4.0
Lead/Lag	Lead	Lead	Lag	Lag					
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	Max			C-Max	C-Max
v/c Ratio	0.28	0.52	0.93	0.32		0.49	0.53		0.34
Control Delay	38.1	11.9	54.5	30.6		17.5	1.3		20.8
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Delay	38.1	11.9	54.5	30.6		17.5	1.3		20.8
Queue Length 50th (ft)	31	0	205	58		86	0		77
Queue Length 95th (ft)	58	49	#310	108		161	0		142
Internal Link Dist (ft)	60			36		380			183
Turn Bay Length (ft)			350						
Base Capacity (vph)	407	462	781	401		1104	1586		1170
Starvation Cap Reductn	0	0	0	0		0	0		0
Spillback Cap Reductn	0	0	0	0		0	0		0
Storage Cap Reductn	0	0	0	0		0	0		0
Reduced v/c Ratio	0.14	0.35	0.92	0.31		0.49	0.53		0.34

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3098: Tremont Street/Tremont St & Melnea Cass Boulevard

Lane Group	EBL	NBL	NBT	SBU	SBT	ø2
Lane Configurations						
Volume (vph)	56	72	1077	13	865	
Lane Group Flow (vph)	88	0	1184	0	1028	
Turn Type	NA	pm+pt	NA	Perm	NA	
Protected Phases	5	6	1 6		1	2
Permitted Phases		1 6		1		
Detector Phase	5	6	1 6	1	1	
Switch Phase						
Minimum Initial (s)	8.0	4.0		8.0	8.0	8.0
Minimum Split (s)	14.0	8.0		25.0	25.0	19.0
Total Split (s)	16.0	8.0		57.0	57.0	19.0
Total Split (%)	16.0%	8.0%		57.0%	57.0%	19%
Yellow Time (s)	3.0	3.0		3.0	3.0	2.0
All-Red Time (s)	1.0	1.0		2.0	2.0	0.0
Lost Time Adjust (s)	0.0				-1.0	
Total Lost Time (s)	4.0				4.0	
Lead/Lag	Lead	Lag		Lead	Lead	Lag
Lead-Lag Optimize?						
Recall Mode	None	Max		C-Max	C-Max	None
v/c Ratio	0.52		0.48		0.61	
Control Delay	47.8		9.3		19.6	
Queue Delay	0.0		0.0		0.0	
Total Delay	47.8		9.3		19.6	
Queue Length 50th (ft)	46		46		204	
Queue Length 95th (ft)	87		269		m227	
Internal Link Dist (ft)	258		709		105	
Turn Bay Length (ft)						
Base Capacity (vph)	207		2442		1690	
Starvation Cap Reductn	0		0		0	
Spillback Cap Reductn	0		0		0	
Storage Cap Reductn	0		0		0	
Reduced v/c Ratio	0.43		0.48		0.61	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 57 (57%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4023: Tremont Street & Prentiss St

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	110	1086	60	0	926
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	120	1180	65	0	1007
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			185			762
pX, platoon unblocked	0.82	0.90			0.90	
vC, conflicting volume	1716	426			1246	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	699	0			881	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	88			100	
cM capacity (veh/h)	307	975			686	

Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	120	472	472	301	503	503
Volume Left	0	0	0	0	0	0
Volume Right	120	0	0	65	0	0
cSH	975	1700	1700	1700	1700	1700
Volume to Capacity	0.12	0.28	0.28	0.18	0.30	0.30
Queue Length 95th (ft)	10	0	0	0	0	0
Control Delay (s)	9.2	0.0	0.0	0.0	0.0	0.0
Lane LOS	A					
Approach Delay (s)	9.2	0.0			0.0	
Approach LOS	A					

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	35.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Volume (vph)	217	315	182	64	411	427	174	1477	82	4	146	644
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor		0.95			0.95	1.00	1.00	0.91			1.00	0.91
Frt		0.96			1.00	0.85	1.00	0.99			1.00	0.97
Flt Protected		0.99			0.99	1.00	0.95	1.00			0.95	1.00
Satd. Flow (prot)		2899			2953	1232	1577	4451			1169	3910
Flt Permitted		0.55			0.58	1.00	0.95	1.00			0.95	1.00
Satd. Flow (perm)		1623			1736	1232	1577	4451			1169	3910
Peak-hour factor, PHF	0.86	0.86	0.86	0.96	0.96	0.96	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	252	366	212	67	428	445	185	1571	87	4	155	685
RTOR Reduction (vph)	0	0	0	0	0	364	0	0	0	0	0	0
Lane Group Flow (vph)	0	830	0	0	495	81	185	1658	0	0	159	876
Heavy Vehicles (%)	8%	5%	6%	11%	9%	18%	3%	4%	5%	0%	40%	8%
Parking (#/hr)												20
Turn Type	pm+pt	NA		Perm	NA	Prot	Prot	NA		Prot	Prot	NA
Protected Phases	3	3 4			4	4	5	1		5	5	1
Permitted Phases	3 4			4								
Actuated Green, G (s)		30.0			21.0	21.0	11.0	39.0			11.0	39.0
Effective Green, g (s)		32.0			21.0	21.0	12.0	39.0			12.0	39.0
Actuated g/C Ratio		0.27			0.18	0.18	0.10	0.32			0.10	0.32
Clearance Time (s)					4.0	4.0	5.0	4.0			5.0	4.0
Vehicle Extension (s)					2.0	2.0	2.0	2.0			2.0	2.0
Lane Grp Cap (vph)		539			304	216	158	1447			117	1271
v/s Ratio Prot		c0.13				0.07	0.12	c0.37			c0.14	0.22
v/s Ratio Perm		0.28			c0.29							
v/c Ratio		1.54			1.63	0.38	1.17	1.15			1.36	0.69
Uniform Delay, d1		44.0			49.5	43.7	54.0	40.5			54.0	35.2
Progression Factor		0.99			1.00	1.00	1.05	0.71			1.09	1.24
Incremental Delay, d2		250.7			297.3	0.4	115.7	72.3			166.6	0.3
Delay (s)		294.2			346.8	44.1	172.4	101.1			225.4	43.8
Level of Service		F			F	D	F	F			F	D
Approach Delay (s)		294.2			203.5			108.3				71.7
Approach LOS		F			F			F				E

Intersection Summary			
HCM Average Control Delay	152.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.35		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	38.0
Intersection Capacity Utilization	108.8%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBR
Lane Configurations	
Volume (vph)	180
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.94
Adj. Flow (vph)	191
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Heavy Vehicles (%)	7%
Parking (#/hr)	
Turn Type Protected	
Phases Permitted	
Phases Actuated	
Green, G (s) Effective	
Green, g (s) Actuated	
g/C Ratio Clearance	
Time (s) Vehicle	
Extension (s) Lane	
Grp Cap (vph) v/s	
Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Volume (vph)	622	0	188	29	15	22	18	298	1581	0	17	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	12	16	12	12	11	11	12	12	12
Total Lost time (s)	4.0		4.0		4.0			4.0	4.0			
Lane Util. Factor	0.97		1.00		1.00			1.00	0.91			
Frpb, ped/bikes	1.00		1.00		0.99			1.00	1.00			
Flpb, ped/bikes	1.00		1.00		0.99			1.00	1.00			
Frt	1.00		0.85		0.95			1.00	1.00			
Flt Protected	0.95		1.00		0.98			0.95	1.00			
Satd. Flow (prot)	2865		989		1610			1281	4257			
Flt Permitted	0.95		1.00		0.98			0.18	1.00			
Satd. Flow (perm)	2865		989		1610			245	4257			
Peak-hour factor, PHF	0.88	0.88	0.88	0.70	0.70	0.70	0.92	0.92	0.92	0.92	0.96	0.96
Adj. Flow (vph)	707	0	214	41	21	31	20	324	1718	0	18	0
RTOR Reduction (vph)	0	0	175	0	8	0	0	0	0	0	0	0
Lane Group Flow (vph)	707	0	39	0	85	0	0	344	1718	0	0	0
Confl. Peds. (#/hr)	8		9	9		8		20				
Heavy Vehicles (%)	10%	0%	42%	14%	0%	14%	0%	24%	6%	67%	0%	0%
Parking (#/hr)				15		0						
Turn Type	Prot		Over	Perm	NA		custom	Prot	NA		Perm	
Protected Phases	3		1!		4			1	6			
Permitted Phases				4			1!				2	
Actuated Green, G (s)	26.0		22.0		22.0			22.0	60.0			
Effective Green, g (s)	26.0		22.0		22.0			22.0	60.0			
Actuated g/C Ratio	0.22		0.18		0.18			0.18	0.50			
Clearance Time (s)	4.0		4.0		4.0			4.0	4.0			
Vehicle Extension (s)	2.0		2.0		2.0			2.0	2.0			
Lane Grp Cap (vph)	621		181		295			45	2129			
v/s Ratio Prot	0.25		0.04						0.40			
v/s Ratio Perm					0.05			c1.40				
v/c Ratio	1.14		0.22		0.29			7.64	0.81			
Uniform Delay, d1	47.0		41.7		42.2			49.0	25.1			
Progression Factor	1.05		1.80		1.00			0.83	1.19			
Incremental Delay, d2	80.3		0.2		2.4			2994.1	0.3			
Delay (s)	129.4		75.1		44.7			3034.6	30.3			
Level of Service	F		E		D			F	C			
Approach Delay (s)		116.8			44.7				531.5			
Approach LOS		F			D				F			

Intersection Summary			
HCM Average Control Delay	305.8	HCM Level of Service	F
HCM Volume to Capacity ratio	2.35		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	119.8%	ICU Level of Service	H
Analysis Period (min)	15		
! Phase conflict between lane groups.			
c Critical Lane Group			

Movement	SWT	SWR
Lane Configurations		
Volume (vph)	835	808
Ideal Flow (vphpl)	1900	1900
Lane Width	11	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frpb, ped/bikes	1.00	0.95
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	2936	1276
Flt Permitted	0.87	1.00
Satd. Flow (perm)	2562	1276
Peak-hour factor, PHF	0.96	0.96
Adj. Flow (vph)	870	842
RTOR Reduction (vph)	0	0
Lane Group Flow (vph)	888	842
Confl. Peds. (#/hr)		20
Heavy Vehicles (%)	7%	5%
Parking (#/hr)		
Turn Type	NA	pm+ov
Protected Phases	2	3
Permitted Phases		2
Actuated Green, G (s)	34.0	60.0
Effective Green, g (s)	34.0	60.0
Actuated g/C Ratio	0.28	0.50
Clearance Time (s)	4.0	4.0
Vehicle Extension (s)	2.0	2.0
Lane Grp Cap (vph)	726	681
v/s Ratio Prot		c0.27
v/s Ratio Perm	0.35	0.39
v/c Ratio	1.22	1.24
Uniform Delay, d1	43.0	30.0
Progression Factor	0.90	1.19
Incremental Delay, d2	111.3	117.5
Delay (s)	150.0	153.3
Level of Service	F	F
Approach Delay (s)	151.6	
Approach LOS	F	

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	24	0	0	0	0	2057	127	0	1662	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	16	12	11	12	12	11	12
Total Lost time (s)			4.0					4.0			4.0	
Lane Util. Factor			1.00					0.91			0.91	
Frpb, ped/bikes			1.00					1.00			1.00	
Flpb, ped/bikes			1.00					1.00			1.00	
Frt			0.86					0.99			1.00	
Flt Protected			1.00					1.00			1.00	
Satd. Flow (prot)			1174					4142			4257	
Flt Permitted			1.00					1.00			1.00	
Satd. Flow (perm)			1174					4142			4257	
Peak-hour factor, PHF	0.72	0.72	0.72	0.92	0.92	0.92	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	0	33	0	0	0	0	2121	131	0	1713	0
RTOR Reduction (vph)	0	0	27	0	0	0	0	3	0	0	0	0
Lane Group Flow (vph)	0	0	6	0	0	0	0	2249	0	0	1713	0
Confl. Peds. (#/hr)									12			
Heavy Vehicles (%)	0%	0%	26%	0%	0%	0%	0%	7%	18%	0%	6%	0%
Turn Type			custom					NA			NA	
Protected Phases			5					1			1	
Permitted Phases												
Actuated Green, G (s)			15.0					97.0			97.0	
Effective Green, g (s)			15.0					97.0			97.0	
Actuated g/C Ratio			0.12					0.81			0.81	
Clearance Time (s)			4.0					4.0			4.0	
Vehicle Extension (s)			2.0					2.0			2.0	
Lane Grp Cap (vph)			147					3348			3441	
v/s Ratio Prot			c0.01					c0.54			0.40	
v/s Ratio Perm												
v/c Ratio			0.04					0.67			0.50	
Uniform Delay, d1			46.2					4.8			3.7	
Progression Factor			1.00					0.85			1.00	
Incremental Delay, d2			0.0					0.5			0.5	
Delay (s)			46.2					4.6			4.2	
Level of Service			D					A			A	
Approach Delay (s)		46.2			0.0			4.6			4.2	
Approach LOS		D			A			A			A	

Intersection Summary			
HCM Average Control Delay	4.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	50.7%	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												
Volume (vph)	6	48	174	1216	194	27	374	696	1194	15	398	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	13	12	13	13	12	12	11	16	12	14	12
Total Lost time (s)		4.0	4.0	4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor		1.00	1.00	0.97	1.00			0.95	1.00		0.95	
Frpb, ped/bikes		1.00	1.00	1.00	1.00			1.00	0.99		1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt		1.00	0.85	1.00	0.98			1.00	0.85		0.99	
Flt Protected		0.99	1.00	0.95	1.00			0.98	1.00		1.00	
Satd. Flow (prot)		1633	1398	3015	1542			2921	1532		3258	
Flt Permitted		0.99	1.00	0.95	1.00			0.61	1.00		0.67	
Satd. Flow (perm)		1633	1398	3015	1542			1827	1532		2184	
Peak-hour factor, PHF	0.38	0.84	0.83	0.96	0.86	0.81	0.82	0.83	0.88	0.54	0.93	0.55
Adj. Flow (vph)	16	57	210	1267	226	33	456	839	1357	28	428	20
RTOR Reduction (vph)	0	0	188	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	73	22	1267	259	0	0	1295	1357	0	473	0
Confl. Peds. (#/hr)									8			
Heavy Vehicles (%)	0%	9%	4%	8%	12%	15%	5%	6%	6%	20%	3%	36%
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA	Free	Perm	NA	
Protected Phases	5	5		6	6		7	1 7			1	
Permitted Phases			5				1 7		Free	1		
Actuated Green, G (s)		10.5	10.5	25.0	25.0			48.5	100.0		31.5	
Effective Green, g (s)		10.5	10.5	25.0	25.0			48.5	100.0		31.5	
Actuated g/C Ratio		0.10	0.10	0.25	0.25			0.48	1.00		0.32	
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	
Lane Grp Cap (vph)		171	147	754	386			1072	1532		688	
v/s Ratio Prot		0.04		c0.42	0.17			c0.21				
v/s Ratio Perm			0.02					c0.38	c0.89		0.22	
v/c Ratio		0.43	0.15	1.68	0.67			1.21	0.89		0.69	
Uniform Delay, d1		41.9	40.7	37.5	33.8			25.8	0.0		30.0	
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		0.6	0.2	312.0	3.6			102.5	7.9		5.5	
Delay (s)		42.6	40.9	349.5	37.4			128.3	7.9		35.5	
Level of Service		D	D	F	D			F	A		D	
Approach Delay (s)		41.3			296.5			66.7			35.5	
Approach LOS		D			F			E			D	

Intersection Summary			
HCM Average Control Delay	133.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.29		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	101.8%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	125	29	266	1856	58	895	146
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	11	12	11	12
Total Lost time (s)	4.0			4.0		4.0	
Lane Util. Factor	1.00			0.91		0.95	
Frt	0.97			1.00		0.98	
Flt Protected	0.96			0.99		1.00	
Satd. Flow (prot)	1501			4211		2467	
Flt Permitted	0.96			0.64		0.58	
Satd. Flow (perm)	1501			2724		1426	
Peak-hour factor, PHF	0.77	0.77	0.89	0.89	0.92	0.97	0.97
Adj. Flow (vph)	162	38	299	2085	63	923	151
RTOR Reduction (vph)	8	0	0	0	0	8	0
Lane Group Flow (vph)	192	0	0	2384	0	1129	0
Heavy Vehicles (%)	11%	7%	3%	7%	2%	13%	10%
Parking (#/hr)						20	
Turn Type	NA		pm+pt	NA	Perm	NA	
Protected Phases	5		6	1 6		1	
Permitted Phases			1 6		1		
Actuated Green, G (s)	19.6			78.6		62.6	
Effective Green, g (s)	19.6			80.6		63.6	
Actuated g/C Ratio	0.16			0.67		0.53	
Clearance Time (s)	4.0					5.0	
Vehicle Extension (s)	2.0					2.0	
Lane Grp Cap (vph)	245			2040		756	
v/s Ratio Prot	c0.13			c0.17			
v/s Ratio Perm				0.62		c0.79	
v/c Ratio	0.79			1.17		1.49	
Uniform Delay, d1	48.2			19.7		28.2	
Progression Factor	1.00			1.67		1.37	
Incremental Delay, d2	14.1			76.4		223.0	
Delay (s)	62.3			109.2		261.6	
Level of Service	E			F		F	
Approach Delay (s)	62.3			109.2		261.6	
Approach LOS	E			F		F	

Intersection Summary			
HCM Average Control Delay	153.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.31		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.8
Intersection Capacity Utilization	100.0%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	ø2
Lane Configurations										
Volume (vph)	217	315	64	411	427	174	1477	146	644	
Lane Group Flow (vph)	0	830	0	495	445	185	1658	159	876	
Turn Type	pm+pt	NA	Perm	NA	Prot	Prot	NA	Prot	NA	
Protected Phases	3	3 4		4	4	5	1	5	1	2
Permitted Phases	3 4		4							
Detector Phase	3	3 4	4	4	4	5	1	5	1	
Switch Phase										
Minimum Initial (s)	4.0		8.0	8.0	8.0	4.0	12.0	4.0	12.0	8.0
Minimum Split (s)	10.0		14.0	14.0	14.0	13.0	18.0	13.0	18.0	22.0
Total Split (s)	14.0		25.0	25.0	25.0	16.0	43.0	16.0	43.0	22.0
Total Split (%)	11.7%		20.8%	20.8%	20.8%	13.3%	35.8%	13.3%	35.8%	18%
Yellow Time (s)	4.0		3.0	3.0	3.0	4.0	3.0	4.0	3.0	2.0
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0
Lost Time Adjust (s)				0.0	0.0	-1.0	0.0	-1.0	0.0	
Total Lost Time (s)				4.0	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead		Lag	Lag	Lag		Lead		Lead	Lag
Lead-Lag Optimize?										
Recall Mode	None		None	None	None	None	C-Max	None	C-Max	None
v/c Ratio		1.58		1.63	0.77	1.17	1.15	1.36	0.69	
Control Delay		297.8		330.2	14.3	164.5	101.0	210.0	44.3	
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		297.8		330.2	14.3	164.5	101.0	210.0	44.3	
Queue Length 50th (ft)		~477		~291	3	~171	~567	~167	189	
Queue Length 95th (ft)		#572		#402	124	m#286	#668	m#108	m135	
Internal Link Dist (ft)		381		1183			1304		709	
Turn Bay Length (ft)						205		205		
Base Capacity (vph)		526		304	579	158	1447	117	1270	
Starvation Cap Reductn		0		0	0	0	0	0	0	
Spillback Cap Reductn		0		0	0	0	0	0	0	
Storage Cap Reductn		0		0	0	0	0	0	0	
Reduced v/c Ratio		1.58		1.63	0.77	1.17	1.15	1.36	0.69	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 93 (78%), Referenced to phase 1:NBSB, Start of Green

Natural Cycle: 150

Control Type: Actuated-Coordinated

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

Splits and Phases: 192: Columbus Avenue /Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

Lane Group	EBL	EBR	WBT	NEU	NEL	NET	SWU	SWT	SWR
Lane Configurations									
Volume (vph)	622	188	15	18	298	1581	17	835	808
Lane Group Flow (vph)	707	214	93	0	344	1718	0	888	842
Turn Type	Prot	Over	NA	custom	Prot	NA	Perm	NA	pm+ov
Protected Phases	3	1!	4		1	6		2	3
Permitted Phases				1!			2		2
Detector Phase	3	1	4	1	1	6	2	2	3
Switch Phase									
Minimum Initial (s)	8.0	4.0	8.0	4.0	4.0	8.0	8.0	8.0	8.0
Minimum Split (s)	13.0	12.0	26.0	12.0	12.0	24.0	24.0	24.0	13.0
Total Split (s)	30.0	26.0	26.0	26.0	26.0	64.0	38.0	38.0	30.0
Total Split (%)	25.0%	21.7%	21.7%	21.7%	21.7%	53.3%	31.7%	31.7%	25.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lead/Lag	Lead	Lead	Lag	Lead	Lead		Lag	Lag	Lead
Lead-Lag Optimize?									
Recall Mode	None	Min	Max	Min	Min	C-Max	C-Max	C-Max	None
v/c Ratio	1.14	0.60	0.31		7.64	0.81		1.22	1.32
Control Delay	124.6	18.1	41.0		3001.7	30.7		146.1	184.1
Queue Delay	0.0	0.0	1.2		0.0	0.0		20.1	135.4
Total Delay	124.6	18.1	42.2		3001.7	30.7		166.2	319.5
Queue Length 50th (ft)	~339	26	56		~495	455		~447	~607
Queue Length 95th (ft)	#446	117	80		m#439	m438		#578	#1096
Internal Link Dist (ft)			271			682		238	
Turn Bay Length (ft)					200				
Base Capacity (vph)	621	356	303		45	2129		726	638
Starvation Cap Reductn	0	0	0		0	0		26	18
Spillback Cap Reductn	0	0	92		0	0		0	119
Storage Cap Reductn	0	0	0		0	0		0	0
Reduced v/c Ratio	1.14	0.60	0.44		7.64	0.81		1.27	1.62

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 48 (40%), Referenced to phase 2:SWTU and 6:NET, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.
! Phase conflict between lane groups.

Splits and Phases: 611: Tremont Street & Ruggles St/Whittier St

Lane Group	EBR	NET	SWT
Lane Configurations			
Volume (vph)	24	2057	1662
Lane Group Flow (vph)	33	2252	1713
Turn Type	custom	NA	NA
Protected Phases	5	1	1
Permitted Phases			
Detector Phase	5	1	1
Switch Phase			
Minimum Initial (s)	6.0	10.0	10.0
Minimum Split (s)	27.0	27.0	27.0
Total Split (s)	38.0	82.0	82.0
Total Split (%)	31.7%	68.3%	68.3%
Yellow Time (s)	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0
Lead/Lag			
Lead-Lag Optimize?			
Recall Mode	None	C-Max	C-Max
v/c Ratio	0.18	0.66	0.49
Control Delay	16.9	6.0	5.3
Queue Delay	0.0	0.2	0.4
Total Delay	16.9	6.1	5.7
Queue Length 50th (ft)	1	204	182
Queue Length 95th (ft)	20	m208	213
Internal Link Dist (ft)		238	380
Turn Bay Length (ft)			
Base Capacity (vph)	355	3405	3498
Starvation Cap Reductn	0	324	1038
Spillback Cap Reductn	28	0	949
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.10	0.73	0.70

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 14 (12%), Referenced to phase 1:NESW, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3082: Tremont Street & Renaissance Park/Ruggles St

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Volume (vph)	48	174	1216	194	374	696	1194	15	398
Lane Group Flow (vph)	73	210	1267	259	0	1295	1357	0	476
Turn Type	NA	Perm	Split	NA	pm+pt	NA	Free	Perm	NA
Protected Phases	5		6	6	7	1 7			1
Permitted Phases		5			1 7		Free	1	
Detector Phase	5	5	6	6	1 7	1 7		1	1
Switch Phase									
Minimum Initial (s)	8.0	8.0	10.0	10.0	4.0			10.0	10.0
Minimum Split (s)	25.0	25.0	22.0	22.0	9.0			29.0	29.0
Total Split (s)	21.0	21.0	29.0	29.0	21.0			29.0	29.0
Total Split (%)	21.0%	21.0%	29.0%	29.0%	21.0%			29.0%	29.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0			3.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0			1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0					0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0					4.0
Lead/Lag	Lead	Lead	Lag	Lag					
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	Max			C-Max	C-Max
v/c Ratio	0.43	0.63	1.68	0.67		1.21	0.89		0.69
Control Delay	48.6	14.5	339.7	43.6		125.0	8.9		37.0
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Delay	48.6	14.5	339.7	43.6		125.0	8.9		37.0
Queue Length 50th (ft)	45	0	~611	149		~448	0		134
Queue Length 95th (ft)	77	47	#742	224		#458	0		#244
Internal Link Dist (ft)	34			60		380			216
Turn Bay Length (ft)			350						
Base Capacity (vph)	278	412	754	386		1073	1532		692
Starvation Cap Reductn	0	0	0	0		0	0		0
Spillback Cap Reductn	0	0	0	0		0	0		0
Storage Cap Reductn	0	0	0	0		0	0		0
Reduced v/c Ratio	0.26	0.51	1.68	0.67		1.21	0.89		0.69

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 145
Control Type: Actuated-Coordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

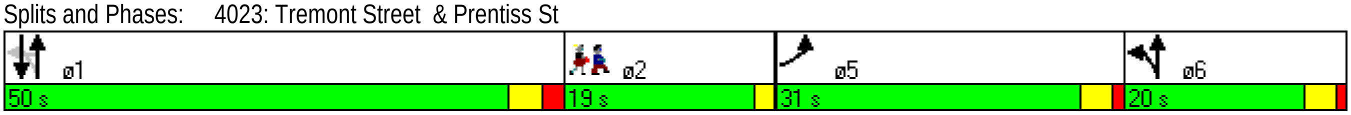
Splits and Phases: 3098: Tremont Street /Tremont St & Melnea Cass Boulevard

Lane Group	EBL	NBL	NBT	SBU	SBT	ø2
Lane Configurations						
Volume (vph)	125	266	1856	58	895	
Lane Group Flow (vph)	200	0	2384	0	1137	
Turn Type	NA	pm+pt	NA	Perm	NA	
Protected Phases	5	6	1 6		1	2
Permitted Phases		1 6		1		
Detector Phase	5	6	1 6	1	1	
Switch Phase						
Minimum Initial (s)	8.0	4.0		8.0	8.0	8.0
Minimum Split (s)	14.0	8.0		25.0	25.0	19.0
Total Split (s)	31.0	20.0		50.0	50.0	19.0
Total Split (%)	25.8%	16.7%		41.7%	41.7%	16%
Yellow Time (s)	3.0	3.0		3.0	3.0	2.0
All-Red Time (s)	1.0	1.0		2.0	2.0	0.0
Lost Time Adjust (s)	0.0				-1.0	
Total Lost Time (s)	4.0				4.0	
Lead/Lag	Lead	Lag		Lead	Lead	Lag
Lead-Lag Optimize?						
Recall Mode	None	Max		C-Max	C-Max	None
v/c Ratio	0.79		1.17		1.46	
Control Delay	67.1		103.2		238.5	
Queue Delay	0.0		0.0		0.0	
Total Delay	67.1		103.2		238.5	
Queue Length 50th (ft)	144		~403		~610	
Queue Length 95th (ft)	176		m#757		m#629	
Internal Link Dist (ft)	258		709		105	
Turn Bay Length (ft)						
Base Capacity (vph)	344		2033		777	
Starvation Cap Reductn	0		0		0	
Spillback Cap Reductn	0		0		0	
Storage Cap Reductn	0		0		0	
Reduced v/c Ratio	0.58		1.17		1.46	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 99 (83%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4023: Tremont Street & Prentiss St



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	27	1784	284	0	1099
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	29	1939	309	0	1195
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			185			762
pX, platoon unblocked	0.71	0.59			0.59	
vC, conflicting volume	2691	801			2248	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	177	0			699	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	95			100	
cM capacity (veh/h)	568	643			529	

Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	29	776	776	697	597	597
Volume Left	0	0	0	0	0	0
Volume Right	29	0	0	309	0	0
cSH	643	1700	1700	1700	1700	1700
Volume to Capacity	0.05	0.46	0.46	0.41	0.35	0.35
Queue Length 95th (ft)	4	0	0	0	0	0
Control Delay (s)	10.9	0.0	0.0	0.0	0.0	0.0
Lane LOS	B					
Approach Delay (s)	10.9	0.0			0.0	
Approach LOS	B					

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	50.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (vph)	295	413	279	238	410	406	1	242	983	249	2	321
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0		4.0	4.0			4.0
Lane Util. Factor		0.95			0.95	1.00		1.00	0.91			1.00
Frt		0.96			1.00	0.85		1.00	0.97			1.00
Flt Protected		0.99			0.98	1.00		0.95	1.00			0.95
Satd. Flow (prot)		2919			3028	1275		1577	4278			1344
Flt Permitted		0.54			0.56	1.00		0.95	1.00			0.95
Satd. Flow (perm)		1612			1732	1275		1577	4278			1344
Peak-hour factor, PHF	0.97	0.97	0.97	0.92	0.92	0.92	0.86	0.86	0.86	0.86	0.97	0.97
Adj. Flow (vph)	304	426	288	259	446	441	1	281	1143	290	2	331
RTOR Reduction (vph)	0	0	0	0	0	338	0	0	0	0	0	0
Lane Group Flow (vph)	0	1018	0	0	705	103	0	282	1433	0	0	333
Heavy Vehicles (%)	5%	5%	5%	6%	5%	14%	0%	3%	5%	9%	0%	21%
Parking (#/hr)												
Turn Type	pm+pt	NA		Perm	NA	Perm	Prot	Prot	NA		Prot	Prot
Protected Phases	3	3 4			4		5	5	1		5	5
Permitted Phases	3 4			4		4						
Actuated Green, G (s)		34.0			27.0	27.0		19.0	30.0			19.0
Effective Green, g (s)		36.0			28.0	28.0		20.0	30.0			20.0
Actuated g/C Ratio		0.30			0.23	0.23		0.17	0.25			0.17
Clearance Time (s)					5.0	5.0		5.0	4.0			5.0
Vehicle Extension (s)					3.0	3.0		2.0	2.0			2.0
Lane Grp Cap (vph)		571			404	298		263	1070			224
v/s Ratio Prot		c0.12						0.18	0.33			c0.25
v/s Ratio Perm		c0.42			0.41	0.08						
v/c Ratio		1.92dl			4.80dl	0.35		1.07	1.34			1.49
Uniform Delay, d1		42.0			46.0	38.4		50.0	45.0			50.0
Progression Factor		1.05			1.00	1.00		0.81	1.04			0.77
Incremental Delay, d2		358.3			345.4	0.7		72.8	158.3			221.2
Delay (s)		402.3			391.4	39.1		113.3	205.0			259.9
Level of Service		F			F	D		F	F			F
Approach Delay (s)		402.3			255.8				189.9			
Approach LOS		F			F				F			

Intersection Summary			
HCM Average Control Delay	253.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.59		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	34.0
Intersection Capacity Utilization	120.6%	ICU Level of Service	H
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

Movement	SBT	SBR
Lane Configurations		
Volume (vph)	1205	226
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	4.0	
Lane Util. Factor	0.91	
Frt	0.98	
Flt Protected	1.00	
Satd. Flow (prot)	4173	
Flt Permitted	1.00	
Satd. Flow (perm)	4173	
Peak-hour factor, PHF	0.97	0.97
Adj. Flow (vph)	1242	233
RTOR Reduction (vph)	0	0
Lane Group Flow (vph)	1475	0
Heavy Vehicles (%)	3%	2%
Parking (#/hr)	15	
Turn Type	NA	
Protected Phases	1	
Permitted Phases		
Actuated Green, G (s)	30.0	
Effective Green, g (s)	30.0	
Actuated g/C Ratio	0.25	
Clearance Time (s)	4.0	
Vehicle Extension (s)	2.0	
Lane Grp Cap (vph)	1043	
v/s Ratio Prot	c0.35	
v/s Ratio Perm		
v/c Ratio	1.41	
Uniform Delay, d1	45.0	
Progression Factor	0.77	
Incremental Delay, d2	186.9	
Delay (s)	221.7	
Level of Service	F	
Approach Delay (s)	228.7	
Approach LOS	F	

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Volume (vph)	961	0	332	48	14	39	64	216	1544	0	50	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	12	16	12	12	11	11	12	12	12
Total Lost time (s)	4.0		4.0		4.0			4.0	4.0			
Lane Util. Factor	0.97		1.00		1.00			1.00	0.91			
Frpb, ped/bikes	1.00		1.00		0.99			1.00	1.00			
Flpb, ped/bikes	1.00		1.00		0.99			0.99	1.00			
Frt	1.00		0.85		0.95			1.00	1.00			
Flt Protected	0.95		1.00		0.98			0.95	1.00			
Satd. Flow (prot)	3001		1171		1733			1333	4298			
Flt Permitted	0.95		1.00		0.98			0.27	1.00			
Satd. Flow (perm)	3001		1171		1733			374	4298			
Peak-hour factor, PHF	0.88	0.88	0.88	0.83	0.83	0.83	0.89	0.89	0.89	0.89	0.96	0.96
Adj. Flow (vph)	1092	0	377	58	17	47	72	243	1735	0	52	0
RTOR Reduction (vph)	0	0	221	0	3	0	0	0	0	0	0	0
Lane Group Flow (vph)	1092	0	156	0	119	0	0	315	1735	0	0	0
Confl. Peds. (#/hr)	13		16	16		13		23				
Heavy Vehicles (%)	5%	0%	20%	2%	0%	0%	0%	22%	5%	0%	0%	0%
Parking (#/hr)				15		0						
Turn Type	Prot		Over	Perm	NA		custom	Prot	NA		Perm	
Protected Phases	3		1!		4			1	6			
Permitted Phases				4			1!				2	
Actuated Green, G (s)	30.0		15.0		22.0			15.0	56.0			
Effective Green, g (s)	30.0		15.0		22.0			15.0	56.0			
Actuated g/C Ratio	0.25		0.12		0.18			0.12	0.47			
Clearance Time (s)	4.0		4.0		4.0			4.0	4.0			
Vehicle Extension (s)	3.0		2.0		2.0			2.0	2.0			
Lane Grp Cap (vph)	750		146		318			47	2006			
v/s Ratio Prot	c0.36		0.13						0.40			
v/s Ratio Perm					0.07			c0.84				
v/c Ratio	1.46		1.07		0.37			6.70	0.86			
Uniform Delay, d1	45.0		52.5		43.0			52.5	28.6			
Progression Factor	0.89		1.73		1.00			1.22	0.92			
Incremental Delay, d2	212.5		92.7		3.3			2587.2	2.6			
Delay (s)	252.7		183.6		46.3			2651.2	28.9			
Level of Service	F		F		D			F	C			
Approach Delay (s)		235.0			46.3				431.8			
Approach LOS		F			D				F			

Intersection Summary			
HCM Average Control Delay	337.5	HCM Level of Service	F
HCM Volume to Capacity ratio	2.17		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	127.2%	ICU Level of Service	H
Analysis Period (min)	15		

! Phase conflict between lane groups.

c Critical Lane Group

Movement	SWT	SWR
Lane Configurations		
Volume (vph)	1183	558
Ideal Flow (vphpl)	1900	1900
Lane Width	11	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frpb, ped/bikes	1.00	0.95
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	3075	1283
Flt Permitted	0.69	1.00
Satd. Flow (perm)	2124	1283
Peak-hour factor, PHF	0.96	0.96
Adj. Flow (vph)	1232	581
RTOR Reduction (vph)	0	0
Lane Group Flow (vph)	1284	581
Confl. Peds. (#/hr)		23
Heavy Vehicles (%)	2%	4%
Parking (#/hr)		
Turn Type	NA	pm+ov
Protected Phases	2	3
Permitted Phases		2
Actuated Green, G (s)	37.0	67.0
Effective Green, g (s)	37.0	67.0
Actuated g/C Ratio	0.31	0.56
Clearance Time (s)	4.0	4.0
Vehicle Extension (s)	2.0	3.0
Lane Grp Cap (vph)	655	759
v/s Ratio Prot		0.19
v/s Ratio Perm	c0.60	0.26
v/c Ratio	1.96	0.77
Uniform Delay, d1	41.5	20.4
Progression Factor	0.91	0.86
Incremental Delay, d2	437.1	4.1
Delay (s)	474.7	21.7
Level of Service	F	C
Approach Delay (s)	333.6	
Approach LOS	F	

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	109	0	0	0	0	2242	186	0	1574	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	16	12	11	12	12	11	12
Total Lost time (s)			4.0					4.0			4.0	
Lane Util. Factor			1.00					0.91			0.91	
Frpb, ped/bikes			1.00					0.99			1.00	
Flpb, ped/bikes			1.00					1.00			1.00	
Frt			0.86					0.99			1.00	
Flt Protected			1.00					1.00			1.00	
Satd. Flow (prot)			1286					4162			4381	
Flt Permitted			1.00					1.00			1.00	
Satd. Flow (perm)			1286					4162			4381	
Peak-hour factor, PHF	0.94	0.94	0.94	0.92	0.92	0.92	0.97	0.97	0.97	0.89	0.89	0.89
Adj. Flow (vph)	0	0	116	0	0	0	0	2311	192	0	1769	0
RTOR Reduction (vph)	0	0	22	0	0	0	0	4	0	0	0	0
Lane Group Flow (vph)	0	0	94	0	0	0	0	2499	0	0	1769	0
Confl. Peds. (#/hr)									26			
Heavy Vehicles (%)	0%	0%	15%	0%	0%	0%	0%	6%	10%	0%	3%	0%
Turn Type			custom					NA			NA	
Protected Phases			5					1			1	
Permitted Phases												
Actuated Green, G (s)			15.0					97.0			97.0	
Effective Green, g (s)			15.0					97.0			97.0	
Actuated g/C Ratio			0.12					0.81			0.81	
Clearance Time (s)			4.0					4.0			4.0	
Vehicle Extension (s)			2.0					2.0			2.0	
Lane Grp Cap (vph)			161					3364			3541	
v/s Ratio Prot			c0.07					c0.60			0.40	
v/s Ratio Perm												
v/c Ratio			0.58					0.74			0.50	
Uniform Delay, d1			49.6					5.5			3.7	
Progression Factor			1.00					0.07			1.00	
Incremental Delay, d2			3.5					0.1			0.5	
Delay (s)			53.0					0.5			4.2	
Level of Service			D					A			A	
Approach Delay (s)		53.0			0.0			0.5			4.2	
Approach LOS		D			A			A			A	

Intersection Summary			
HCM Average Control Delay	3.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	56.2%	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												
Volume (vph)	8	187	317	1154	101	37	199	611	1555	41	524	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	13	12	13	13	12	12	11	16	12	14	12
Total Lost time (s)		4.0	4.0	4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor		1.00	1.00	0.97	1.00			0.95	1.00		0.95	
Frt		1.00	0.85	1.00	0.96			1.00	0.85		1.00	
Flt Protected		1.00	1.00	0.95	1.00			0.99	1.00		0.99	
Satd. Flow (prot)		1626	1398	3015	1500			2933	1554		3241	
Flt Permitted		1.00	1.00	0.95	1.00			0.56	1.00		0.56	
Satd. Flow (perm)		1626	1398	3015	1500			1657	1554		1833	
Peak-hour factor, PHF	0.38	0.84	0.83	0.96	0.86	0.81	0.82	0.83	0.88	0.54	0.93	0.55
Adj. Flow (vph)	21	223	382	1202	117	46	243	736	1767	76	563	18
RTOR Reduction (vph)	0	0	178	0	0	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	244	204	1202	163	0	0	979	1767	0	655	0
Heavy Vehicles (%)	0%	9%	4%	8%	12%	15%	5%	6%	6%	20%	3%	36%
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA	Free	Perm	NA	
Protected Phases	5	5		6	6		7	1 7			1	
Permitted Phases			5				1 7		Free	1		
Actuated Green, G (s)		17.9	17.9	26.0	26.0			40.1	100.0		29.1	
Effective Green, g (s)		17.9	17.9	26.0	26.0			40.1	100.0		29.1	
Actuated g/C Ratio		0.18	0.18	0.26	0.26			0.40	1.00		0.29	
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	
Lane Grp Cap (vph)		291	250	784	390			805	1554		533	
v/s Ratio Prot		0.15		c0.40	0.11			0.13				
v/s Ratio Perm			0.15					0.35	c1.14		0.36	
v/c Ratio		0.84	0.82	1.53	0.42			1.22	1.14		1.23	
Uniform Delay, d1		39.7	39.5	37.0	30.7			29.9	50.0		35.5	
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		17.9	17.3	246.4	0.3			108.5	70.1		118.6	
Delay (s)		57.5	56.8	283.4	31.0			138.5	120.1		154.1	
Level of Service		E	E	F	C			F	F		F	
Approach Delay (s)		57.1			253.2			126.7			154.1	
Approach LOS		E			F			F			F	

Intersection Summary			
HCM Average Control Delay	154.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.24		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	104.3%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	154	143	106	1460	17	1542	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	11	12	11	12
Total Lost time (s)	4.0			4.0		4.0	
Lane Util. Factor	1.00			0.91		0.95	
Frt	0.94			1.00		0.99	
Flt Protected	0.97			1.00		1.00	
Satd. Flow (prot)	1475			4175		2677	
Flt Permitted	0.97			0.63		0.91	
Satd. Flow (perm)	1475			2635		2438	
Peak-hour factor, PHF	0.85	0.85	0.94	0.94	0.92	0.96	0.96
Adj. Flow (vph)	181	168	113	1553	18	1606	86
RTOR Reduction (vph)	30	0	0	0	0	3	0
Lane Group Flow (vph)	319	0	0	1666	0	1707	0
Heavy Vehicles (%)	13%	5%	4%	8%	2%	6%	11%
Parking (#/hr)						15	
Turn Type	NA		pm+pt	NA	Perm	NA	
Protected Phases	5		6	1 6		1	
Permitted Phases			1 6		1		
Actuated Green, G (s)	29.1			65.7		61.7	
Effective Green, g (s)	29.1			67.7		62.7	
Actuated g/C Ratio	0.24			0.56		0.52	
Clearance Time (s)	4.0					5.0	
Vehicle Extension (s)	2.0					2.0	
Lane Grp Cap (vph)	358			1551		1274	
v/s Ratio Prot	c0.22			c0.04			
v/s Ratio Perm				0.56		c0.70	
v/c Ratio	0.89			1.07		1.34	
Uniform Delay, d1	43.9			26.1		28.6	
Progression Factor	1.00			1.38		0.95	
Incremental Delay, d2	22.7			34.8		153.5	
Delay (s)	66.7			71.0		180.6	
Level of Service	E			E		F	
Approach Delay (s)	66.7			71.0		180.6	
Approach LOS	E			E		F	

Intersection Summary			
HCM Average Control Delay	120.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	24.2
Intersection Capacity Utilization	113.8%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	ø2
Lane Configurations										
Volume (vph)	295	413	238	410	406	242	983	321	1205	
Lane Group Flow (vph)	0	1018	0	705	441	282	1433	333	1475	
Turn Type	pm+pt	NA	Perm	NA	Perm	Prot	NA	Prot	NA	
Protected Phases	3	3 4		4		5	1	5	1	2
Permitted Phases	3 4		4		4					
Detector Phase	3	3 4	4	4	4	5	1	5	1	
Switch Phase										
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0	12.0	4.0	12.0	8.0
Minimum Split (s)	10.0		14.0	14.0	14.0	13.0	18.0	13.0	18.0	22.0
Total Split (s)	12.0		32.0	32.0	32.0	24.0	30.0	24.0	30.0	22.0
Total Split (%)	10.0%		26.7%	26.7%	26.7%	20.0%	25.0%	20.0%	25.0%	18%
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0	3.0	4.0	3.0	2.0
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0
Lost Time Adjust (s)				-1.0	-1.0	-1.0	0.0	-1.0	0.0	
Total Lost Time (s)				4.0	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead		Lag	Lag	Lag		Lead		Lead	Lag
Lead-Lag Optimize?										
Recall Mode	None		None	None	None	None	C-Max	None	C-Max	None
v/c Ratio		1.92dl		4.80dl	0.69	1.07	1.32	1.49	1.40	
Control Delay		385.7		375.2	10.0	113.0	188.1	252.0	208.9	
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		385.7		375.2	10.0	113.0	188.1	252.0	208.9	
Queue Length 50th (ft)		~621		~426	0	~247	~584	~349	~623	
Queue Length 95th (ft)		m#753		#549	103	#396	#641	m#251	m#440	
Internal Link Dist (ft)		381		1186			1304		709	
Turn Bay Length (ft)						205		205		
Base Capacity (vph)		571		404	636	263	1084	224	1057	
Starvation Cap Reductn		0		0	0	0	0	0	0	
Spillback Cap Reductn		0		0	0	0	0	0	0	
Storage Cap Reductn		0		0	0	0	0	0	0	
Reduced v/c Ratio		1.78		1.75	0.69	1.07	1.32	1.49	1.40	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 119 (99%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 192: Columbus Avenue/Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

Lane Group	EBL	EBR	WBT	NEU	NEL	NET	SWU	SWT	SWR
Lane Configurations									
Volume (vph)	961	332	14	64	216	1544	50	1183	558
Lane Group Flow (vph)	1092	377	122	0	315	1735	0	1284	581
Turn Type	Prot	Over	NA	custom	Prot	NA	Perm	NA	pm+ov
Protected Phases	3	1!	4		1	6		2	3
Permitted Phases				1!			2		2
Detector Phase	3	1	4	1	1	6	2	2	3
Switch Phase									
Minimum Initial (s)	8.0	4.0	8.0	4.0	4.0	8.0	8.0	8.0	8.0
Minimum Split (s)	13.0	12.0	26.0	12.0	12.0	24.0	24.0	24.0	13.0
Total Split (s)	34.0	19.0	26.0	19.0	19.0	60.0	41.0	41.0	34.0
Total Split (%)	28.3%	15.8%	21.7%	15.8%	15.8%	50.0%	34.2%	34.2%	28.3%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lead/Lag	Lead	Lead	Lag	Lead	Lead		Lag	Lag	Lead
Lead-Lag Optimize?									
Recall Mode	None	Min	Max	Min	Min	C-Max	C-Max	C-Max	None
v/c Ratio	1.46	1.02	0.38		6.70	0.86		1.96	0.81
Control Delay	244.4	79.1	45.6		2596.2	29.3		461.9	26.9
Queue Delay	6.1	5.3	0.0		0.0	0.0		0.0	0.7
Total Delay	250.5	84.4	45.6		2596.2	29.3		461.9	27.5
Queue Length 50th (ft)	~602	~133	81		~483	287		~821	319
Queue Length 95th (ft)	#713	#360	128		m#497	m286		#961	#476
Internal Link Dist (ft)			271			704		238	
Turn Bay Length (ft)					200				
Base Capacity (vph)	750	368	321		47	2006		655	716
Starvation Cap Reductn	7	6	0		0	0		0	0
Spillback Cap Reductn	0	0	0		0	0		0	22
Storage Cap Reductn	0	0	0		0	0		0	0
Reduced v/c Ratio	1.47	1.04	0.38		6.70	0.86		1.96	0.84

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 63 (53%), Referenced to phase 2:SWTU and 6:NET, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.
! Phase conflict between lane groups.

Splits and Phases: 611: Tremont Street & Ruggles St/Whittier St

Lane Group	EBR	NET	SWT
Lane Configurations			
Volume (vph)	109	2242	1574
Lane Group Flow (vph)	116	2503	1769
Turn Type	custom	NA	NA
Protected Phases	5	1	1
Permitted Phases			
Detector Phase	5	1	1
Switch Phase			
Minimum Initial (s)	6.0	10.0	10.0
Minimum Split (s)	27.0	27.0	27.0
Total Split (s)	40.0	80.0	80.0
Total Split (%)	33.3%	66.7%	66.7%
Yellow Time (s)	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0
Lead/Lag			
Lead-Lag Optimize?			
Recall Mode	None	C-Max	C-Max
v/c Ratio	0.63	0.74	0.50
Control Delay	52.6	0.6	5.0
Queue Delay	5.6	2.2	0.6
Total Delay	58.1	2.8	5.6
Queue Length 50th (ft)	69	11	113
Queue Length 95th (ft)	123	m10	216
Internal Link Dist (ft)		238	380
Turn Bay Length (ft)			
Base Capacity (vph)	403	3365	3540
Starvation Cap Reductn	0	688	1232
Spillback Cap Reductn	230	0	1025
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.67	0.94	0.77

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 65 (54%), Referenced to phase 1:NESW, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3082: Tremont Street & Renaissance Park/Ruggles St

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Volume (vph)	187	317	1154	101	199	611	1555	41	524
Lane Group Flow (vph)	244	382	1202	163	0	979	1767	0	657
Turn Type	NA	Perm	Split	NA	pm+pt	NA	Free	Perm	NA
Protected Phases	5		6	6	7	1 7			1
Permitted Phases		5			1 7		Free	1	
Detector Phase	5	5	6	6	7	1 7		1	1
Switch Phase									
Minimum Initial (s)	8.0	8.0	10.0	10.0	4.0			10.0	10.0
Minimum Split (s)	25.0	25.0	22.0	22.0	9.0			29.0	29.0
Total Split (s)	24.0	24.0	30.0	30.0	15.0			31.0	31.0
Total Split (%)	24.0%	24.0%	30.0%	30.0%	15.0%			31.0%	31.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0			3.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0			1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0					0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0					4.0
Lead/Lag	Lead	Lead	Lag	Lag					
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	Max			C-Max	C-Max
v/c Ratio	0.84	0.89	1.53	0.42		1.22	1.14		1.23
Control Delay	64.0	41.1	275.7	34.7		135.3	77.1		151.0
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Delay	64.0	41.1	275.7	34.7		135.3	77.1		151.0
Queue Length 50th (ft)	148	104	~557	86		~382	~284		~288
Queue Length 95th (ft)	#229	#214	#686	141		#480	#488		#404
Internal Link Dist (ft)	51			68		380			136
Turn Bay Length (ft)			350						
Base Capacity (vph)	325	453	784	390		805	1554		535
Starvation Cap Reductn	0	0	0	0		0	0		0
Spillback Cap Reductn	0	0	0	0		0	0		0
Storage Cap Reductn	0	0	0	0		0	0		0
Reduced v/c Ratio	0.75	0.84	1.53	0.42		1.22	1.14		1.23

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 145
Control Type: Actuated-Coordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3098: Tremont Street/Tremont St & Melnea Cass Boulevard

Lane Group	EBL	NBL	NBT	SBU	SBT	ø2
Lane Configurations						
Volume (vph)	154	106	1460	17	1542	
Lane Group Flow (vph)	349	0	1666	0	1710	
Turn Type	NA	pm+pt	NA	Perm	NA	
Protected Phases	5	6	1 6		1	2
Permitted Phases		1 6		1		
Detector Phase	5	6	1 6	1	1	
Switch Phase						
Minimum Initial (s)	8.0	4.0		8.0	8.0	8.0
Minimum Split (s)	14.0	8.0		25.0	25.0	19.0
Total Split (s)	38.0	8.0		55.0	55.0	19.0
Total Split (%)	31.7%	6.7%		45.8%	45.8%	16%
Yellow Time (s)	3.0	3.0		3.0	3.0	2.0
All-Red Time (s)	1.0	1.0		2.0	2.0	0.0
Lost Time Adjust (s)	0.0				-1.0	
Total Lost Time (s)	4.0				4.0	
Lead/Lag	Lead	Lag		Lead	Lead	Lag
Lead-Lag Optimize?						
Recall Mode	None	Max		C-Max	C-Max	None
v/c Ratio	0.90		1.09		1.32	
Control Delay	65.0		73.2		171.5	
Queue Delay	0.0		0.0		0.0	
Total Delay	65.0		73.2		171.5	
Queue Length 50th (ft)	232		~570		~954	
Queue Length 95th (ft)	314		m#341		m#282	
Internal Link Dist (ft)	258		709		84	
Turn Bay Length (ft)						
Base Capacity (vph)	446		1533		1293	
Starvation Cap Reductn	0		0		0	
Spillback Cap Reductn	0		0		0	
Storage Cap Reductn	0		0		0	
Reduced v/c Ratio	0.78		1.09		1.32	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 55 (46%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4023: Tremont Street & Prentiss St

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	179	1578	52	0	1652
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	195	1715	57	0	1796
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			164			784
pX, platoon unblocked	0.86	0.72			0.72	
vC, conflicting volume	2641	600			1772	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	670	0			735	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	75			100	
cM capacity (veh/h)	337	786			628	

Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	195	686	686	400	898	898
Volume Left	0	0	0	0	0	0
Volume Right	195	0	0	57	0	0
cSH	786	1700	1700	1700	1700	1700
Volume to Capacity	0.25	0.40	0.40	0.24	0.53	0.53
Queue Length 95th (ft)	24	0	0	0	0	0
Control Delay (s)	11.1	0.0	0.0	0.0	0.0	0.0
Lane LOS	B					
Approach Delay (s)	11.1	0.0			0.0	
Approach LOS	B					

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	49.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
192: Columbus Avenue/Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

2/20/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (vph)	238	240	93	65	281	270	1	104	809	67	13	169
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0		4.0	4.0			4.0
Lane Util. Factor		0.95			0.95	1.00		1.00	0.91			1.00
Frt		0.98			1.00	0.85		1.00	0.99			1.00
Flt Protected		0.98			0.99	1.00		0.95	1.00			0.95
Satd. Flow (prot)		3044			3008	1358		1593	4524			1562
Flt Permitted		0.62			0.73	1.00		0.95	1.00			0.95
Satd. Flow (perm)		1924			2228	1358		1593	4524			1562
Peak-hour factor, PHF	0.90	0.90	0.90	0.95	0.95	0.95	0.94	0.94	0.94	0.94	0.91	0.91
Adj. Flow (vph)	264	267	103	68	296	284	1	111	861	71	14	186
RTOR Reduction (vph)	0	0	0	0	0	227	0	0	0	0	0	0
Lane Group Flow (vph)	0	634	0	0	364	57	0	112	932	0	0	200
Heavy Vehicles (%)	2%	2%	2%	7%	7%	7%	2%	2%	2%	2%	4%	4%
Parking (#/hr)												
Turn Type	pm+pt	NA		Perm	NA	Perm	Prot	Prot	NA		Prot	Prot
Protected Phases	3	3 4			4		5	5	1		5	5
Permitted Phases	3 4			4		4						
Actuated Green, G (s)		26.0			19.0	19.0		13.0	24.0			13.0
Effective Green, g (s)		28.0			20.0	20.0		14.0	24.0			14.0
Actuated g/C Ratio		0.28			0.20	0.20		0.14	0.24			0.14
Clearance Time (s)					5.0	5.0		5.0	4.0			5.0
Vehicle Extension (s)					3.0	3.0		2.0	2.0			2.0
Lane Grp Cap (vph)		628			446	272		223	1086			219
v/s Ratio Prot		c0.08						0.07	0.21			c0.13
v/s Ratio Perm		c0.20			0.16	0.04						
v/c Ratio		1.01			0.82	0.21		0.50	0.86			0.91
Uniform Delay, d1		36.0			38.2	33.4		39.8	36.4			42.4
Progression Factor		1.11			1.00	1.00		1.12	0.83			0.73
Incremental Delay, d2		36.1			11.0	0.4		0.6	8.5			27.2
Delay (s)		76.0			49.2	33.8		45.1	38.5			58.1
Level of Service		E			D	C		D	D			E
Approach Delay (s)		76.0			42.5				39.2			
Approach LOS		E			D				D			

Intersection Summary

HCM Average Control Delay	55.4	HCM Level of Service	E
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	34.0
Intersection Capacity Utilization	80.5%	ICU Level of Service	D
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

Movement	SBT	SBR
Lane Configurations		
Volume (vph)	641	280
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	4.0	
Lane Util. Factor	0.91	
Frt	0.95	
Flt Protected	1.00	
Satd. Flow (prot)	4070	
Flt Permitted	1.00	
Satd. Flow (perm)	4070	
Peak-hour factor, PHF	0.91	0.91
Adj. Flow (vph)	704	308
RTOR Reduction (vph)	0	0
Lane Group Flow (vph)	1012	0
Heavy Vehicles (%)	4%	4%
Parking (#/hr)	10	
Turn Type	NA	
Protected Phases	1	
Permitted Phases		
Actuated Green, G (s)	24.0	
Effective Green, g (s)	24.0	
Actuated g/C Ratio	0.24	
Clearance Time (s)	4.0	
Vehicle Extension (s)	2.0	
Lane Grp Cap (vph)	977	
v/s Ratio Prot	c0.25	
v/s Ratio Perm		
v/c Ratio	1.06dr	
Uniform Delay, d1	38.0	
Progression Factor	0.90	
Incremental Delay, d2	32.8	
Delay (s)	66.8	
Level of Service	E	
Approach Delay (s)	65.4	
Approach LOS	E	

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Volume (vph)	370	0	127	12	1	15	22	136	1244	0	14	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	12	16	12	12	11	11	12	12	12
Total Lost time (s)	4.0		4.0		4.0			4.0	4.0			
Lane Util. Factor	0.97		1.00		1.00			1.00	0.91			
Frpb, ped/bikes	1.00		1.00		0.99			1.00	1.00			
Flpb, ped/bikes	1.00		1.00		1.00			0.99	1.00			
Frt	1.00		0.85		0.93			1.00	1.00			
Flt Protected	0.95		1.00		0.98			0.95	1.00			
Satd. Flow (prot)	2789		1243		1671			1489	4339			
Flt Permitted	0.95		1.00		0.98			0.36	1.00			
Satd. Flow (perm)	2789		1243		1671			570	4339			
Peak-hour factor, PHF	0.96	0.96	0.96	0.64	0.64	0.64	0.99	0.99	0.99	0.99	0.90	0.90
Adj. Flow (vph)	385	0	132	19	2	23	22	137	1257	0	16	0
RTOR Reduction (vph)	0	0	117	0	18	0	0	0	0	0	0	0
Lane Group Flow (vph)	385	0	15	0	26	0	0	159	1257	0	0	0
Confl. Peds. (#/hr)	7		6	6		7		37				
Heavy Vehicles (%)	13%	13%	13%	4%	4%	4%	4%	4%	4%	4%	1%	1%
Parking (#/hr)				5								
Turn Type	Prot		Over	Perm	NA		custom	Prot	NA		Perm	
Protected Phases	3		1!		4			1	6			
Permitted Phases				4			1!				2	
Actuated Green, G (s)	17.2		11.0		22.0			11.0	48.8			
Effective Green, g (s)	17.2		11.0		22.0			11.0	48.8			
Actuated g/C Ratio	0.17		0.11		0.22			0.11	0.49			
Clearance Time (s)	4.0		4.0		4.0			4.0	4.0			
Vehicle Extension (s)	3.0		2.0		2.0			2.0	2.0			
Lane Grp Cap (vph)	480		137		368			63	2117			
v/s Ratio Prot	c0.14		0.01						0.29			
v/s Ratio Perm					0.02			c0.28				
v/c Ratio	0.80		0.11		0.07			2.52	0.59			
Uniform Delay, d1	39.8		40.1		30.9			44.5	18.5			
Progression Factor	0.70		3.15		1.00			1.31	0.62			
Incremental Delay, d2	9.2		0.1		0.4			724.6	1.1			
Delay (s)	37.2		126.3		31.3			783.1	12.4			
Level of Service	D		F		C			F	B			
Approach Delay (s)		59.9			31.3				99.0			
Approach LOS		E			C				F			

Intersection Summary			
HCM Average Control Delay	88.5	HCM Level of Service	F
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	99.3%	ICU Level of Service	F
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Movement	SWT	SWR
Lane Configurations		
Volume (vph)	1012	391
Ideal Flow (vphpl)	1900	1900
Lane Width	11	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frpb, ped/bikes	1.00	0.92
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	3107	1285
Flt Permitted	0.92	1.00
Satd. Flow (perm)	2869	1285
Peak-hour factor, PHF	0.90	0.90
Adj. Flow (vph)	1124	434
RTOR Reduction (vph)	0	0
Lane Group Flow (vph)	1140	434
Confl. Peds. (#/hr)		37
Heavy Vehicles (%)	1%	1%
Parking (#/hr)		
Turn Type	NA	pm+ov
Protected Phases	2	3
Permitted Phases		2
Actuated Green, G (s)	33.8	51.0
Effective Green, g (s)	33.8	51.0
Actuated g/C Ratio	0.34	0.51
Clearance Time (s)	4.0	4.0
Vehicle Extension (s)	2.0	3.0
Lane Grp Cap (vph)	970	707
v/s Ratio Prot		0.11
v/s Ratio Perm	c0.40	0.23
v/c Ratio	1.18	0.61
Uniform Delay, d1	33.1	17.5
Progression Factor	0.89	0.76
Incremental Delay, d2	89.2	1.5
Delay (s)	118.7	14.8
Level of Service	F	B
Approach Delay (s)	90.1	
Approach LOS	F	

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	43	0	0	0	0	1554	94	0	1369	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	16	12	11	12	12	11	12
Total Lost time (s)			4.0					4.0			4.0	
Lane Util. Factor			1.00					0.91			0.91	
Frpb, ped/bikes			1.00					1.00			1.00	
Flpb, ped/bikes			1.00					1.00			1.00	
Frt			0.86					0.99			1.00	
Flt Protected			1.00					1.00			1.00	
Satd. Flow (prot)			1450					4377			4468	
Flt Permitted			1.00					1.00			1.00	
Satd. Flow (perm)			1450					4377			4468	
Peak-hour factor, PHF	0.88	0.88	0.88	0.92	0.92	0.92	0.98	0.98	0.98	0.91	0.91	0.91
Adj. Flow (vph)	0	0	49	0	0	0	0	1586	96	0	1504	0
RTOR Reduction (vph)	0	0	31	0	0	0	0	3	0	0	0	0
Lane Group Flow (vph)	0	0	18	0	0	0	0	1679	0	0	1504	0
Confl. Peds. (#/hr)									7			
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	2%	2%	2%	1%	1%	1%
Turn Type			custom					NA			NA	
Protected Phases			5					1			1	
Permitted Phases												
Actuated Green, G (s)			11.6					80.4			80.4	
Effective Green, g (s)			11.6					80.4			80.4	
Actuated g/C Ratio			0.12					0.80			0.80	
Clearance Time (s)			4.0					4.0			4.0	
Vehicle Extension (s)			2.0					2.0			2.0	
Lane Grp Cap (vph)			168					3519			3592	
v/s Ratio Prot			c0.01					c0.38			0.34	
v/s Ratio Perm												
v/c Ratio			0.11					0.48			0.42	
Uniform Delay, d1			39.6					3.1			2.9	
Progression Factor			1.00					0.08			1.00	
Incremental Delay, d2			0.1					0.4			0.4	
Delay (s)			39.7					0.6			3.3	
Level of Service			D					A			A	
Approach Delay (s)		39.7			0.0			0.6			3.3	
Approach LOS		D			A			A			A	

Intersection Summary			
HCM Average Control Delay	2.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	41.1%	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												
Volume (vph)	5	51	163	882	77	41	130	408	1017	34	331	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	13	12	13	13	12	12	11	16	12	14	12
Total Lost time (s)		4.0	4.0	4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor		1.00	1.00	0.97	1.00			0.95	1.00		0.95	
Frpb, ped/bikes		1.00	1.00	1.00	1.00			1.00	0.98		1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt		1.00	0.85	1.00	0.95			1.00	0.85		0.99	
Flt Protected		1.00	1.00	0.95	1.00			0.99	1.00		1.00	
Satd. Flow (prot)		1742	1439	3193	1642			3042	1586		3330	
Flt Permitted		1.00	1.00	0.95	1.00			0.73	1.00		0.87	
Satd. Flow (perm)		1742	1439	3193	1642			2233	1586		2918	
Peak-hour factor, PHF	0.97	0.97	0.97	0.92	0.92	0.92	0.97	0.97	0.97	0.92	0.92	0.92
Adj. Flow (vph)	5	53	168	959	84	45	134	421	1048	37	360	16
RTOR Reduction (vph)	0	0	148	0	0	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	58	20	959	129	0	0	555	1048	0	411	0
Confl. Peds. (#/hr)									20			
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	2%	2%	2%	3%	3%	3%
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA	Free	Perm	NA	
Protected Phases	5	5		6	6		7	1 7			1	
Permitted Phases			5				1 7		Free	1		
Actuated Green, G (s)		10.5	10.5	22.0	22.0			41.5	90.0		35.5	
Effective Green, g (s)		10.5	10.5	22.0	22.0			41.5	90.0		35.5	
Actuated g/C Ratio		0.12	0.12	0.24	0.24			0.46	1.00		0.39	
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	
Lane Grp Cap (vph)		203	168	781	401			1084	1586		1151	
v/s Ratio Prot		0.03		c0.30	0.08			0.03				
v/s Ratio Perm			0.01					0.20	c0.66		0.14	
v/c Ratio		0.29	0.12	1.23	0.32			0.51	0.66		0.36	
Uniform Delay, d1		36.3	35.6	34.0	27.9			17.1	0.0		19.2	
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		0.3	0.1	113.8	0.2			1.7	2.2		0.9	
Delay (s)		36.6	35.7	147.8	28.1			18.8	2.2		20.1	
Level of Service		D	D	F	C			B	A		C	
Approach Delay (s)		35.9			133.6			7.9			20.1	
Approach LOS		D			F			A			C	

Intersection Summary			
HCM Average Control Delay	52.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	74.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	57	18	74	1281	13	1093	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	11	12	11	12
Total Lost time (s)	4.0			4.0		4.0	
Lane Util. Factor	1.00			0.91		0.95	
Frt	0.97			1.00		0.99	
Flt Protected	0.96			1.00		1.00	
Satd. Flow (prot)	1631			4327		2775	
Flt Permitted	0.96			0.76		0.93	
Satd. Flow (perm)	1631			3304		2579	
Peak-hour factor, PHF	0.84	0.84	0.97	0.97	0.92	0.90	0.90
Adj. Flow (vph)	68	21	76	1321	14	1214	54
RTOR Reduction (vph)	12	0	0	0	0	3	0
Lane Group Flow (vph)	77	0	0	1397	0	1279	0
Heavy Vehicles (%)	1%	1%	4%	4%	2%	4%	4%
Parking (#/hr)						10	
Turn Type	NA		pm+pt	NA	Perm	NA	
Protected Phases	5		6	1 6		1	
Permitted Phases			1 6		1		
Actuated Green, G (s)	8.0			66.8		62.8	
Effective Green, g (s)	8.0			68.8		63.8	
Actuated g/C Ratio	0.08			0.69		0.64	
Clearance Time (s)	4.0					5.0	
Vehicle Extension (s)	2.0					2.0	
Lane Grp Cap (vph)	130			2324		1645	
v/s Ratio Prot	c0.05			c0.03			
v/s Ratio Perm				0.38		c0.50	
v/c Ratio	0.59			0.60		0.78	
Uniform Delay, d1	44.4			8.3		13.0	
Progression Factor	1.00			1.12		1.57	
Incremental Delay, d2	4.8			0.6		0.3	
Delay (s)	49.2			10.0		20.8	
Level of Service	D			A		C	
Approach Delay (s)	49.2			10.0		20.8	
Approach LOS	D			A		C	

Intersection Summary			
HCM Average Control Delay	16.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	24.2
Intersection Capacity Utilization	81.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	ø2
Lane Configurations										
Volume (vph)	238	240	65	281	270	104	809	169	641	
Lane Group Flow (vph)	0	634	0	364	284	112	932	200	1012	
Turn Type	pm+pt	NA	Perm	NA	Perm	Prot	NA	Prot	NA	
Protected Phases	3	3 4		4		5	1	5	1	2
Permitted Phases	3 4		4		4					
Detector Phase	3	3 4	4	4	4	5	1	5	1	
Switch Phase										
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0	12.0	4.0	12.0	8.0
Minimum Split (s)	10.0		14.0	14.0	14.0	13.0	18.0	13.0	18.0	22.0
Total Split (s)	12.0		24.0	24.0	24.0	18.0	24.0	18.0	24.0	22.0
Total Split (%)	12.0%		24.0%	24.0%	24.0%	18.0%	24.0%	18.0%	24.0%	22%
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0	3.0	4.0	3.0	2.0
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0
Lost Time Adjust (s)				-1.0	-1.0	-1.0	0.0	-1.0	0.0	
Total Lost Time (s)				4.0	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead		Lag	Lag	Lag		Lead		Lead	Lag
Lead-Lag Optimize?										
Recall Mode	None		None	None	None	None	C-Max	None	C-Max	None
v/c Ratio		1.01		0.82	0.57	0.50	0.84	0.91	1.06dr	
Control Delay		73.0		54.3	9.2	52.9	40.4	64.9	65.2	
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		73.0		54.3	9.2	52.9	40.4	64.9	65.2	
Queue Length 50th (ft)		~182		117	0	74	~197	121	~305	
Queue Length 95th (ft)		#326		#192	72	131	#311	m#207	#398	
Internal Link Dist (ft)		381		1188			1304		709	
Turn Bay Length (ft)						205		205		
Base Capacity (vph)		629		446	499	223	1104	219	993	
Starvation Cap Reductn		0		0	0	0	0	0	0	
Spillback Cap Reductn		0		0	0	0	0	0	0	
Storage Cap Reductn		0		0	0	0	0	0	0	
Reduced v/c Ratio		1.01		0.82	0.57	0.50	0.84	0.91	1.02	

Intersection Summary
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 34 (34%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.
dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Splits and Phases: 192: Columbus Avenue/Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

Lane Group	EBL	EBR	WBT	NEU	NEL	NET	SWU	SWT	SWR
Lane Configurations									
Volume (vph)	370	127	1	22	136	1244	14	1012	391
Lane Group Flow (vph)	385	132	44	0	159	1257	0	1140	434
Turn Type	Prot	Over	NA	custom	Prot	NA	Perm	NA	pm+ov
Protected Phases	3	1!	4		1	6		2	3
Permitted Phases				1!			2		2
Detector Phase	3	1	4	1	1	6	2	2	3
Switch Phase									
Minimum Initial (s)	8.0	4.0	8.0	4.0	4.0	8.0	8.0	8.0	8.0
Minimum Split (s)	13.0	12.0	26.0	12.0	12.0	24.0	24.0	24.0	13.0
Total Split (s)	22.0	15.0	26.0	15.0	15.0	52.0	37.0	37.0	22.0
Total Split (%)	22.0%	15.0%	26.0%	15.0%	15.0%	52.0%	37.0%	37.0%	22.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lead/Lag	Lead	Lead	Lag	Lead	Lead		Lag	Lag	Lead
Lead-Lag Optimize?									
Recall Mode	None	Min	Max	Min	Min	C-Max	C-Max	C-Max	None
v/c Ratio	0.80	0.52	0.11		2.52	0.59		1.18	0.66
Control Delay	41.7	32.3	19.3		748.2	12.7		118.6	17.7
Queue Delay	0.0	0.0	0.0		0.0	0.0		10.9	0.1
Total Delay	41.7	32.3	19.3		748.2	12.7		129.4	17.8
Queue Length 50th (ft)	124	18	11		~172	75		~471	173
Queue Length 95th (ft)	#186	93	24		#312	152		#604	271
Internal Link Dist (ft)			271			682		238	
Turn Bay Length (ft)					200				
Base Capacity (vph)	502	254	385		63	2119		970	667
Starvation Cap Reductn	0	0	0		0	0		20	10
Spillback Cap Reductn	0	0	0		0	0		0	0
Storage Cap Reductn	0	0	0		0	0		0	0
Reduced v/c Ratio	0.77	0.52	0.11		2.52	0.59		1.20	0.66

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 73 (73%), Referenced to phase 2:SWTU and 6:NET, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
! Phase conflict between lane groups.

Splits and Phases: 611: Tremont Street & Ruggles St/Whittier St

Lane Group	EBR	NET	SWT
Lane Configurations			
Volume (vph)	43	1554	1369
Lane Group Flow (vph)	49	1682	1504
Turn Type	custom	NA	NA
Protected Phases	5	1	1
Permitted Phases			
Detector Phase	5	1	1
Switch Phase			
Minimum Initial (s)	6.0	10.0	10.0
Minimum Split (s)	27.0	27.0	27.0
Total Split (s)	37.0	63.0	63.0
Total Split (%)	37.0%	63.0%	63.0%
Yellow Time (s)	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0
Lead/Lag			
Lead-Lag Optimize?			
Recall Mode	None	C-Max	C-Max
v/c Ratio	0.23	0.47	0.41
Control Delay	17.8	0.7	4.5
Queue Delay	0.1	0.1	0.3
Total Delay	17.8	0.8	4.7
Queue Length 50th (ft)	9	2	46
Queue Length 95th (ft)	36	6	174
Internal Link Dist (ft)		238	380
Turn Bay Length (ft)			
Base Capacity (vph)	502	3591	3664
Starvation Cap Reductn	0	491	1273
Spillback Cap Reductn	106	0	647
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.12	0.54	0.63

Intersection Summary
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 76 (76%), Referenced to phase 1:NESW, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Splits and Phases: 3082: Tremont Street & Renaissance Park/Ruggles St

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Volume (vph)	51	163	882	77	130	408	1017	34	331
Lane Group Flow (vph)	58	168	959	129	0	555	1048	0	413
Turn Type	NA	Perm	Split	NA	pm+pt	NA	Free	Perm	NA
Protected Phases	5		6	6	7	1 7			1
Permitted Phases		5			1 7		Free	1	
Detector Phase	5	5	6	6	1 7	1 7		1	1
Switch Phase									
Minimum Initial (s)	8.0	8.0	10.0	10.0	4.0			10.0	10.0
Minimum Split (s)	25.0	25.0	22.0	22.0	9.0			29.0	29.0
Total Split (s)	25.0	25.0	26.0	26.0	10.0			29.0	29.0
Total Split (%)	27.8%	27.8%	28.9%	28.9%	11.1%			32.2%	32.2%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0			3.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0			1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0					0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0					4.0
Lead/Lag	Lead	Lead	Lag	Lag					
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	Max			C-Max	C-Max
v/c Ratio	0.28	0.53	1.23	0.32		0.51	0.66		0.36
Control Delay	38.2	11.9	145.6	30.6		18.0	2.2		21.2
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Delay	38.2	11.9	145.6	30.6		18.0	2.2		21.2
Queue Length 50th (ft)	32	0	~350	60		89	0		80
Queue Length 95th (ft)	59	50	#470	111		165	0		146
Internal Link Dist (ft)	60			36		380			183
Turn Bay Length (ft)			350						
Base Capacity (vph)	407	465	781	401		1082	1586		1152
Starvation Cap Reductn	0	0	0	0		0	0		0
Spillback Cap Reductn	0	0	0	0		0	0		0
Storage Cap Reductn	0	0	0	0		0	0		0
Reduced v/c Ratio	0.14	0.36	1.23	0.32		0.51	0.66		0.36

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3098: Tremont Street/Tremont St & Melnea Cass Boulevard

Lane Group	EBL	NBL	NBT	SBU	SBT	ø2
Lane Configurations						
Volume (vph)	57	74	1281	13	1093	
Lane Group Flow (vph)	89	0	1397	0	1282	
Turn Type	NA	pm+pt	NA	Perm	NA	
Protected Phases	5	6	1 6		1	2
Permitted Phases		1 6		1		
Detector Phase	5	6	1 6	1	1	
Switch Phase						
Minimum Initial (s)	8.0	4.0		8.0	8.0	8.0
Minimum Split (s)	14.0	8.0		25.0	25.0	19.0
Total Split (s)	16.0	8.0		57.0	57.0	19.0
Total Split (%)	16.0%	8.0%		57.0%	57.0%	19%
Yellow Time (s)	3.0	3.0		3.0	3.0	2.0
All-Red Time (s)	1.0	1.0		2.0	2.0	0.0
Lost Time Adjust (s)	0.0				-1.0	
Total Lost Time (s)	4.0				4.0	
Lead/Lag	Lead	Lag		Lead	Lead	Lag
Lead-Lag Optimize?						
Recall Mode	None	Max		C-Max	C-Max	None
v/c Ratio	0.53		0.60		0.76	
Control Delay	48.0		12.4		25.5	
Queue Delay	0.0		0.0		0.0	
Total Delay	48.0		12.4		25.5	
Queue Length 50th (ft)	47		67		377	
Queue Length 95th (ft)	87		m345		m234	
Internal Link Dist (ft)	258		709		105	
Turn Bay Length (ft)						
Base Capacity (vph)	207		2333		1690	
Starvation Cap Reductn	0		0		0	
Spillback Cap Reductn	0		0		0	
Storage Cap Reductn	0		0		0	
Reduced v/c Ratio	0.43		0.60		0.76	

Intersection Summary
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 57 (57%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4023: Tremont Street & Prentiss St

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	110	1290	60	0	1155
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	120	1402	65	0	1255
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			185			762
pX, platoon unblocked	0.77	0.87			0.87	
vC, conflicting volume	2062	500			1467	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	730	0			1000	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	87			100	
cM capacity (veh/h)	274	940			596	

Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	120	561	561	346	628	628
Volume Left	0	0	0	0	0	0
Volume Right	120	0	0	65	0	0
cSH	940	1700	1700	1700	1700	1700
Volume to Capacity	0.13	0.33	0.33	0.20	0.37	0.37
Queue Length 95th (ft)	11	0	0	0	0	0
Control Delay (s)	9.4	0.0	0.0	0.0	0.0	0.0
Lane LOS	A					
Approach Delay (s)	9.4	0.0			0.0	
Approach LOS	A					

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	39.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	NWL	NWR	NET	NER	SWL	SWT	ø9
Lane Configurations							
Volume (vph)	43	56	1878	226	121	1024	
Lane Group Flow (vph)	47	61	2041	246	0	1245	
Turn Type	NA	Perm	NA	pm+ov	pm+pt	NA	
Protected Phases	2		4	2	3	8	9
Permitted Phases		2		4	8		
Detector Phase	2	2	4	2	3	8	
Switch Phase							
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	21.0	21.0	21.0	21.0	9.0	21.0	22.0
Total Split (s)	21.0	21.0	62.0	21.0	16.0	78.0	21.0
Total Split (%)	17.5%	17.5%	51.7%	17.5%	13.3%	65.0%	18%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.0	4.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	0.0	1.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0		5.0	
Lead/Lag			Lag		Lead		
Lead-Lag Optimize?							
Recall Mode	None	None	C-Max	None	None	C-Max	None
v/c Ratio	0.37	0.36	0.54	0.17		1.19dl	
Control Delay	60.6	18.7	4.3	0.0		8.9	
Queue Delay	0.3	0.0	57.9	0.1		0.1	
Total Delay	60.9	18.7	62.2	0.1		8.9	
Queue Length 50th (ft)	35	0	33	0		20	
Queue Length 95th (ft)	74	42	m206	m0		m150	
Internal Link Dist (ft)	411		138			156	
Turn Bay Length (ft)				100			
Base Capacity (vph)	236	264	3774	1412		2271	
Starvation Cap Reductn	0	0	1957	294		0	
Spillback Cap Reductn	43	0	0	0		143	
Storage Cap Reductn	0	0	0	0		0	
Reduced v/c Ratio	0.24	0.23	1.12	0.22		0.59	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 113 (94%), Referenced to phase 4:NET and 8:SWTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 6: Tremont Street & Site Drive

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	43	56	1878	226	121	1024
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	12	12
Total Lost time (s)	5.0	5.0	5.0	5.0		5.0
Lane Util. Factor	1.00	1.00	0.91	1.00		0.91
Frt	1.00	0.85	1.00	0.85		1.00
Flt Protected	0.95	1.00	1.00	1.00		0.99
Satd. Flow (prot)	1770	1583	4848	1531		4614
Flt Permitted	0.95	1.00	1.00	1.00		0.63
Satd. Flow (perm)	1770	1583	4848	1531		2917
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	61	2041	246	132	1113
RTOR Reduction (vph)	0	57	0	21	0	0
Lane Group Flow (vph)	47	4	2041	225	0	1245
Heavy Vehicles (%)	2%	2%	7%	2%	2%	13%
Turn Type	NA	Perm	NA	pm+ov	pm+pt	NA
Protected Phases	2		4	2	3	8
Permitted Phases		2		4	8	
Actuated Green, G (s)	8.6	8.6	91.6	100.2		91.6
Effective Green, g (s)	8.6	8.6	91.6	100.2		91.6
Actuated g/C Ratio	0.07	0.07	0.76	0.84		0.76
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)	127	113	3701	1342		2227
v/s Ratio Prot	c0.03		0.42	0.01		
v/s Ratio Perm		0.00		0.14		c0.43
v/c Ratio	0.37	0.04	0.55	0.17		1.19dl
Uniform Delay, d1	53.1	51.9	5.8	1.9		5.9
Progression Factor	1.00	1.00	0.61	0.00		1.13
Incremental Delay, d2	1.8	0.1	0.1	0.0		0.2
Delay (s)	54.9	52.0	3.6	0.0		6.8
Level of Service	D	D	A	A		A
Approach Delay (s)	53.3		3.2			6.8
Approach LOS	D		A			A

Intersection Summary

HCM Average Control Delay	5.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	19.8
Intersection Capacity Utilization	74.4%	ICU Level of Service	D
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	ø2
Lane Configurations										
Volume (vph)	250	315	64	411	437	174	1512	150	656	
Lane Group Flow (vph)	0	869	0	495	455	185	1696	164	900	
Turn Type	pm+pt	NA	Perm	NA	Prot	Prot	NA	Prot	NA	
Protected Phases	3	3 4		4	4	5	1	5	1	2
Permitted Phases	3 4		4							
Detector Phase	3	3 4	4	4	4	5	1	5	1	
Switch Phase										
Minimum Initial (s)	4.0		8.0	8.0	8.0	4.0	12.0	4.0	12.0	8.0
Minimum Split (s)	10.0		14.0	14.0	14.0	13.0	18.0	13.0	18.0	22.0
Total Split (s)	14.0		25.0	25.0	25.0	16.0	43.0	16.0	43.0	22.0
Total Split (%)	11.7%		20.8%	20.8%	20.8%	13.3%	35.8%	13.3%	35.8%	18%
Yellow Time (s)	4.0		3.0	3.0	3.0	4.0	3.0	4.0	3.0	2.0
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0
Lost Time Adjust (s)				0.0	0.0	-1.0	0.0	-1.0	0.0	
Total Lost Time (s)				4.0	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead		Lag	Lag	Lag		Lead		Lead	Lag
Lead-Lag Optimize?										
Recall Mode	None		None	None	None	None	C-Max	None	C-Max	None
v/c Ratio		1.64		1.71	0.79	1.17	1.17	1.40	0.71	
Control Delay		325.7		364.0	16.4	165.0	112.2	260.7	45.6	
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		325.7		364.0	16.4	165.0	112.2	260.7	45.6	
Queue Length 50th (ft)		~510		~296	13	~170	~590	~175	183	
Queue Length 95th (ft)		#604		#407	#155	m#287	#691	#319	217	
Internal Link Dist (ft)		381		1183			1304		709	
Turn Bay Length (ft)						205		205		
Base Capacity (vph)		529		290	575	158	1447	117	1269	
Starvation Cap Reductn		0		0	0	0	0	0	0	
Spillback Cap Reductn		0		0	0	0	0	0	0	
Storage Cap Reductn		0		0	0	0	0	0	0	
Reduced v/c Ratio		1.64		1.71	0.79	1.17	1.17	1.40	0.71	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 93 (78%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated

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

Splits and Phases: 192: Columbus Avenue /Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Volume (vph)	250	315	182	64	411	437	174	1512	82	4	150	656
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor		0.95			0.95	1.00	1.00	0.91			1.00	0.91
Frt		0.96			1.00	0.85	1.00	0.99			1.00	0.97
Flt Protected		0.98			0.99	1.00	0.95	1.00			0.95	1.00
Satd. Flow (prot)		2898			2953	1232	1577	4452			1168	3907
Flt Permitted		0.56			0.56	1.00	0.95	1.00			0.95	1.00
Satd. Flow (perm)		1640			1658	1232	1577	4452			1168	3907
Peak-hour factor, PHF	0.86	0.86	0.86	0.96	0.96	0.96	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	291	366	212	67	428	455	185	1609	87	4	160	698
RTOR Reduction (vph)	0	0	0	0	0	360	0	0	0	0	0	0
Lane Group Flow (vph)	0	869	0	0	495	95	185	1696	0	0	164	900
Heavy Vehicles (%)	8%	5%	6%	11%	9%	18%	3%	4%	5%	0%	40%	8%
Parking (#/hr)												20
Turn Type	pm+pt	NA		Perm	NA	Prot	Prot	NA		Prot	Prot	NA
Protected Phases	3	3 4			4	4	5	1		5	5	1
Permitted Phases	3 4			4								
Actuated Green, G (s)		30.0			21.0	21.0	11.0	39.0			11.0	39.0
Effective Green, g (s)		32.0			21.0	21.0	12.0	39.0			12.0	39.0
Actuated g/C Ratio		0.27			0.18	0.18	0.10	0.32			0.10	0.32
Clearance Time (s)					4.0	4.0	5.0	4.0			5.0	4.0
Vehicle Extension (s)					2.0	2.0	2.0	2.0			2.0	2.0
Lane Grp Cap (vph)		542			290	216	158	1447			117	1270
v/s Ratio Prot		c0.13				0.08	0.12	c0.38			c0.14	0.23
v/s Ratio Perm		0.29			c0.30							
v/c Ratio		1.60			1.71	0.44	1.17	1.17			1.40	0.71
Uniform Delay, d1		44.0			49.5	44.3	54.0	40.5			54.0	35.5
Progression Factor		0.99			1.00	1.00	1.05	0.72			1.06	1.19
Incremental Delay, d2		278.9			332.4	0.5	116.2	83.4			219.3	2.9
Delay (s)		322.4			381.9	44.8	172.9	112.6			276.7	45.1
Level of Service		F			F	D	F	F			F	D
Approach Delay (s)		322.4			220.5			118.5				80.8
Approach LOS		F			F			F				F

Intersection Summary

HCM Average Control Delay	167.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.40		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	38.0
Intersection Capacity Utilization	111.6%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	SBR
Lane Configurations	
Volume (vph)	190
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.94
Adj. Flow (vph)	202
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Heavy Vehicles (%)	7%
Parking (#/hr)	
Turn Type Protected	
Phases Permitted	
Phases Actuated	
Green, G (s) Effective	
Green, g (s) Actuated	
g/C Ratio Clearance	
Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

Lane Group	EBL	EBT	WBL	WBT	NEL	NET	SWL	SWT	SWR
Lane Configurations									
Volume (vph)	626	9	29	18	308	1713	9	879	808
Lane Group Flow (vph)	711	240	0	106	340	1862	27	916	842
Turn Type	Split	NA	Perm	NA	Prot	NA	Prot	NA	pm+ov
Protected Phases	3	3		4	1	6	5	2	3
Permitted Phases		3	4	4					2
Detector Phase	3	3	4	4	1	6	5	2	3
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	4.0	8.0	4.0	8.0	8.0
Minimum Split (s)	13.0	13.0	26.0	26.0	12.0	24.0	9.0	24.0	13.0
Total Split (s)	31.0	31.0	26.0	26.0	27.0	51.0	12.0	36.0	31.0
Total Split (%)	25.8%	25.8%	21.7%	21.7%	22.5%	42.5%	10.0%	30.0%	25.8%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	4.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0		4.0	4.0	4.0	5.0	4.0	4.0
Lead/Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	Min	C-Max	None	C-Max	None
v/c Ratio	1.10	0.60		0.66	1.40	0.87	0.30	0.92	1.17
Control Delay	114.5	21.2		58.7	241.5	26.7	55.7	50.3	113.1
Queue Delay	0.0	0.7		1.0	0.0	104.3	0.0	17.7	85.8
Total Delay	114.5	22.0		59.7	241.5	131.0	55.7	68.0	198.9
Queue Length 50th (ft)	~321	44		65	~347	461	20	227	~490
Queue Length 95th (ft)	#434	122		84	#534	#688	m41	#563	#825
Internal Link Dist (ft)		324		271		413		238	
Turn Bay Length (ft)					200		100		
Base Capacity (vph)	645	400		253	243	2131	94	995	718
Starvation Cap Reductn	0	33		0	0	0	0	101	0
Spillback Cap Reductn	0	0		41	0	619	0	0	102
Storage Cap Reductn	0	0		0	0	0	0	0	0
Reduced v/c Ratio	1.10	0.65		0.50	1.40	1.23	0.29	1.02	1.37

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:SWT and 6:NET, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 611: Tremont Street & Ruggles St/Whittier St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Volume (vph)	626	9	202	29	18	27	5	308	1713	0	17	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	12	16	12	12	11	11	12	12	10
Total Lost time (s)	4.0	4.0			4.0			4.0	4.0			5.0
Lane Util. Factor	0.97	1.00			1.00			1.00	0.91			1.00
Frpb, ped/bikes	1.00	0.98			0.99			1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00			1.00			1.00	1.00			1.00
Frt	1.00	0.86			0.95			1.00	1.00			1.00
Flt Protected	0.95	1.00			0.98			0.95	1.00			0.95
Satd. Flow (prot)	2865	986			1613			1270	4257			1516
Flt Permitted	0.95	1.00			0.78			0.95	1.00			0.95
Satd. Flow (perm)	2865	986			1286			1270	4257			1516
Peak-hour factor, PHF	0.88	0.88	0.88	0.70	0.70	0.70	0.92	0.92	0.92	0.92	0.96	0.96
Adj. Flow (vph)	711	10	230	41	26	39	5	335	1862	0	18	9
RTOR Reduction (vph)	0	178	0	0	19	0	0	0	0	0	0	0
Lane Group Flow (vph)	711	62	0	0	87	0	0	340	1862	0	0	27
Confl. Peds. (#/hr)	8		9	9		8		20				
Heavy Vehicles (%)	10%	0%	42%	14%	0%	14%	0%	24%	6%	0%	0%	0%
Parking (#/hr)				15		0						
Turn Type	Split	NA		Perm	NA		Prot	Prot	NA		Prot	Prot
Protected Phases	3	3			4		1	1	6		5	5
Permitted Phases		3		4	4							
Actuated Green, G (s)	27.0	27.0			13.3			23.0	58.1			4.6
Effective Green, g (s)	27.0	27.0			13.3			23.0	58.1			4.6
Actuated g/C Ratio	0.22	0.22			0.11			0.19	0.48			0.04
Clearance Time (s)	4.0	4.0			4.0			4.0	4.0			5.0
Vehicle Extension (s)	2.0	2.0			2.0			2.0	2.0			3.0
Lane Grp Cap (vph)	645	222			143			243	2061			58
v/s Ratio Prot	0.25	0.06						c0.27	0.44			0.02
v/s Ratio Perm					c0.07							
v/c Ratio	1.10	0.28			0.61			1.40	0.90			0.47
Uniform Delay, d1	46.5	38.4			50.9			48.5	28.4			56.5
Progression Factor	1.13	2.36			1.00			1.19	0.72			0.88
Incremental Delay, d2	66.4	0.2			5.3			200.0	6.2			5.1
Delay (s)	118.9	90.8			56.2			257.6	26.8			55.1
Level of Service	F	F			E			F	C			E
Approach Delay (s)		111.8			56.2				62.4			
Approach LOS		F			E				E			

Intersection Summary

HCM Average Control Delay	73.0	HCM Level of Service	E
HCM Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	120.0	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	SWT	SWR
Lane Configurations		
Volume (vph)	879	808
Ideal Flow (vphpl)	1900	1900
Lane Width	11	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frpb, ped/bikes	1.00	0.95
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	2935	1272
Flt Permitted	1.00	1.00
Satd. Flow (perm)	2935	1272
Peak-hour factor, PHF	0.96	0.96
Adj. Flow (vph)	916	842
RTOR Reduction (vph)	0	0
Lane Group Flow (vph)	916	842
Confl. Peds. (#/hr)		20
Heavy Vehicles (%)	7%	5%
Parking (#/hr)		
Turn Type	NA	pm+ov
Protected Phases	2	3
Permitted Phases		2
Actuated Green, G (s)	40.7	67.7
Effective Green, g (s)	40.7	67.7
Actuated g/C Ratio	0.34	0.56
Clearance Time (s)	4.0	4.0
Vehicle Extension (s)	2.0	2.0
Lane Grp Cap (vph)	995	760
v/s Ratio Prot	0.31	c0.25
v/s Ratio Perm		0.41
v/c Ratio	0.92	1.11
Uniform Delay, d1	38.1	26.1
Progression Factor	0.94	0.81
Incremental Delay, d2	13.4	64.6
Delay (s)	49.1	85.8
Level of Service	D	F
Approach Delay (s)	66.5	
Approach LOS	E	

Intersection Summary

Lane Group	EBR	NET	SWT
Lane Configurations			
Volume (vph)	24	2092	1715
Lane Group Flow (vph)	33	2391	1768
Turn Type	custom	NA	NA
Protected Phases	5	1	1
Permitted Phases			
Detector Phase	5	1	1
Switch Phase			
Minimum Initial (s)	6.0	10.0	10.0
Minimum Split (s)	27.0	27.0	27.0
Total Split (s)	38.0	82.0	82.0
Total Split (%)	31.7%	68.3%	68.3%
Yellow Time (s)	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0
Lead/Lag			
Lead-Lag Optimize?			
Recall Mode	None	C-Max	C-Max
v/c Ratio	0.18	0.71	0.51
Control Delay	19.8	11.0	5.5
Queue Delay	0.2	50.0	0.4
Total Delay	20.0	61.0	5.9
Queue Length 50th (ft)	4	611	192
Queue Length 95th (ft)	22	m663	225
Internal Link Dist (ft)		238	380
Turn Bay Length (ft)			
Base Capacity (vph)	352	3366	3498
Starvation Cap Reductn	0	1205	1014
Spillback Cap Reductn	96	0	295
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.13	1.11	0.71

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 14 (12%), Referenced to phase 1:NESW, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3082: Tremont Street & Renaissance Park/Ruggles St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	24	0	0	0	0	2092	227	0	1715	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	16	12	11	12	12	11	12
Total Lost time (s)			4.0					4.0			4.0	
Lane Util. Factor			1.00					0.91			0.91	
Frpb, ped/bikes			1.00					0.99			1.00	
Flpb, ped/bikes			1.00					1.00			1.00	
Frt			0.86					0.99			1.00	
Flt Protected			1.00					1.00			1.00	
Satd. Flow (prot)			1174					4090			4257	
Flt Permitted			1.00					1.00			1.00	
Satd. Flow (perm)			1174					4090			4257	
Peak-hour factor, PHF	0.72	0.72	0.72	0.92	0.92	0.92	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	0	33	0	0	0	0	2157	234	0	1768	0
RTOR Reduction (vph)	0	0	24	0	0	0	0	6	0	0	0	0
Lane Group Flow (vph)	0	0	9	0	0	0	0	2385	0	0	1768	0
Confl. Peds. (#/hr)									12			
Heavy Vehicles (%)	0%	0%	26%	0%	0%	0%	0%	7%	18%	0%	6%	0%
Turn Type Protected			custom					NA			NA	
Phases Permitted			5					1			1	
Phases Actuated												
Green, G (s)			15.0					97.0			97.0	
Effective Green, g (s)			15.0					97.0			97.0	
Actuated g/C Ratio			0.12					0.81			0.81	
Clearance Time (s)			4.0					4.0			4.0	
Vehicle Extension (s)			2.0					2.0			2.0	
Lane Grp Cap (vph)			147					3306			3441	
v/s Ratio Prot			c0.01					c0.58			0.42	
v/s Ratio Perm												
v/c Ratio			0.06					0.72			0.51	
Uniform Delay, d1			46.3					5.3			3.8	
Progression Factor			1.00					1.48			1.00	
Incremental Delay, d2			0.1					0.5			0.6	
Delay (s)			46.4					8.4			4.3	
Level of Service			D					A			A	
Approach Delay (s)		46.4			0.0			8.4			4.3	
Approach LOS		D			A			A			A	

Intersection Summary

HCM Average Control Delay	7.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	54.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Volume (vph)	48	174	1232	194	374	719	1206	15	434
Lane Group Flow (vph)	73	210	1283	259	0	1322	1370	0	520
Turn Type	NA	Perm	Split	NA	pm+pt	NA	Free	Perm	NA
Protected Phases	5		6	6	7	1 7			1
Permitted Phases		5			1 7		Free	1	
Detector Phase	5	5	6	6	1 7	1 7		1	1
Switch Phase									
Minimum Initial (s)	8.0	8.0	10.0	10.0	4.0			10.0	10.0
Minimum Split (s)	25.0	25.0	22.0	22.0	9.0			29.0	29.0
Total Split (s)	21.0	21.0	29.0	29.0	21.0			29.0	29.0
Total Split (%)	21.0%	21.0%	29.0%	29.0%	21.0%			29.0%	29.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0			3.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0			1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0					0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0					4.0
Lead/Lag	Lead	Lead	Lag	Lag					
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	Max			C-Max	C-Max
v/c Ratio	0.43	0.63	1.70	0.67		1.25	0.89		0.76
Control Delay	48.6	14.5	348.9	43.6		144.1	9.5		40.4
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Delay	48.6	14.5	348.9	43.6		144.1	9.5		40.4
Queue Length 50th (ft)	45	0	~623	149		~488	0		151
Queue Length 95th (ft)	77	47	#753	224		#485	0		#281
Internal Link Dist (ft)	34			60		380			216
Turn Bay Length (ft)			350						
Base Capacity (vph)	278	412	754	386		1056	1532		681
Starvation Cap Reductn	0	0	0	0		0	0		0
Spillback Cap Reductn	0	0	0	0		0	0		0
Storage Cap Reductn	0	0	0	0		0	0		0
Reduced v/c Ratio	0.26	0.51	1.70	0.67		1.25	0.89		0.76

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 145
Control Type: Actuated-Coordinated

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Splits and Phases: 3098: Tremont Street /Tremont St & Melnea Cass Boulevard

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	48	174	1232	194	27	374	719	1206	15	434	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	13	12	13	13	12	12	11	16	12	14	12
Total Lost time (s)		4.0	4.0	4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor		1.00	1.00	0.97	1.00			0.95	1.00		0.95	
Frpb, ped/bikes		1.00	1.00	1.00	1.00			1.00	0.99		1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt		1.00	0.85	1.00	0.98			1.00	0.85		0.99	
Flt Protected		0.99	1.00	0.95	1.00			0.98	1.00		1.00	
Satd. Flow (prot)		1633	1398	3015	1542			2922	1532		3252	
Flt Permitted		0.99	1.00	0.95	1.00			0.60	1.00		0.66	
Satd. Flow (perm)		1633	1398	3015	1542			1776	1532		2150	
Peak-hour factor, PHF	0.38	0.84	0.83	0.96	0.86	0.81	0.82	0.83	0.88	0.54	0.93	0.55
Adj. Flow (vph)	16	57	210	1283	226	33	456	866	1370	28	467	25
RTOR Reduction (vph)	0	0	188	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	73	22	1283	259	0	0	1322	1370	0	517	0
Confl. Peds. (#/hr)									8			
Heavy Vehicles (%)	0%	9%	4%	8%	12%	15%	5%	6%	6%	20%	3%	36%
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA	Free	Perm	NA	
Protected Phases	5	5		6	6		7	1 7			1	
Permitted Phases			5				1 7		Free	1		
Actuated Green, G (s)		10.5	10.5	25.0	25.0			48.5	100.0		31.5	
Effective Green, g (s)		10.5	10.5	25.0	25.0			48.5	100.0		31.5	
Actuated g/C Ratio		0.10	0.10	0.25	0.25			0.48	1.00		0.32	
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	
Lane Grp Cap (vph)		171	147	754	386			1056	1532		677	
v/s Ratio Prot		0.04		c0.43	0.17			c0.21				
v/s Ratio Perm			0.02					c0.39	c0.89		0.24	
v/c Ratio		0.43	0.15	1.70	0.67			1.25	0.89		0.76	
Uniform Delay, d1		41.9	40.7	37.5	33.8			25.8	0.0		30.9	
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		0.6	0.2	321.4	3.6			121.3	8.4		8.0	
Delay (s)		42.6	40.9	358.9	37.4			147.0	8.4		38.9	
Level of Service		D	D	F	D			F	A		D	
Approach Delay (s)		41.3			304.9			76.5			38.9	
Approach LOS		D			F			E			D	

Intersection Summary

HCM Average Control Delay	140.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.32		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	104.2%	ICU Level of Service	G
Analysis Period (min)	15		

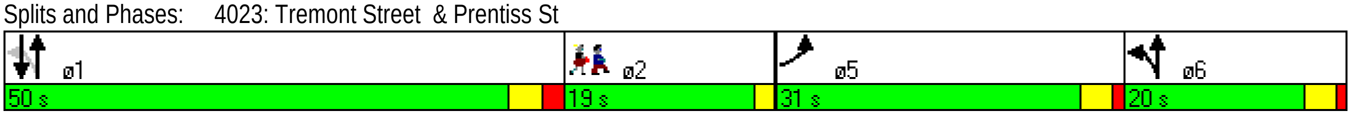
c Critical Lane Group

Lane Group	EBL	NBL	NBT	SBT	ø2
Lane Configurations					
Volume (vph)	125	266	1934	921	
Lane Group Flow (vph)	200	0	2472	1100	
Turn Type	NA	pm+pt	NA	NA	
Protected Phases	5	6	1 6	1	2
Permitted Phases		1 6			
Detector Phase	5	6	1 6	1	
Switch Phase					
Minimum Initial (s)	8.0	4.0		8.0	8.0
Minimum Split (s)	14.0	8.0		25.0	19.0
Total Split (s)	31.0	20.0		50.0	19.0
Total Split (%)	25.8%	16.7%		41.7%	16%
Yellow Time (s)	3.0	3.0		3.0	2.0
All-Red Time (s)	1.0	1.0		2.0	0.0
Lost Time Adjust (s)	0.0			-1.0	
Total Lost Time (s)	4.0			4.0	
Lead/Lag	Lead	Lag		Lead	Lag
Lead-Lag Optimize?					
Recall Mode	None	Max		C-Max	None
v/c Ratio	0.79		1.19	0.55	
Control Delay	67.1		111.4	23.4	
Queue Delay	0.0		31.2	0.6	
Total Delay	67.1		142.6	24.0	
Queue Length 50th (ft)	144		~438	108	
Queue Length 95th (ft)	176		m#766	348	
Internal Link Dist (ft)	258		709	138	
Turn Bay Length (ft)					
Base Capacity (vph)	344		2073	1991	
Starvation Cap Reductn	0		0	485	
Spillback Cap Reductn	0		115	0	
Storage Cap Reductn	0		0	0	
Reduced v/c Ratio	0.58		1.26	0.73	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 99 (83%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4023: Tremont Street & Prentiss St



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	125	29	266	1934	921	146
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	11	11	12
Total Lost time (s)	4.0			4.0	4.0	
Lane Util. Factor	1.00			0.91	0.91	
Frt	0.97			1.00	0.98	
Flt Protected	0.96			0.99	1.00	
Satd. Flow (prot)	1501			4211	3664	
Flt Permitted	0.96			0.66	1.00	
Satd. Flow (perm)	1501			2801	3664	
Peak-hour factor, PHF	0.77	0.77	0.89	0.89	0.97	0.97
Adj. Flow (vph)	162	38	299	2173	949	151
RTOR Reduction (vph)	8	0	0	0	14	0
Lane Group Flow (vph)	192	0	0	2472	1086	0
Heavy Vehicles (%)	11%	7%	3%	7%	13%	10%
Parking (#/hr)					20	
Turn Type	NA		pm+pt	NA	NA	
Protected Phases	5		6	1 6	1	
Permitted Phases			1 6			
Actuated Green, G (s)	19.6			78.6	62.6	
Effective Green, g (s)	19.6			80.6	63.6	
Actuated g/C Ratio	0.16			0.67	0.53	
Clearance Time (s)	4.0				5.0	
Vehicle Extension (s)	2.0				2.0	
Lane Grp Cap (vph)	245			2081	1942	
v/s Ratio Prot	c0.13			c0.17	0.30	
v/s Ratio Perm				c0.63		
v/c Ratio	0.79			1.19	0.56	
Uniform Delay, d1	48.2			19.7	18.8	
Progression Factor	1.00			1.58	1.08	
Incremental Delay, d2	14.1			85.0	1.0	
Delay (s)	62.3			116.2	21.4	
Level of Service	E			F	C	
Approach Delay (s)	62.3			116.2	21.4	
Approach LOS	E			F	C	

Intersection Summary

HCM Average Control Delay	85.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.8
Intersection Capacity Utilization	90.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	NWL	NWR	NET	NER	SWL	SWT	ø9
Lane Configurations							
Volume (vph)	208	146	1560	150	156	1558	
Lane Group Flow (vph)	226	159	1696	163	0	1863	
Turn Type	NA	Perm	NA	pm+ov	pm+pt	NA	
Protected Phases	2		4	2	3	8	9
Permitted Phases		2		4	8		
Detector Phase	2	2	4	2	3	8	
Switch Phase							
Minimum Initial (s)	8.0	8.0	4.0	8.0	4.0	4.0	4.0
Minimum Split (s)	19.0	19.0	8.0	19.0	9.0	21.0	21.0
Total Split (s)	25.0	25.0	55.0	25.0	19.0	74.0	21.0
Total Split (%)	20.8%	20.8%	45.8%	20.8%	15.8%	61.7%	18%
Yellow Time (s)	2.0	2.0	3.0	2.0	4.0	4.0	3.0
All-Red Time (s)	0.0	0.0	1.0	0.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	
Total Lost Time (s)	2.0	2.0	4.0	2.0		5.0	
Lead/Lag			Lag		Lead		
Lead-Lag Optimize?							
Recall Mode	None	None	C-Max	None	None	C-Max	None
v/c Ratio	0.81	0.42	0.49	0.11		1.18dl	
Control Delay	70.8	9.8	6.0	1.3		20.3	
Queue Delay	18.7	0.0	1.8	0.0		4.6	
Total Delay	89.5	9.8	7.9	1.3		24.9	
Queue Length 50th (ft)	170	0	40	0		178	
Queue Length 95th (ft)	252	58	m158	m12		m254	
Internal Link Dist (ft)	282		139			163	
Turn Bay Length (ft)				100			
Base Capacity (vph)	339	432	3473	1418		2126	
Starvation Cap Reductn	0	0	1547	317		0	
Spillback Cap Reductn	101	0	0	0		208	
Storage Cap Reductn	0	0	0	0		0	
Reduced v/c Ratio	0.95	0.37	0.88	0.15		0.97	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 4:NET and 8:SWTL, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 6: Tremont Street & Site Drive

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	208	146	1560	150	156	1558
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	12	12
Total Lost time (s)	2.0	2.0	4.0	2.0		5.0
Lane Util. Factor	1.00	1.00	0.91	1.00		0.91
Frt	1.00	0.85	1.00	0.85		1.00
Flt Protected	0.95	1.00	1.00	1.00		1.00
Satd. Flow (prot)	1770	1583	4803	1531		4686
Flt Permitted	0.95	1.00	1.00	1.00		0.63
Satd. Flow (perm)	1770	1583	4803	1531		2975
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	226	159	1696	163	170	1693
RTOR Reduction (vph)	0	134	0	15	0	0
Lane Group Flow (vph)	226	25	1696	148	0	1863
Heavy Vehicles (%)	2%	2%	8%	2%	2%	11%
Turn Type	NA	Perm	NA	pm+ov	pm+pt	NA
Protected Phases	2		4	2	3	8
Permitted Phases		2		4	8	
Actuated Green, G (s)	18.8	18.8	84.4	103.2		83.4
Effective Green, g (s)	18.8	18.8	84.4	103.2		83.4
Actuated g/C Ratio	0.16	0.16	0.70	0.86		0.70
Clearance Time (s)	2.0	2.0	4.0	2.0		5.0
Vehicle Extension (s)	2.0	2.0	2.0	2.0		3.0
Lane Grp Cap (vph)	277	248	3378	1342		2068
v/s Ratio Prot	c0.13		0.35	0.02		
v/s Ratio Perm		0.02		0.08		c0.63
v/c Ratio	0.82	0.10	0.50	0.11		1.18dl
Uniform Delay, d1	48.9	43.4	8.2	1.3		14.9
Progression Factor	1.00	1.00	0.62	1.74		1.21
Incremental Delay, d2	15.9	0.1	0.2	0.0		0.6
Delay (s)	64.8	43.4	5.3	2.3		18.6
Level of Service	E	D	A	A		B
Approach Delay (s)	56.0		5.0			18.6
Approach LOS	E		A			B

Intersection Summary

HCM Average Control Delay	15.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.8
Intersection Capacity Utilization	85.8%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	ø2
Lane Configurations										
Volume (vph)	335	413	238	410	418	242	1024	336	1263	
Lane Group Flow (vph)	0	1059	0	705	454	282	1481	348	1595	
Turn Type	pm+pt	NA	Perm	NA	Perm	Prot	NA	Prot	NA	
Protected Phases	3	3 4		4		5	1	5	1	2
Permitted Phases	3 4		4		4					
Detector Phase	3	3 4	4	4	4	5	1	5	1	
Switch Phase										
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0	12.0	4.0	12.0	8.0
Minimum Split (s)	10.0		14.0	14.0	14.0	13.0	18.0	13.0	18.0	22.0
Total Split (s)	12.0		32.0	32.0	32.0	24.0	30.0	24.0	30.0	22.0
Total Split (%)	10.0%		26.7%	26.7%	26.7%	20.0%	25.0%	20.0%	25.0%	18%
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0	3.0	4.0	3.0	2.0
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0
Lost Time Adjust (s)				-1.0	-1.0	-1.0	0.0	-1.0	0.0	
Total Lost Time (s)				4.0	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead		Lag	Lag	Lag		Lead		Lead	Lag
Lead-Lag Optimize?										
Recall Mode	None		None	None	None	None	C-Max	None	C-Max	None
v/c Ratio		2.18dl		4.80dl	0.70	1.07	1.36	1.55	1.52	
Control Delay		411.4		365.9	10.2	113.5	205.9	284.4	276.4	
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		411.4		365.9	10.2	113.5	205.9	284.4	276.4	
Queue Length 50th (ft)		~654		~424	0	~248	~612	~392	~697	
Queue Length 95th (ft)		m#787		#547	105	#398	#667	m#378	m#658	
Internal Link Dist (ft)		381		1186			1304		709	
Turn Bay Length (ft)						205		205		
Base Capacity (vph)		575		409	646	263	1085	224	1052	
Starvation Cap Reductn		0		0	0	0	0	0	0	
Spillback Cap Reductn		0		0	0	0	0	0	0	
Storage Cap Reductn		0		0	0	0	0	0	0	
Reduced v/c Ratio		1.84		1.72	0.70	1.07	1.36	1.55	1.52	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 119 (99%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 192: Columbus Avenue/Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (vph)	335	413	279	238	410	418	1	242	1024	249	2	336
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0		4.0	4.0			4.0
Lane Util. Factor		0.95			0.95	1.00		1.00	0.91			1.00
Frt		0.96			1.00	0.85		1.00	0.97			1.00
Flt Protected		0.98			0.98	1.00		0.95	1.00			0.95
Satd. Flow (prot)		2920			3028	1275		1577	4283			1344
Flt Permitted		0.55			0.57	1.00		0.95	1.00			0.95
Satd. Flow (perm)		1629			1750	1275		1577	4283			1344
Peak-hour factor, PHF	0.97	0.97	0.97	0.92	0.92	0.92	0.86	0.86	0.86	0.86	0.97	0.97
Adj. Flow (vph)	345	426	288	259	446	454	1	281	1191	290	2	346
RTOR Reduction (vph)	0	0	0	0	0	348	0	0	0	0	0	0
Lane Group Flow (vph)	0	1059	0	0	705	106	0	282	1481	0	0	348
Heavy Vehicles (%)	5%	5%	5%	6%	5%	14%	0%	3%	5%	9%	0%	21%
Parking (#/hr)												
Turn Type	pm+pt	NA		Perm	NA	Perm	Prot	Prot	NA		Prot	Prot
Protected Phases	3	3 4			4		5	5	1		5	5
Permitted Phases	3 4			4		4						
Actuated Green, G (s)		34.0			27.0	27.0		19.0	30.0			19.0
Effective Green, g (s)		36.0			28.0	28.0		20.0	30.0			20.0
Actuated g/C Ratio		0.30			0.23	0.23		0.17	0.25			0.17
Clearance Time (s)					5.0	5.0		5.0	4.0			5.0
Vehicle Extension (s)					3.0	3.0		2.0	2.0			2.0
Lane Grp Cap (vph)		575			408	298		263	1071			224
v/s Ratio Prot		c0.12						0.18	0.35			c0.26
v/s Ratio Perm		c0.43			0.40	0.08						
v/c Ratio		2.18dl			4.80dl	0.36		1.07	1.38			1.55
Uniform Delay, d1		42.0			46.0	38.5		50.0	45.0			50.0
Progression Factor		1.05			1.00	1.00		0.82	1.04			0.94
Incremental Delay, d2		384.6			337.7	0.7		73.0	177.5			251.1
Delay (s)		428.5			383.7	39.2		113.8	224.2			298.2
Level of Service		F			F	D		F	F			F
Approach Delay (s)		428.5			248.8				206.6			
Approach LOS		F			F				F			

Intersection Summary

HCM Average Control Delay	289.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.67		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	34.0
Intersection Capacity Utilization	124.5%	ICU Level of Service	H
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

Movement	SBT	SBR
Lane Configurations		
Volume (vph)	1263	284
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	4.0	
Lane Util. Factor	0.91	
Frt	0.97	
Flt Protected	1.00	
Satd. Flow (prot)	4158	
Flt Permitted	1.00	
Satd. Flow (perm)	4158	
Peak-hour factor, PHF	0.97	0.97
Adj. Flow (vph)	1302	293
RTOR Reduction (vph)	0	0
Lane Group Flow (vph)	1595	0
Heavy Vehicles (%)	3%	2%
Parking (#/hr)	15	
Turn Type	NA	
Protected Phases	1	
Permitted Phases		
Actuated Green, G (s)	30.0	
Effective Green, g (s)	30.0	
Actuated g/C Ratio	0.25	
Clearance Time (s)	4.0	
Vehicle Extension (s)	2.0	
Lane Grp Cap (vph)	1040	
v/s Ratio Prot	c0.38	
v/s Ratio Perm		
v/c Ratio	1.53	
Uniform Delay, d1	45.0	
Progression Factor	1.65	
Incremental Delay, d2	240.6	
Delay (s)	314.9	
Level of Service	F	
Approach Delay (s)	311.9	
Approach LOS	F	

Intersection Summary

Lane Group	EBL	EBT	WBL	WBT	NEL	NET	SWL	SWT	SWR
Lane Configurations									
Volume (vph)	957	15	48	28	252	1655	18	1263	558
Lane Group Flow (vph)	1088	433	0	161	295	1860	71	1316	581
Turn Type	Split	NA	Perm	NA	Prot	NA	Prot	NA	pm+ov
Protected Phases	3	3		4	1	6	5	2	3
Permitted Phases		3	4						2
Detector Phase	3	3	4	4	1	6	5	2	3
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	4.0	8.0	4.0	8.0	8.0
Minimum Split (s)	13.0	13.0	26.0	26.0	12.0	24.0	9.0	24.0	13.0
Total Split (s)	31.0	31.0	26.0	26.0	21.0	51.0	12.0	42.0	31.0
Total Split (%)	25.8%	25.8%	21.7%	21.7%	17.5%	42.5%	10.0%	35.0%	25.8%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	4.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0		4.0	4.0	4.0	5.0	4.0	4.0
Lead/Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	Min	C-Max	None	C-Max	None
v/c Ratio	1.61	0.84		0.85	1.60	1.03	0.64	1.21	0.79
Control Delay	317.5	37.6		76.6	333.3	66.0	72.1	138.1	34.0
Queue Delay	397.6	0.5		3.8	0.0	16.8	0.0	144.0	3.3
Total Delay	715.1	38.0		80.4	333.3	82.8	72.1	282.1	37.3
Queue Length 50th (ft)	~637	119		101	~338	~614	54	~679	372
Queue Length 95th (ft)	#744	#271		159	#514	#677	m#136	#861	#526
Internal Link Dist (ft)		324		271		405		238	
Turn Bay Length (ft)					200		100		
Base Capacity (vph)	675	516		230	184	1801	111	1091	739
Starvation Cap Reductn	0	7		0	0	0	0	230	86
Spillback Cap Reductn	483	0		26	0	72	0	0	33
Storage Cap Reductn	0	0		0	0	0	0	0	0
Reduced v/c Ratio	5.67	0.85		0.79	1.60	1.08	0.64	1.53	0.89

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:SWT and 6:NET, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

Splits and Phases: 611: Tremont Street & Ruggles St/Whittier St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Volume (vph)	957	15	366	48	28	57	11	252	1655	0	50	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	12	12	12	12	11	11	12	12	12
Total Lost time (s)	4.0	4.0			4.0			4.0	4.0			5.0
Lane Util. Factor	0.97	1.00			1.00			1.00	0.91			1.00
Frpb, ped/bikes	1.00	0.97			0.99			1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00			0.99			1.00	1.00			1.00
Frt	1.00	0.86			0.94			1.00	1.00			1.00
Flt Protected	0.95	1.00			0.98			0.95	1.00			0.95
Satd. Flow (prot)	3001	1149			1541			1297	4298			1624
Flt Permitted	0.95	1.00			0.72			0.95	1.00			0.95
Satd. Flow (perm)	3001	1149			1129			1297	4298			1624
Peak-hour factor, PHF	0.88	0.88	0.88	0.83	0.83	0.83	0.89	0.89	0.89	0.89	0.96	0.96
Adj. Flow (vph)	1088	17	416	58	34	69	12	283	1860	0	52	19
RTOR Reduction (vph)	0	257	0	0	24	0	0	0	0	0	0	0
Lane Group Flow (vph)	1088	176	0	0	137	0	0	295	1860	0	0	71
Confl. Peds. (#/hr)	13		16	16		13		23				
Heavy Vehicles (%)	5%	0%	20%	2%	0%	0%	0%	22%	5%	0%	0%	0%
Parking (#/hr)				15		0						
Turn Type	Split	NA		Perm	NA		Prot	Prot	NA		Prot	Prot
Protected Phases	3	3			4		1	1	6		5	5
Permitted Phases		3		4								
Actuated Green, G (s)	27.0	27.0			17.5			17.0	50.3			8.2
Effective Green, g (s)	27.0	27.0			17.5			17.0	50.3			8.2
Actuated g/C Ratio	0.22	0.22			0.15			0.14	0.42			0.07
Clearance Time (s)	4.0	4.0			4.0			4.0	4.0			5.0
Vehicle Extension (s)	3.0	3.0			2.0			2.0	2.0			3.0
Lane Grp Cap (vph)	675	259			165			184	1802			111
v/s Ratio Prot	c0.36	0.15						c0.23	0.43			0.04
v/s Ratio Perm					c0.12							
v/c Ratio	1.61	0.68			0.83			1.60	1.03			0.64
Uniform Delay, d1	46.5	42.5			49.8			51.5	34.9			54.5
Progression Factor	1.19	2.10			1.00			1.27	1.06			0.90
Incremental Delay, d2	282.1	6.8			27.4			293.8	29.2			10.0
Delay (s)	337.4	96.3			77.2			359.3	66.0			58.8
Level of Service	F	F			E			F	E			E
Approach Delay (s)		268.8			77.2				106.2			
Approach LOS		F			E				F			

Intersection Summary

HCM Average Control Delay	148.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.31		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	111.0%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	SWT	SWR
Lane Configurations		
Volume (vph)	1263	558
Ideal Flow (vphpl)	1900	1900
Lane Width	11	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frpb, ped/bikes	1.00	0.94
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	3079	1276
Flt Permitted	1.00	1.00
Satd. Flow (perm)	3079	1276
Peak-hour factor, PHF	0.96	0.96
Adj. Flow (vph)	1316	581
RTOR Reduction (vph)	0	0
Lane Group Flow (vph)	1316	581
Confl. Peds. (#/hr)		23
Heavy Vehicles (%)	2%	4%
Parking (#/hr)		
Turn Type	NA	pm+ov
Protected Phases	2	3
Permitted Phases		2
Actuated Green, G (s)	42.5	69.5
Effective Green, g (s)	42.5	69.5
Actuated g/C Ratio	0.35	0.58
Clearance Time (s)	4.0	4.0
Vehicle Extension (s)	2.0	3.0
Lane Grp Cap (vph)	1090	782
v/s Ratio Prot	c0.43	0.17
v/s Ratio Perm		0.29
v/c Ratio	1.21	0.74
Uniform Delay, d1	38.8	18.7
Progression Factor	1.09	1.35
Incremental Delay, d2	100.9	3.3
Delay (s)	143.3	28.4
Level of Service	F	C
Approach Delay (s)	106.3	
Approach LOS	F	

Intersection Summary

Lane Group	EBR	NET	SWT
Lane Configurations			
Volume (vph)	109	2353	1671
Lane Group Flow (vph)	116	2630	1878
Turn Type	custom	NA	NA
Protected Phases	5	1	1
Permitted Phases			
Detector Phase	5	1	1
Switch Phase			
Minimum Initial (s)	6.0	10.0	10.0
Minimum Split (s)	27.0	27.0	27.0
Total Split (s)	40.0	80.0	80.0
Total Split (%)	33.3%	66.7%	66.7%
Yellow Time (s)	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0
Lead/Lag			
Lead-Lag Optimize?			
Recall Mode	None	C-Max	C-Max
v/c Ratio	0.58	0.80	0.54
Control Delay	49.7	15.9	6.1
Queue Delay	0.0	185.9	3.0
Total Delay	49.8	201.8	9.1
Queue Length 50th (ft)	67	546	209
Queue Length 95th (ft)	128	m455	238
Internal Link Dist (ft)		238	380
Turn Bay Length (ft)			
Base Capacity (vph)	399	3290	3460
Starvation Cap Reductn	0	1428	1040
Spillback Cap Reductn	7	0	1438
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.30	1.41	0.93

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 65 (54%), Referenced to phase 1:NESW, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3082: Tremont Street & Renaissance Park/Ruggles St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	109	0	0	0	0	2353	198	0	1671	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	16	12	11	12	12	11	12
Total Lost time (s)			4.0					4.0			4.0	
Lane Util. Factor			1.00					0.91			0.91	
Frpb, ped/bikes			1.00					0.99			1.00	
Flpb, ped/bikes			1.00					1.00			1.00	
Frt			0.86					0.99			1.00	
Flt Protected			1.00					1.00			1.00	
Satd. Flow (prot)			1286					4161			4381	
Flt Permitted			1.00					1.00			1.00	
Satd. Flow (perm)			1286					4161			4381	
Peak-hour factor, PHF	0.94	0.94	0.94	0.92	0.92	0.92	0.97	0.97	0.97	0.89	0.89	0.89
Adj. Flow (vph)	0	0	116	0	0	0	0	2426	204	0	1878	0
RTOR Reduction (vph)	0	0	16	0	0	0	0	5	0	0	0	0
Lane Group Flow (vph)	0	0	100	0	0	0	0	2625	0	0	1878	0
Confl. Peds. (#/hr)									26			
Heavy Vehicles (%)	0%	0%	15%	0%	0%	0%	0%	6%	10%	0%	3%	0%
Turn Type Protected			custom					NA			NA	
Phases Permitted			5					1			1	
Phases Actuated												
Green, G (s)			17.2					94.8			94.8	
Effective Green, g (s)			17.2					94.8			94.8	
Actuated g/C Ratio			0.14					0.79			0.79	
Clearance Time (s)			4.0					4.0			4.0	
Vehicle Extension (s)			2.0					2.0			2.0	
Lane Grp Cap (vph)			184					3287			3461	
v/s Ratio Prot			c0.08					c0.63			0.43	
v/s Ratio Perm												
v/c Ratio			0.54					0.80			0.54	
Uniform Delay, d1			47.7					7.2			4.6	
Progression Factor			1.00					1.77			1.00	
Incremental Delay, d2			1.7					0.2			0.6	
Delay (s)			49.5					12.9			5.2	
Level of Service			D					B			A	
Approach Delay (s)		49.5			0.0			12.9			5.2	
Approach LOS		D			A			B			A	

Intersection Summary

HCM Average Control Delay	10.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	58.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Volume (vph)	187	317	1183	101	199	681	1596	41	592
Lane Group Flow (vph)	244	382	1232	163	0	1063	1814	0	731
Turn Type	NA	Perm	Split	NA	pm+pt	NA	Free	Perm	NA
Protected Phases	5		6	6	7	1 7			1
Permitted Phases		5			1 7		Free	1	
Detector Phase	5	5	6	6	7	1 7		1	1
Switch Phase									
Minimum Initial (s)	8.0	8.0	10.0	10.0	4.0			10.0	10.0
Minimum Split (s)	25.0	25.0	22.0	22.0	9.0			29.0	29.0
Total Split (s)	24.0	24.0	30.0	30.0	15.0			31.0	31.0
Total Split (%)	24.0%	24.0%	30.0%	30.0%	15.0%			31.0%	31.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0			3.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0			1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0					0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0					4.0
Lead/Lag	Lead	Lead	Lag	Lag					
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	Max			C-Max	C-Max
v/c Ratio	0.84	0.91	1.57	0.42		1.35	1.17		1.42
Control Delay	64.0	45.1	292.2	34.7		192.2	90.4		231.2
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Delay	64.0	45.1	292.2	34.7		192.2	90.4		231.2
Queue Length 50th (ft)	148	112	~577	86		~482	~347		~348
Queue Length 95th (ft)	#229	#225	#706	141		#543	#550		#468
Internal Link Dist (ft)	51			68		380			136
Turn Bay Length (ft)			350						
Base Capacity (vph)	325	445	784	390		786	1554		514
Starvation Cap Reductn	0	0	0	0		0	0		0
Spillback Cap Reductn	0	0	0	0		0	0		0
Storage Cap Reductn	0	0	0	0		0	0		0
Reduced v/c Ratio	0.75	0.86	1.57	0.42		1.35	1.17		1.42

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 145
Control Type: Actuated-Coordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3098: Tremont Street/Tremont St & Melnea Cass Boulevard

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	8	187	317	1183	101	37	199	681	1596	41	592	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	13	12	13	13	12	12	11	16	12	14	12
Total Lost time (s)		4.0	4.0	4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor		1.00	1.00	0.97	1.00			0.95	1.00		0.95	
Frt		1.00	0.85	1.00	0.96			1.00	0.85		1.00	
Flt Protected		1.00	1.00	0.95	1.00			0.99	1.00		0.99	
Satd. Flow (prot)		1626	1398	3015	1500			2936	1554		3253	
Flt Permitted		1.00	1.00	0.95	1.00			0.54	1.00		0.54	
Satd. Flow (perm)		1626	1398	3015	1500			1590	1554		1762	
Peak-hour factor, PHF	0.38	0.84	0.83	0.96	0.86	0.81	0.82	0.83	0.88	0.54	0.93	0.55
Adj. Flow (vph)	21	223	382	1232	117	46	243	820	1814	76	637	18
RTOR Reduction (vph)	0	0	170	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	244	212	1232	163	0	0	1063	1814	0	730	0
Heavy Vehicles (%)	0%	9%	4%	8%	12%	15%	5%	6%	6%	20%	3%	36%
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA	Free	Perm	NA	
Protected Phases	5	5		6	6		7	1 7			1	
Permitted Phases			5				1 7		Free	1		
Actuated Green, G (s)		17.9	17.9	26.0	26.0			40.1	100.0		29.1	
Effective Green, g (s)		17.9	17.9	26.0	26.0			40.1	100.0		29.1	
Actuated g/C Ratio		0.18	0.18	0.26	0.26			0.40	1.00		0.29	
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	
Lane Grp Cap (vph)		291	250	784	390			786	1554		513	
v/s Ratio Prot		0.15		c0.41	0.11			0.15				
v/s Ratio Perm			0.15					0.39	c1.17		c0.41	
v/c Ratio		0.84	0.85	1.57	0.42			1.35	1.17		1.42	
Uniform Delay, d1		39.7	39.7	37.0	30.7			29.9	50.0		35.5	
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		17.9	21.7	263.3	0.3			166.9	82.7		201.1	
Delay (s)		57.5	61.5	300.3	31.0			196.9	132.7		236.6	
Level of Service		E	E	F	C			F	F		F	
Approach Delay (s)		59.9			268.8			156.4			236.6	
Approach LOS		E			F			F			F	

Intersection Summary			
HCM Average Control Delay	183.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.36		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	109.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	NBL	NBT	SBT	ø2
Lane Configurations					
Volume (vph)	154	106	1553	1673	
Lane Group Flow (vph)	349	0	1765	1829	
Turn Type	NA	pm+pt	NA	NA	
Protected Phases	5	6	1 6	1	2
Permitted Phases		1 6			
Detector Phase	5	6	1 6	1	
Switch Phase					
Minimum Initial (s)	8.0	4.0		4.0	4.0
Minimum Split (s)	14.0	8.0		8.0	19.0
Total Split (s)	37.0	9.0		55.0	19.0
Total Split (%)	30.8%	7.5%		45.8%	16%
Yellow Time (s)	3.0	3.0		3.0	3.0
All-Red Time (s)	1.0	1.0		1.0	0.0
Lost Time Adjust (s)	0.0			-1.0	
Total Lost Time (s)	4.0			3.0	
Lead/Lag	Lead	Lag		Lead	Lag
Lead-Lag Optimize?					
Recall Mode	None	C-Max		Max	None
v/c Ratio	0.91		0.92	1.06	
Control Delay	67.0		22.5	58.0	
Queue Delay	29.7		0.0	185.7	
Total Delay	96.7		22.5	243.7	
Queue Length 50th (ft)	233		210	~296	
Queue Length 95th (ft)	#326		m#136	#394	
Internal Link Dist (ft)	258		709	139	
Turn Bay Length (ft)					
Base Capacity (vph)	433		1921	1726	
Starvation Cap Reductn	0		0	490	
Spillback Cap Reductn	94		0	0	
Storage Cap Reductn	0		0	0	
Reduced v/c Ratio	1.03		0.92	1.48	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 6:NBTL, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4023: Tremont Street & Prentiss St

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	154	143	106	1553	1673	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	11	11	12
Total Lost time (s)	4.0			3.0	3.0	
Lane Util. Factor	1.00			0.91	0.91	
Frt	0.94			1.00	0.99	
Flt Protected	0.97			1.00	1.00	
Satd. Flow (prot)	1475			4175	3972	
Flt Permitted	0.97			0.65	1.00	
Satd. Flow (perm)	1475			2704	3972	
Peak-hour factor, PHF	0.85	0.85	0.94	0.94	0.96	0.96
Adj. Flow (vph)	181	168	113	1652	1743	86
RTOR Reduction (vph)	29	0	0	0	5	0
Lane Group Flow (vph)	320	0	0	1765	1824	0
Heavy Vehicles (%)	13%	5%	4%	8%	6%	11%
Parking (#/hr)					15	
Turn Type	NA		pm+pt	NA	NA	
Protected Phases	5		6	1 6	1	
Permitted Phases			1 6			
Actuated Green, G (s)	28.9			69.7	51.0	
Effective Green, g (s)	28.9			71.7	52.0	
Actuated g/C Ratio	0.24			0.60	0.43	
Clearance Time (s)	4.0				4.0	
Vehicle Extension (s)	2.0				2.0	
Lane Grp Cap (vph)	355			1857	1721	
v/s Ratio Prot	c0.22			c0.16	c0.46	
v/s Ratio Perm				0.41		
v/c Ratio	0.90			0.95	1.06	
Uniform Delay, d1	44.2			22.5	34.0	
Progression Factor	1.00			1.00	0.67	
Incremental Delay, d2	24.6			1.6	34.3	
Delay (s)	68.7			24.0	57.1	
Level of Service	E			C	E	
Approach Delay (s)	68.7			24.0	57.1	
Approach LOS	E			C	E	

Intersection Summary

HCM Average Control Delay	43.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	19.4
Intersection Capacity Utilization	102.9%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	NWL	NWR	NET	NER	SWL	SWT	ø9
Lane Configurations							
Volume (vph)	182	284	1246	227	209	1102	
Lane Group Flow (vph)	198	309	1354	247	0	1425	
Turn Type	NA	Perm	NA	pm+ov	pm+pt	NA	
Protected Phases	2		4	2	3	8	9
Permitted Phases		2		4	8		
Detector Phase	2	2	4	2	3	8	
Switch Phase							
Minimum Initial (s)	7.0	7.0	4.0	7.0	4.0	4.0	4.0
Minimum Split (s)	12.0	12.0	12.0	12.0	12.0	12.0	20.0
Total Split (s)	24.0	24.0	38.0	24.0	17.0	55.0	21.0
Total Split (%)	24.0%	24.0%	38.0%	24.0%	17.0%	55.0%	21%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0		5.0	
Lead/Lag			Lag		Lead		
Lead-Lag Optimize?							
Recall Mode	None	None	C-Max	None	None	C-Max	None
v/c Ratio	0.75	0.62	0.42	0.18		1.10dl	
Control Delay	57.6	10.1	6.0	0.2		5.9	
Queue Delay	1.6	0.0	1.1	0.0		0.0	
Total Delay	59.2	10.1	7.1	0.3		5.9	
Queue Length 50th (ft)	122	0	194	0		41	
Queue Length 95th (ft)	191	72	86	0		m17	
Internal Link Dist (ft)	249		142			107	
Turn Bay Length (ft)				100			
Base Capacity (vph)	336	551	3189	1382		2024	
Starvation Cap Reductn	0	0	1478	223		0	
Spillback Cap Reductn	46	0	0	0		11	
Storage Cap Reductn	0	0	0	0		0	
Reduced v/c Ratio	0.68	0.56	0.79	0.21		0.71	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 35 (35%), Referenced to phase 4:NET and 8:SWTL, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 6: Tremont Street & Site Drive

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	182	284	1246	227	209	1102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	12	12
Total Lost time (s)	5.0	5.0	5.0	5.0		5.0
Lane Util. Factor	1.00	1.00	0.91	1.00		0.91
Frt	1.00	0.85	1.00	0.85		1.00
Flt Protected	0.95	1.00	1.00	1.00		0.99
Satd. Flow (prot)	1770	1583	4759	1531		4697
Flt Permitted	0.95	1.00	1.00	1.00		0.64
Satd. Flow (perm)	1770	1583	4759	1531		3022
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	198	309	1354	247	227	1198
RTOR Reduction (vph)	0	263	0	37	0	0
Lane Group Flow (vph)	198	46	1354	210	0	1425
Heavy Vehicles (%)	2%	2%	9%	2%	2%	11%
Turn Type	NA	Perm	NA	pm+ov	pm+pt	NA
Protected Phases	2		4	2	3	8
Permitted Phases		2		4	8	
Actuated Green, G (s)	15.0	15.0	65.2	80.2		65.2
Effective Green, g (s)	15.0	15.0	65.2	80.2		65.2
Actuated g/C Ratio	0.15	0.15	0.65	0.80		0.65
Clearance Time (s)	5.0	5.0	5.0	5.0		5.0
Vehicle Extension (s)	2.0	2.0	3.0	2.0		3.0
Lane Grp Cap (vph)	266	237	3103	1304		1970
v/s Ratio Prot	c0.11		0.28	0.02		
v/s Ratio Perm		0.03		0.11		c0.47
v/c Ratio	0.74	0.20	0.44	0.16		1.10dl
Uniform Delay, d1	40.7	37.2	8.5	2.3		11.5
Progression Factor	1.00	1.00	0.57	0.00		0.33
Incremental Delay, d2	9.5	0.1	0.3	0.0		0.1
Delay (s)	50.1	37.4	5.2	0.0		3.8
Level of Service	D	D	A	A		A
Approach Delay (s)	42.4		4.4			3.8
Approach LOS	D		A			A

Intersection Summary

HCM Average Control Delay	9.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	19.8
Intersection Capacity Utilization	72.2%	ICU Level of Service	C
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	ø2
Lane Configurations										
Volume (vph)	294	240	65	281	287	104	866	185	701	
Lane Group Flow (vph)	0	667	0	407	338	113	1003	209	1096	
Turn Type	pm+pt	NA	Perm	NA	Perm	Prot	NA	Prot	NA	
Protected Phases	3	3 4		4		5	1	5	1	2
Permitted Phases	3 4		4		4					
Detector Phase	3	3 4	4	4	4	5	1	5	1	
Switch Phase										
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0	12.0	4.0	12.0	8.0
Minimum Split (s)	10.0		14.0	14.0	14.0	13.0	18.0	13.0	18.0	22.0
Total Split (s)	12.0		24.0	24.0	24.0	18.0	24.0	18.0	24.0	22.0
Total Split (%)	12.0%		24.0%	24.0%	24.0%	18.0%	24.0%	18.0%	24.0%	22%
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0	3.0	4.0	3.0	2.0
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0
Lost Time Adjust (s)				-1.0	-1.0	-1.0	0.0	-1.0	0.0	
Total Lost Time (s)				4.0	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead		Lag	Lag	Lag		Lead		Lead	Lag
Lead-Lag Optimize?										
Recall Mode	None		None	None	None	None	C-Max	None	C-Max	None
v/c Ratio		1.39dl		0.98	0.64	0.53	0.95	1.22	1.25dr	
Control Delay		117.4		80.3	10.3	54.0	53.0	176.6	110.4	
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		117.4		80.3	10.3	54.0	53.0	176.6	110.4	
Queue Length 50th (ft)		~234		136	0	74	~268	~159	~339	
Queue Length 95th (ft)		#381		#215	60	133	#358	m#260	#425	
Internal Link Dist (ft)		381		1188			1304		709	
Turn Bay Length (ft)						205		205		
Base Capacity (vph)		582		416	525	213	1054	172	955	
Starvation Cap Reductn		0		0	0	0	0	0	0	
Spillback Cap Reductn		0		0	0	0	0	0	0	
Storage Cap Reductn		0		0	0	0	0	0	0	
Reduced v/c Ratio		1.15		0.98	0.64	0.53	0.95	1.22	1.15	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 34 (34%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.
dl Defacto Left Lane. Recode with 1 though lane as a left lane.
dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Splits and Phases: 192: Columbus Avenue/Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd

HCM Signalized Intersection Capacity Analysis
192: Columbus Avenue/Tremont Street & Tremont St/Malcolm X/Malcolm X Blvd 4/4/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (vph)	294	240	93	65	281	287	1	104	866	67	13	185
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0		4.0	4.0			4.0
Lane Util. Factor		0.95			0.95	1.00		1.00	0.91			1.00
Frt		0.98			1.00	0.85		1.00	0.99			1.00
Flt Protected		0.98			0.99	1.00		0.95	1.00			0.95
Satd. Flow (prot)		2915			2945	1275		1519	4322			1225
Flt Permitted		0.58			0.70	1.00		0.95	1.00			0.95
Satd. Flow (perm)		1741			2077	1275		1519	4322			1225
Peak-hour factor, PHF	0.94	0.94	0.94	0.85	0.85	0.85	0.93	0.93	0.93	0.93	0.95	0.95
Adj. Flow (vph)	313	255	99	76	331	338	1	112	931	72	14	195
RTOR Reduction (vph)	0	0	0	0	0	270	0	0	0	0	0	0
Lane Group Flow (vph)	0	667	0	0	407	68	0	113	1003	0	0	209
Heavy Vehicles (%)	9%	4%	5%	15%	8%	14%	0%	7%	7%	5%	0%	35%
Parking (#/hr)												
Turn Type	pm+pt	NA		Perm	NA	Perm	Prot	Prot	NA		Prot	Prot
Protected Phases	3	3 4			4		5	5	1		5	5
Permitted Phases	3 4			4		4						
Actuated Green, G (s)		26.0			19.0	19.0		13.0	24.0			13.0
Effective Green, g (s)		28.0			20.0	20.0		14.0	24.0			14.0
Actuated g/C Ratio		0.28			0.20	0.20		0.14	0.24			0.14
Clearance Time (s)					5.0	5.0		5.0	4.0			5.0
Vehicle Extension (s)					3.0	3.0		2.0	2.0			2.0
Lane Grp Cap (vph)		581			415	255		213	1037			172
v/s Ratio Prot		c0.09						0.07	0.23			c0.17
v/s Ratio Perm		c0.23			0.20	0.05						
v/c Ratio		1.39dl			0.98	0.27		0.53	0.97			1.22
Uniform Delay, d1		36.0			39.8	33.8		39.9	37.6			43.0
Progression Factor		1.10			1.00	1.00		1.11	0.84			1.44
Incremental Delay, d2		83.7			38.9	0.6		1.2	20.6			126.5
Delay (s)		123.4			78.7	34.4		45.5	52.1			188.3
Level of Service		F			E	C		D	D			F
Approach Delay (s)		123.4			58.6				51.4			
Approach LOS		F			E				D			

Intersection Summary

HCM Average Control Delay	91.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	34.0
Intersection Capacity Utilization	85.7%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

Movement	SBT	SBR
Lane Configurations		
Volume (vph)	701	340
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	4.0	
Lane Util. Factor	0.91	
Frt	0.95	
Flt Protected	1.00	
Satd. Flow (prot)	3916	
Flt Permitted	1.00	
Satd. Flow (perm)	3916	
Peak-hour factor, PHF	0.95	0.95
Adj. Flow (vph)	738	358
RTOR Reduction (vph)	0	0
Lane Group Flow (vph)	1096	0
Heavy Vehicles (%)	9%	5%
Parking (#/hr)	10	
Turn Type	NA	
Protected Phases	1	
Permitted Phases		
Actuated Green, G (s)	24.0	
Effective Green, g (s)	24.0	
Actuated g/C Ratio	0.24	
Clearance Time (s)	4.0	
Vehicle Extension (s)	2.0	
Lane Grp Cap (vph)	940	
v/s Ratio Prot	c0.28	
v/s Ratio Perm		
v/c Ratio	1.25dr	
Uniform Delay, d1	38.0	
Progression Factor	0.93	
Incremental Delay, d2	82.7	
Delay (s)	118.1	
Level of Service	F	
Approach Delay (s)	129.4	
Approach LOS	F	

Intersection Summary

Lane Group	EBL	EBT	WBL	WBT	NEL	NET	SWL	SWT	SWR
Lane Configurations									
Volume (vph)	361	22	12	16	172	1349	26	1126	391
Lane Group Flow (vph)	384	212	0	74	192	1420	43	1211	420
Turn Type	Split	NA	Perm	NA	Prot	NA	Prot	NA	pm+ov
Protected Phases	3	3		4	1	6	5	2	3
Permitted Phases		3	4						2
Detector Phase	3	3	4	4	1	6	5	2	3
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	4.0	8.0	4.0	8.0	8.0
Minimum Split (s)	13.0	13.0	26.0	26.0	12.0	24.0	9.0	24.0	13.0
Total Split (s)	16.0	16.0	26.0	26.0	17.0	47.0	11.0	41.0	16.0
Total Split (%)	16.0%	16.0%	26.0%	26.0%	17.0%	47.0%	11.0%	41.0%	16.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	4.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0		4.0	4.0	4.0	5.0	4.0	4.0
Lead/Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lag	Lag	Lead
Lead-Lag Optimize?									
Recall Mode	None	None	Max	Max	Min	C-Max	None	C-Max	None
v/c Ratio	1.10	0.71		0.22	1.18	0.70	0.45	1.12	0.71
Control Delay	119.4	35.3		18.6	161.9	35.2	54.2	92.3	27.9
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	8.0	0.2
Total Delay	119.4	35.3		18.6	161.9	35.2	54.2	100.3	28.2
Queue Length 50th (ft)	~150	63		17	~153	350	28	~471	214
Queue Length 95th (ft)	#245	#144		49	#297	388	m60	#606	336
Internal Link Dist (ft)		324		271		458		238	
Turn Bay Length (ft)					200				
Base Capacity (vph)	350	300		342	163	2018	97	1086	588
Starvation Cap Reductn	0	0		0	0	0	0	18	12
Spillback Cap Reductn	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0
Reduced v/c Ratio	1.10	0.71		0.22	1.18	0.70	0.44	1.13	0.73

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:SWT and 6:NET, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 611: Tremont Street & Ruggles St/Whittier St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEU	NEL	NET	NER	SWU	SWL
Lane Configurations												
Volume (vph)	361	22	178	12	16	34	10	172	1349	0	14	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	12	12	12	12	11	11	12	12	12
Total Lost time (s)	4.0	4.0			4.0			4.0	4.0			5.0
Lane Util. Factor	0.97	1.00			1.00			1.00	0.91			1.00
Frpb, ped/bikes	1.00	0.98			0.99			1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00			1.00			1.00	1.00			1.00
Frt	1.00	0.87			0.93			1.00	1.00			1.00
Flt Protected	0.95	1.00			0.99			0.95	1.00			0.95
Satd. Flow (prot)	2918	1119			1497			1252	4257			1624
Flt Permitted	0.95	1.00			0.93			0.95	1.00			0.95
Satd. Flow (perm)	2918	1119			1410			1252	4257			1624
Peak-hour factor, PHF	0.94	0.94	0.94	0.83	0.83	0.83	0.95	0.95	0.95	0.95	0.93	0.93
Adj. Flow (vph)	384	23	189	14	19	41	11	181	1420	0	15	28
RTOR Reduction (vph)	0	166	0	0	32	0	0	0	0	0	0	0
Lane Group Flow (vph)	384	46	0	0	42	0	0	192	1420	0	0	43
Confl. Peds. (#/hr)	7		6	6		7		37				
Heavy Vehicles (%)	8%	0%	28%	4%	10%	0%	0%	27%	6%	0%	0%	0%
Parking (#/hr)				5								
Turn Type	Split	NA		Perm	NA		Prot	Prot	NA		Prot	Prot
Protected Phases	3	3			4		1	1	6		5	5
Permitted Phases		3		4								
Actuated Green, G (s)	12.0	12.0			22.0			13.0	45.4			3.6
Effective Green, g (s)	12.0	12.0			22.0			13.0	45.4			3.6
Actuated g/C Ratio	0.12	0.12			0.22			0.13	0.45			0.04
Clearance Time (s)	4.0	4.0			4.0			4.0	4.0			5.0
Vehicle Extension (s)	3.0	3.0			2.0			2.0	2.0			3.0
Lane Grp Cap (vph)	350	134			310			163	1933			58
v/s Ratio Prot	c0.13	0.04						c0.15	0.33			0.03
v/s Ratio Perm					c0.03							
v/c Ratio	1.10	0.34			0.14			1.18	0.73			0.74
Uniform Delay, d1	44.0	40.4			31.4			43.5	22.4			47.7
Progression Factor	1.03	2.58			1.00			0.95	1.52			0.88
Incremental Delay, d2	76.3	1.5			0.9			123.2	2.3			36.7
Delay (s)	121.5	105.5			32.3			164.4	36.2			78.9
Level of Service	F	F			C			F	D			E
Approach Delay (s)		115.8			32.3				51.5			
Approach LOS		F			C				D			

Intersection Summary

HCM Average Control Delay	70.6	HCM Level of Service	E
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	74.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	SWT	SWR
Lane Configurations		
Volume (vph)	1126	391
Ideal Flow (vphpl)	1900	1900
Lane Width	11	11
Total Lost time (s)	4.0	4.0
Lane Util. Factor	0.95	1.00
Frpb, ped/bikes	1.00	0.91
Flpb, ped/bikes	1.00	1.00
Frt	1.00	0.85
Flt Protected	1.00	1.00
Satd. Flow (prot)	2935	1199
Flt Permitted	1.00	1.00
Satd. Flow (perm)	2935	1199
Peak-hour factor, PHF	0.93	0.93
Adj. Flow (vph)	1211	420
RTOR Reduction (vph)	0	0
Lane Group Flow (vph)	1211	420
Confl. Peds. (#/hr)		37
Heavy Vehicles (%)	7%	7%
Parking (#/hr)		
Turn Type	NA	pm+ov
Protected Phases	2	3
Permitted Phases		2
Actuated Green, G (s)	37.0	49.0
Effective Green, g (s)	37.0	49.0
Actuated g/C Ratio	0.37	0.49
Clearance Time (s)	4.0	4.0
Vehicle Extension (s)	2.0	3.0
Lane Grp Cap (vph)	1086	635
v/s Ratio Prot	c0.41	0.08
v/s Ratio Perm		0.27
v/c Ratio	1.12	0.66
Uniform Delay, d1	31.5	19.2
Progression Factor	0.89	1.14
Incremental Delay, d2	63.7	2.4
Delay (s)	91.8	24.4
Level of Service	F	C
Approach Delay (s)	74.6	
Approach LOS	E	

Intersection Summary

Lane Group	EBR	NET	SWT
Lane Configurations			
Volume (vph)	43	1670	1509
Lane Group Flow (vph)	66	1917	1588
Turn Type	custom	NA	NA
Protected Phases	5	1	1
Permitted Phases			
Detector Phase	5	1	1
Switch Phase			
Minimum Initial (s)	6.0	10.0	10.0
Minimum Split (s)	27.0	27.0	27.0
Total Split (s)	37.0	63.0	63.0
Total Split (%)	37.0%	63.0%	63.0%
Yellow Time (s)	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0
Lead/Lag			
Lead-Lag Optimize?			
Recall Mode	None	C-Max	C-Max
v/c Ratio	0.34	0.57	0.47
Control Delay	26.9	3.7	5.0
Queue Delay	0.0	0.2	0.3
Total Delay	26.9	3.8	5.3
Queue Length 50th (ft)	23	16	61
Queue Length 95th (ft)	34	m117	197
Internal Link Dist (ft)		238	380
Turn Bay Length (ft)			
Base Capacity (vph)	440	3380	3414
Starvation Cap Reductn	0	495	1021
Spillback Cap Reductn	5	0	679
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.15	0.66	0.66

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 76 (76%), Referenced to phase 1:NESW, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3082: Tremont Street & Renaissance Park/Ruggles St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	43	0	0	0	0	1670	94	0	1509	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	16	12	11	12	12	11	12
Total Lost time (s)			4.0					4.0			4.0	
Lane Util. Factor			1.00					0.91			0.91	
Frpb, ped/bikes			1.00					1.00			1.00	
Flpb, ped/bikes			1.00					1.00			1.00	
Frt			0.86					0.99			1.00	
Flt Protected			1.00					1.00			1.00	
Satd. Flow (prot)			1275					4132			4178	
Flt Permitted			1.00					1.00			1.00	
Satd. Flow (perm)			1275					4132			4178	
Peak-hour factor, PHF	0.65	0.65	0.65	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.95	0.95
Adj. Flow (vph)	0	0	66	0	0	0	0	1815	102	0	1588	0
RTOR Reduction (vph)	0	0	26	0	0	0	0	3	0	0	0	0
Lane Group Flow (vph)	0	0	40	0	0	0	0	1914	0	0	1588	0
Confl. Peds. (#/hr)									7			
Heavy Vehicles (%)	0%	0%	16%	0%	0%	0%	0%	8%	10%	0%	8%	0%
Turn Type Protected			custom					NA			NA	
Phases Permitted			5					1			1	
Phases Actuated												
Green, G (s)			11.9					80.1			80.1	
Effective Green, g (s)			11.9					80.1			80.1	
Actuated g/C Ratio			0.12					0.80			0.80	
Clearance Time (s)			4.0					4.0			4.0	
Vehicle Extension (s)			2.0					2.0			2.0	
Lane Grp Cap (vph)			152					3310			3347	
v/s Ratio Prot			c0.03					c0.46			0.38	
v/s Ratio Perm												
v/c Ratio			0.27					0.58			0.47	
Uniform Delay, d1			40.1					3.7			3.2	
Progression Factor			1.00					0.61			1.00	
Incremental Delay, d2			0.3					0.5			0.5	
Delay (s)			40.4					2.7			3.7	
Level of Service			D					A			A	
Approach Delay (s)		40.4			0.0			2.7			3.7	
Approach LOS		D			A			A			A	

Intersection Summary

HCM Average Control Delay	3.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	44.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Volume (vph)	51	163	929	77	130	481	1060	34	424
Lane Group Flow (vph)	74	196	968	141	0	739	1205	0	547
Turn Type	NA	Perm	Split	NA	pm+pt	NA	Free	Perm	NA
Protected Phases	5		6	6	7	1 7			1
Permitted Phases		5			1 7		Free	1	
Detector Phase	5	5	6	6	1 7	1 7		1	1
Switch Phase									
Minimum Initial (s)	8.0	8.0	10.0	10.0	4.0			10.0	10.0
Minimum Split (s)	25.0	25.0	22.0	22.0	9.0			29.0	29.0
Total Split (s)	25.0	25.0	26.0	26.0	10.0			29.0	29.0
Total Split (%)	27.8%	27.8%	28.9%	28.9%	11.1%			32.2%	32.2%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0			3.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0			1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0					0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0					4.0
Lead/Lag	Lead	Lead	Lag	Lag					
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	Max			C-Max	C-Max
v/c Ratio	0.37	0.59	1.31	0.39		0.77	0.79		0.57
Control Delay	40.3	14.1	181.3	32.3		26.7	4.2		25.4
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Delay	40.3	14.1	181.3	32.3		26.7	4.2		25.4
Queue Length 50th (ft)	41	6	~369	67		131	0		117
Queue Length 95th (ft)	67	48	#489	116		#245	0		210
Internal Link Dist (ft)	60			36		380			183
Turn Bay Length (ft)			350						
Base Capacity (vph)	380	467	737	361		956	1526		963
Starvation Cap Reductn	0	0	0	0		0	0		0
Spillback Cap Reductn	0	0	0	0		0	0		0
Storage Cap Reductn	0	0	0	0		0	0		0
Reduced v/c Ratio	0.19	0.42	1.31	0.39		0.77	0.79		0.57

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 115
Control Type: Actuated-Coordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3098: Tremont Street/Tremont St & Melnea Cass Boulevard

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	51	163	929	77	41	130	481	1060	34	424	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	13	12	13	13	12	12	11	16	12	14	12
Total Lost time (s)		4.0	4.0	4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor		1.00	1.00	0.97	1.00			0.95	1.00		0.95	
Frpb, ped/bikes		1.00	1.00	1.00	1.00			1.00	0.98		1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt		1.00	0.85	1.00	0.95			1.00	0.85		0.99	
Flt Protected		0.99	1.00	0.95	1.00			0.99	1.00		0.99	
Satd. Flow (prot)		1631	1398	3015	1478			2937	1526		3208	
Flt Permitted		0.99	1.00	0.95	1.00			0.66	1.00		0.76	
Satd. Flow (perm)		1631	1398	3015	1478			1949	1526		2457	
Peak-hour factor, PHF	0.38	0.84	0.83	0.96	0.86	0.81	0.82	0.83	0.88	0.53	0.93	0.55
Adj. Flow (vph)	13	61	196	968	90	51	159	580	1205	64	456	27
RTOR Reduction (vph)	0	0	162	0	0	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	74	34	968	141	0	0	739	1205	0	543	0
Confl. Peds. (#/hr)									20			
Heavy Vehicles (%)	0%	9%	4%	8%	12%	15%	5%	6%	6%	20%	3%	36%
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA	Free	Perm	NA	
Protected Phases	5	5		6	6		7	1 7			1	
Permitted Phases			5				1 7		Free	1		
Actuated Green, G (s)		10.9	10.9	22.0	22.0			41.1	90.0		35.1	
Effective Green, g (s)		10.9	10.9	22.0	22.0			41.1	90.0		35.1	
Actuated g/C Ratio		0.12	0.12	0.24	0.24			0.46	1.00		0.39	
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	
Lane Grp Cap (vph)		198	169	737	361			956	1526		958	
v/s Ratio Prot		0.05		c0.32	0.10			0.05				
v/s Ratio Perm			0.02					0.30	c0.79		0.22	
v/c Ratio		0.37	0.20	1.31	0.39			0.77	0.79		0.57	
Uniform Delay, d1		36.4	35.6	34.0	28.4			20.5	0.0		21.5	
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		0.4	0.2	150.6	0.3			6.1	4.2		2.4	
Delay (s)		36.8	35.9	184.6	28.7			26.6	4.2		23.9	
Level of Service		D	D	F	C			C	A		C	
Approach Delay (s)		36.1			164.8			12.7			23.9	
Approach LOS		D			F			B			C	

Intersection Summary

HCM Average Control Delay	59.5	HCM Level of Service	E
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	79.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Queues
4023: Tremont Street & Prentiss St

4/4/2012

Lane Group	EBL	NBL	NBT	SBT	ø2
Lane Configurations					
Volume (vph)	57	74	1411	1229	
Lane Group Flow (vph)	87	0	1597	1486	
Turn Type	NA	pm+pt	NA	NA	
Protected Phases	5	6	1 6	1	2
Permitted Phases		1 6			
Detector Phase	5	6	1 6	1	
Switch Phase					
Minimum Initial (s)	4.0	4.0		5.0	4.0
Minimum Split (s)	12.0	8.0		10.0	19.0
Total Split (s)	16.0	9.0		56.0	19.0
Total Split (%)	16.0%	9.0%		56.0%	19%
Yellow Time (s)	4.0	3.0		3.0	3.0
All-Red Time (s)	1.0	1.0		2.0	0.0
Lost Time Adjust (s)	0.0			-1.0	
Total Lost Time (s)	5.0			4.0	
Lead/Lag	Lead	Lag		Lead	Lag
Lead-Lag Optimize?	Yes				
Recall Mode	None	C-Max		Max	None
v/c Ratio	0.56		0.65	0.74	
Control Delay	50.9		20.5	9.9	
Queue Delay	0.1		0.5	5.6	
Total Delay	51.0		21.0	15.5	
Queue Length 50th (ft)	45		201	100	
Queue Length 95th (ft)	91		m309	144	
Internal Link Dist (ft)	258		709	142	
Turn Bay Length (ft)					
Base Capacity (vph)	181		2463	2003	
Starvation Cap Reductn	0		0	458	
Spillback Cap Reductn	2		416	0	
Storage Cap Reductn	0		0	0	
Reduced v/c Ratio	0.49		0.78	0.96	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 6:NBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4023: Tremont Street & Prentiss St

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	57	18	74	1411	1229	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	11	11	12
Total Lost time (s)	5.0			4.0	4.0	
Lane Util. Factor	1.00			0.91	0.91	
Frt	0.97			1.00	0.99	
Flt Protected	0.96			1.00	1.00	
Satd. Flow (prot)	1543			4134	3844	
Flt Permitted	0.96			0.75	1.00	
Satd. Flow (perm)	1543			3120	3844	
Peak-hour factor, PHF	0.87	0.87	0.93	0.93	0.86	0.86
Adj. Flow (vph)	66	21	80	1517	1429	57
RTOR Reduction (vph)	12	0	0	0	4	0
Lane Group Flow (vph)	75	0	0	1597	1482	0
Heavy Vehicles (%)	6%	9%	7%	9%	11%	8%
Parking (#/hr)					10	
Turn Type	NA		pm+pt	NA	NA	
Protected Phases	5		6	1 6	1	
Permitted Phases			1 6			
Actuated Green, G (s)	8.1			68.5	51.0	
Effective Green, g (s)	8.1			70.5	52.0	
Actuated g/C Ratio	0.08			0.70	0.52	
Clearance Time (s)	5.0				5.0	
Vehicle Extension (s)	3.0				2.0	
Lane Grp Cap (vph)	125			2387	1999	
v/s Ratio Prot	c0.05			c0.12	c0.39	
v/s Ratio Perm				0.35		
v/c Ratio	0.60			0.67	0.74	
Uniform Delay, d1	44.4			8.2	18.7	
Progression Factor	1.00			1.98	0.42	
Incremental Delay, d2	7.9			0.6	1.9	
Delay (s)	52.3			16.9	9.8	
Level of Service	D			B	A	
Approach Delay (s)	52.3			16.9	9.8	
Approach LOS	D			B	A	

Intersection Summary

HCM Average Control Delay	14.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	22.4
Intersection Capacity Utilization	75.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Appendix 3-F: Warrant Analysis

HCS+: MUTCD Signal Warrants Release 5.5

Analyst: JML
Agency: BSC Group
Date: 2/21/2012
Project ID: 23155.00 Tremont Crossing
EW Street: Site Drive

Intersection: Tremont St at Site Drive
Jurisdiction: District 6
Units: U.S. Customary
Analysis Year: 2012
NS Street: Tremont Street

General Information

Major St. Speed (mph): 30
Nearest Signal (ft): 200
Crashes per Yr: 0

Population: Not less than 10000
Coordinated Signal System: Y

School Crossing

Students in Highest Hour: 0
Adequate Gaps in Period: 0
Minutes in Period: 0

Roadway Network

Two Major Routes: 0
Weekend Count: 0
5-yr Growth Factor: 0

Geometry and Traffic

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	0	1	0	3	1	1	3	0
LaneUsage				L	LR	R		T	R	L	LT	

Results

Warrant 1: Eight-Hour Vehicular Volume	[X]
1 A. Minimum Vehicular Volumes	[ ]
1 B. Interruption of Continuous Traffic	[X]
1 80% Vehicular --and-- Interruption Volumes	[ ]
Warrant 2: Four-Hour Vehicular Volume	
2 A. Four-Hour Vehicular Volumes	[X]
Warrant 3: Peak Hour	[X]
3 A. Peak-Hour Conditions	[ ]
3 B. Peak-Hour Vehicular Volume Hours Met	[X]
Warrant 4: Pedestrian Volume	[ ]
4 A. Pedestrian Volumes	[ ]
4 B. Gaps Same Period	[ ]
Warrant 5: School Crossing	[ ]
5 A. Student Volumes	[ ]
5 B. Gaps Same Period	[ ]
Warrant 6: Coordinated Signal System	
6 Degree of Platooning	[X]
Warrant 7: Crash Experience	[ ]
7 A. Adequate trials of alternatives	[ ]

7 B. Reported crashes [ ]
7 80% Volumes for Warrants 1A, 1B --or-- 4 [X]

Warrant 8: Roadway Network [ ]
8 A. Weekday Volume [ ]
8 B. Weekend Volume [ ]

Summary

Hours	Major Volume	Minor Volume	Total Volume	Delay (Veh-hr)	1A 100%	1A 80%	1B 100%	1B 80%	2 100%	3A 100%	3B 100%
09-10	3308	133	3441	0.0	No	No	Yes	Yes	Yes	No	No
10-11	0	0	0	0.0	No	No	No	No	No	No	No
11-12	0	0	0	0.0	No	No	No	No	No	No	No
12-13	0	0	0	0.0	No	No	No	No	No	No	No
13-14	2699	389	3088	0.0	Yes	Yes	Yes	Yes	Yes	No	Yes
14-15	2648	401	3049	0.0	Yes	Yes	Yes	Yes	Yes	No	Yes
15-16	2980	429	3409	0.0	Yes	Yes	Yes	Yes	Yes	No	Yes
16-17	2804	420	3224	0.0	Yes	Yes	Yes	Yes	Yes	No	Yes
17-18	3302	466	3768	0.0	Yes	Yes	Yes	Yes	Yes	No	Yes
18-19	3430	430	3860	0.0	Yes	Yes	Yes	Yes	Yes	No	Yes
19-20	2724	361	3085	0.0	Yes	Yes	Yes	Yes	Yes	No	Yes
20-21	0	0	0	0.0	No	No	No	No	No	No	No
Total	23895	3029	26924		7	7	8	8	8	0	7

Traffic Volumes (vph)

Eastbound L	Eastbound T	Eastbound R	Westbound L	Westbound T	Westbound R	Northbound L	Northbound T	Northbound R	Southbound L	Southbound T	Southbound R
0	0	0	133	0	0	0	2127	0	0	1181	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	389	0	0	0	1344	0	0	1355	0
0	0	0	401	0	0	0	1319	0	0	1329	0
0	0	0	429	0	0	0	1486	0	0	1494	0
0	0	0	420	0	0	0	1397	0	0	1407	0
0	0	0	466	0	0	0	1647	0	0	1655	0
0	0	0	430	0	0	0	1712	0	0	1718	0
0	0	0	361	0	0	0	1357	0	0	1367	0
0	0	0	0	0	0	0	0	0	0	0	0

Pedestrian Volumes and Gaps (Per Hour)

Volume	Gap	Volume	Gap	Volume	Gap	Volume	Gap
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0

Delay	sec/veh	veh-hrs	sec/veh	veh-hrs	sec/veh	veh-hrs	sec/veh	veh-hrs
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0
0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0
0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0
0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0
0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0
0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0