PROJECT NOTIFICATION FORM

Northeastern University EXP

Submitted to:
Boston Planning and Development Agency
One City Hall Square
Boston, MA 02201

Submitted by:
Northeastern University
360 Huntington Avenue
Boston, MA 02115

Prepared by:
Epsilon Associates, Inc.
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Maynard, MA 01754

In Association with:
Payette
Goulston & Storrs
Howard Stein Hudson
Nistch Engineering
Soden Sustainability Consulting
Haley & Aldrich

May 22, 2019

NORTHEASTERN UNIVERSITY

Epsilon ASSOCIATES INC.

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Chapter 1.0

Project Description

1.0 PROJECT DESCRIPTION

1.1 Introduction

Northeastern University (the Proponent, or Northeastern) proposes a new building on the Columbus Lot (the Project site) located on the Northeastern campus at 795 Columbus Avenue between the Renaissance Park Parking Garage and the Columbus Parking Garage. The Project was initially articulated in the Institutional Master Plan dated November 20, 2013, effective December 20, 2013 (Northeastern IMP). The Northeastern IMP stated that the Project site would provide academic and research space for science, health sciences, engineering and cross-disciplinary research and teaching.

In 2013, the first building on the Project site was permitted and then opened January of 2017, known as the Interdisciplinary Science and Engineering Complex (ISEC). Northeastern now proposes to construct another building on the Project site: an eight-story, approximately 350,000 gross square foot building containing additional classrooms, laboratories, and a dynamic new makerspace hub (the Project, or EXP). The Project is consistent with the dimensions and uses described in the Northeastern IMP.

EXP will expand upon and enhance one of the key features on the Columbus lot: an open space gateway entry to the campus and urban plaza, which provides an amenity both for Northeastern and the broader community and a pedestrian plaza that links communities across the rail corridor. The Project will further animate and enhance the quality of the Columbus Avenue streetscape and neighborhood through the extended plaza paving, landscaping, lighting, and a visually open building design.

This Project Notification Form (PNF) is being submitted to the Boston Redevelopment Authority (BRA) doing business as Boston Planning and Development Agency (the BPDA) to initiate review of the Project under Article 80B, Large Project Review, of the Boston Zoning Code.

1.2 Existing Site and Area Context

The approximately 3.44-acre Project site[1] is located at 795 Columbus Avenue between the Renaissance Park Parking Garage and the Columbus Parking Garage, south of the MBTA/Amtrak rails (see Figure 1-1). The northeastern portion of the Project site contains the ISEC building. The ISEC building contains a new, eight-story building consisting of research and office space for faculty, interdisciplinary research clusters/collaborative space, specialized teaching labs, classrooms, and student space. ISEC also included the construction of pedestrian track crossings that span the MBTA Orange Line, Commuter Rail, and Mainline Amtrak (all referred to as the railroad tracks), thereby linking the Project site to the academic side of the campus.

[1] Note that this is a correction of the size of the Project site, which was described in the Northeastern IMP as 2.7 acres.

As a place for interdisciplinary discovery, the ISEC complex laboratory programs have been transformational for science and engineering research pursued by faculty and students, representing the following academic colleges:

- College of Engineering;
- College of Science;
- Khoury College of Computer Sciences;
- Bouvé College of Health Sciences;
- College of Arts, Media and Design; and
- D'Amore-McKim School of Business.

The ISEC landscaping and open space establish the pedestrian campus on Columbus Avenue and form a gateway connecting Northeastern's south campus to the campus areas north of the tracks connected by the newly constructed pedestrian track crossing, that will open in June of 2019. This provides an accessible landscape integrated with the campus open space network, also linking the Roxbury and Fenway neighborhoods. Northeastern's increased presence on Columbus Avenue also creates improved pedestrian and bicycle streetscape amenities shared with the surrounding community.

The Project site is well-situated to take advantage of the City's public transportation system. The Project site is located approximately one-minute east of the Ruggles Station on the MBTA Orange Line. In addition to serving the MBTA Orange Line, Ruggles Station also serves the Franklin, Needham, and Providence/Stoughton MBTA Commuter Rail trains as well as several MBTA bus routes. The Project site is also an approximately 7-minute walk from the MBTA Massachusetts Avenue Station, which provides access to Orange Line subway service, and an approximately 7-minute walk from the MBTA Symphony Station which provides access to Green Line light rail service. With the completion of the new pedestrian bridge, the Project site will also be an approximately 7-minute walk to the MBTA Northeastern Station which provides an additional access point to the Green Line.

Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

EXP **Boston, Masschusetts**

Epsilon ASSOCIATES INC.

Figure 1-1
Aerial Locus Map

1.3 Project Description

The EXP Project will expand and compliment the ISEC program by providing additional classrooms, laboratories, and a dynamic new makerspace hub supporting the entire campus community. Ground-level program space will serve makerspace, active learning classrooms, and high bay robotics research, supporting Northeastern's innovative work in autonomous vehicles, drones, and humanoid robots. This will place these exciting programs on display while providing them with the direct street level access needed for periodic vehicular equipment transport.

Levels two and three will include additional collaboration space, makerspace and classroom/lab spaces. Levels four through seven will provide new open, efficient, flexible, and adaptable research laboratories arranged to support the needs of interdisciplinary research clusters.

A site plan is presented in Figure 1-2, and floor plans and a section are presented in Appendix A. The Project program is presented in Table 1-1.

Table 1-1 Project Program

Project Element	Approximate Dimension
Research Programs	200,000 gfa
Academic Programs	73,000 gfa
Administrative Programs	18,000 gfa
Faculty Club	7,000 gfa
Building Support	17,000 gfa
Total Building Gross Floor Area (GFA)	**315,000 gfa**
Building Mechanical Support	35,000
Building Total Gross Square Foot Area (GSF)	350,000

Consistent with the ISEC construction, the design for the site and EXP building will be open to and integrated with the Columbus Avenue streetscape and the pedestrian track crossing. The first floor will provide an on-grade front door to the south at Columbus Avenue, as well as a connecting entry to the east to the ISEC plaza. The second floor will provide access to the pedestrian crossing on the east side.

The Project will complete the dramatic new urban path that overcomes the divide of the rail lines by unifying the Northeastern campus and two Boston Neighborhoods: Roxbury and the Fenway. The Project will provide an integrated landscape design with consistent details, and a durable palette of materials.

EXP Boston, Massachusetts

PAYETTE

Figure 1-2
Site Plan

The building's program will bring expanded pedestrian activity to the site and further enhance the vibrant local community. The after-hours presence of 24/7 research activities in the complex will help create a safer street environment. Combined with the open space design, this will help to create a welcoming urban environment and safe pedestrian experience.

The landscape is designed for a high level of biodiversity and sustainability. Control of stormwater is achieved by channeling water within the sloped site as a feature terminating in bioswale rain gardens. The existing mature linden trees lining the street will be supplemented with additional trees, contributing to the lush streetscape environment. The frontage of the site along Columbus Avenue includes the upgrade of the existing infrastructure of Columbus Avenue and Southwest Corridor Park in front of the proposed building. This completes the last section of parkway upgrades from the Renaissance Park to Camden Street.

Vehicular access to campus and the Project site along Columbus Avenue will remain largely unchanged. The service access drive established in the ISEC development will be extended to provide access to the building's loading dock facility adjacent to the tracks and well concealed from adjacent properties.

1.4 Public Benefits

The Project will provide a number of benefits to the City and its residents including:

- Enhancing the vitality of Columbus Avenue with a well-designed building that will animate the streetscape.
- Constructing new open space and sidewalks/pathways with enhanced landscaping adjacent to the Project site.
- Seeking sustainable design and green building features to promote energy conservation and to comply with the provisions of Article 37 of the Boston Zoning Code.
- Creating an estimated 725 new construction jobs and approximately 750 full-time jobs, including faculty, staff, and graduate students.
- Making linkage contributions to the Neighborhood Housing Trust and the Neighborhood Jobs Trust.
- Improving the society at large through research efforts that stimulate the economy and create innovations for the future.

1.5 Community Outreach Overview

A Letter of Intent was filed with the BPDA on May 2, 2019 beginning the Project's formal public review process. The Proponent looks forward to a comprehensive review process, including meetings with the Task Force, neighbors, local groups, elected officials and other interested parties.

1.6 Schedule

It is anticipated that construction will start in the first quarter of 2020 and will last approximately 36 months.

Chapter 2.0

General Information

2.0 GENERAL INFORMATION

2.1 Project Identification and Team

Address/Location:	Columbus Avenue
Developer:	Northeastern University 360 Huntington Avenue Boston, MA 02115 (617) 373-2000 Maria Cimilluca Kathy Spiegelman John Tobin Jim Cahill Jeremy Munn
Architect:	Payette 290 Congress Street, 5th Floor Boston, MA 02210 (617) 895-1000 Kevin B. Sullivan Robert Schaeffner Barry Shiel
Landscape Architect:	Stephen Stimson Associates Landscape Architects, Inc. 288 Norfolk Street, 5th Floor Cambridge, MA 02139 (617) 876-8960 Stephen Stimson
Legal Counsel:	Goulston & Storrs 400 Atlantic Avenue Boston, MA 02110 (617) 482-1776 Matthew Kiefer, Esq. Adam Hundley, Esq.
Permitting Consultant:	Epsilon Associates, Inc. 3 Mill & Main Place, Suite 250 Maynard, MA 01754 (978) 897-7100 Talya Moked

Transportation Consultant:	Howard Stein Hudson 11 Beacon Street, Suite 1010 Boston, MA 02108 (617) 482-7080 Ian McKinnon
Infrastructure Permitting Consultant:	Howard Stein Hudson 11 Beacon Street, Suite 1010 Boston, MA 02108 (617) 482-7080 Rick Latini James Downing
Civil Engineer:	Nitsch Engineering 2 Center Plaza, Suite 430 Boston, MA 02108 (617) 338-0068 John M. Schmid Marc Gabriel
Geotechnical Consultant:	Haley & Aldrich, Inc. 465 Medford Street, Suite 2200 Boston, MA 02129 (617) 886-7400 Marya Gorczyca Katelyn Tripp
LEED Consultant	Soden Sustainability Consulting 19 Richardson Street Winchester, MA 01890 (617) 372-7857 Colleen Soden

2.2 Zoning and Regulatory Controls

2.2.1 Current Northeastern Zoning

Northeastern's current owned and leased facilities are located within a large area on both sides of the MBTA rail tracks generally bounded by Ruggles and Gainsborough Streets and both sides of Huntington and Columbus Avenues. The campus is located in several zoning districts. The area south of the rail tracks is within the Roxbury Neighborhood District (governed by Article 50 of the Zoning Code), and specifically the Project site is located within the Greater Roxbury

Economic Development Area (EDA) of the Roxbury Neighborhood District. The Project site is within an Institutional Master Plan Area (as described immediately below) and the Restricted Parking Overlay District.

The zoning for Northeastern's campus, including the Project site, is governed by the Institutional Master Plan (IMP) dated November 20, 2013, effective December 20, 2013, as amended by a First Amendment to Northeastern University's Institutional Master Plan dated April 11, 2016 and Second Amendment to Northeastern University's Institutional Master Plan dated May 26, 2017. The uses, building heights, gross floor area, floor area ratio (FAR), parking spaces, and other zoning information for the campus are set forth in the Northeastern IMP.

The Project and Project site are specifically addressed in the Northeastern IMP. Section 7.3.1 and Figure 7-2 of the Northeastern IMP describe uses, dimensions, and other features of development on the Columbus Lot, a former parking lot measuring approximately 3.44 acres in area which includes the Project site and the adjacent site now improved with the ISEC building. As stated in Section 7.3.1 and Figure 7-2 of the Northeastern IMP, the Columbus Lot will include up to four buildings (this PNF contemplates a total of two buildings, the Project and now-completed ISEC building); uses of the Columbus Lot will include academic, student life, and commercial uses; the height of buildings on the Columbus Lot will be up to 14 stories; and the development size of buildings on the Columbus Lot (including the now-completed ISEC, which measures approximately 235,000 gross square feet) will be up to 650,000 gross square feet, resulting in an FAR of up to 5.5. The IMP anticipates but does not require any specific number of parking spaces on the Columbus Lot.

2.2.2 Future Zoning

As stated above, Northeastern is proposing to construct a building on Columbus Avenue between Ruggles Station and the ISEC building as shown on the plans included with this PNF. The building will include academic uses. There will be no parking. Site amenities will include landscaped green space and pedestrian walkways. The building will have a height of eight occupied stories above grade and consist of approximately 350,000 gross square feet. The plans attached to this PNF highlight building and site features, including proposed setbacks, open space, and landscaping.

As stated above, the Project site is within the Institutional Master Plan Area and accordingly no Zoning Map amendment is required. Consistent with discussions with the BPDA, the Project will be consistent with the overall development controls for the Columbus Lot as set forth in the Northeastern IMP, and accordingly no IMP Amendment will be required for the Project.

Pursuant to Article 80D of the Zoning Code, Institutional Mater Plan projects described in the Northeastern IMP will be permitted and deemed to be in compliance with the use, dimensional, parking, and loading requirements of underlying zoning, notwithstanding any provision of underlying zoning to the contrary and without the requirement for further zoning relief. Northeastern will request a Certification of Consistency under Article 80D as well as a Certification of Compliance under Article 80B of the Zoning Code upon completion of Large Project Review with the BPDA.

2.3 Legal Information

2.3.1 Legal Judgements Adverse to the Proposed Project

Northeastern is not aware of any legal judgments or actions pending which involve the Project or Project site.

2.3.2 History of Tax Arrears on Property

Northeastern owns no real estate in Boston on which real estate tax payments are in arrears.

2.3.3 Evidence of Site Control over the Project Area

Northeastern owns the Project site.

2.3.4 Nature and Extent of any and all Public Easements

Northeastern and the MBTA are parties to agreements which grant the MBTA easement rights for access to, maintenance of, and extension of platforms at Ruggles Station, and grant Northeastern easement rights for a pedestrian walkway over the rail tracks and use of sliver parcels adjacent to the busway at Ruggles Station.

The Southwest Corridor Park extends along the southern boundary of the Project site. Northeastern has entered into a Conservation Restriction and Restriction and Agreement in favor of the MBTA establishing a 20-foot-wide green strip along this southern boundary. Northeastern understands that the Department of Conservation and Recreation has the benefit of and enforces these restrictions pursuant to agreements with the MBTA.

2.4 Anticipated Permits and Approvals

Table 2-1 presents a preliminary list of local, state, and federal permits and approvals that may be required for the Proposed Project. The list is based on current information about the Proposed Project and is subject to change as the design of the Project advances. Some of the permits listed may not be required, while there may be others not listed that will be needed.

Table 2-1 Preliminary List of Permits and Approvals

Agency Name	Permit/Approval
Federal	
Federal Aviation Administration	Determination of No Hazard to Air Navigation (for construction cranes, if required)
U.S. Environmental Protection Agency	National Pollutant Discharge Elimination System (NPDES) permits for stormwater discharge and construction dewatering, if required
State	
Massachusetts Department of Conservation and Recreation	Curb cut and/or work permits for work on the Southwest Corridor Park
Massachusetts Historical Commission	State Register Review
Massachusetts Department of Environmental Protection	Sewer connection self-certification and fossil fuel utilization permit, if required; Notice of commencement of construction
Local	
Boston Civic Design Commission	Design Review
Boston Inspectional Services Department	Building and occupancy permits (including review by the Boston Fire Department); Other construction-related permits as required
Boston Parks Commission	Design review (based on proximity to the Southwest Corridor Park)
Boston Planning and Development Agency	Article 80 Large Project Review and related documents, including a Cooperation Agreement; Certification of Compliance pursuant to Article 80B and Certification of Consistency pursuant to Article 80D
Boston Public Safety Commission, Committee on Licenses	Flammable storage license, if required
Boston Public Works Department	Construction-related permits such as street and sidewalk occupancy permits, if required
Boston Transportation Department	Construction Management Plan; Transportation Access Plan Agreement
Boston Water and Sewer Commission	Site Plan Approval; Utility Connection and Dewatering Permits (if required)
Interagency Green Building Committee	Zoning Article 37 Green Buildings
Public Improvement Commission	Approval of specific repair plan for sidewalk improvements and other changes to the public right of way

Chapter 3.0

Transportation

3.0 TRANSPORTATION

Howard Stein Hudson conducted an evaluation of the transportation impacts of the Project. This transportation study adheres to the Boston Transportation Department (BTD) Transportation Access Plan Guidelines and BPDA Article 80 Large Project Review process. This study includes an evaluation of existing conditions, future conditions with and without the Project, projected parking demand, loading operations, transit services, and pedestrian activity. The Project is not expected to have a significant impact on the existing neighborhood or surrounding transportation facilities.

3.1 Project Description

The proposed Project will consist of an approximately 350,000 gsf multi-use development that will include research and classroom space, as well as executive and faculty offices. No on-site parking will be provided, consistent with Northeastern's commitment to reduce vehicular trips throughout the campus.

3.1.1 Study Area

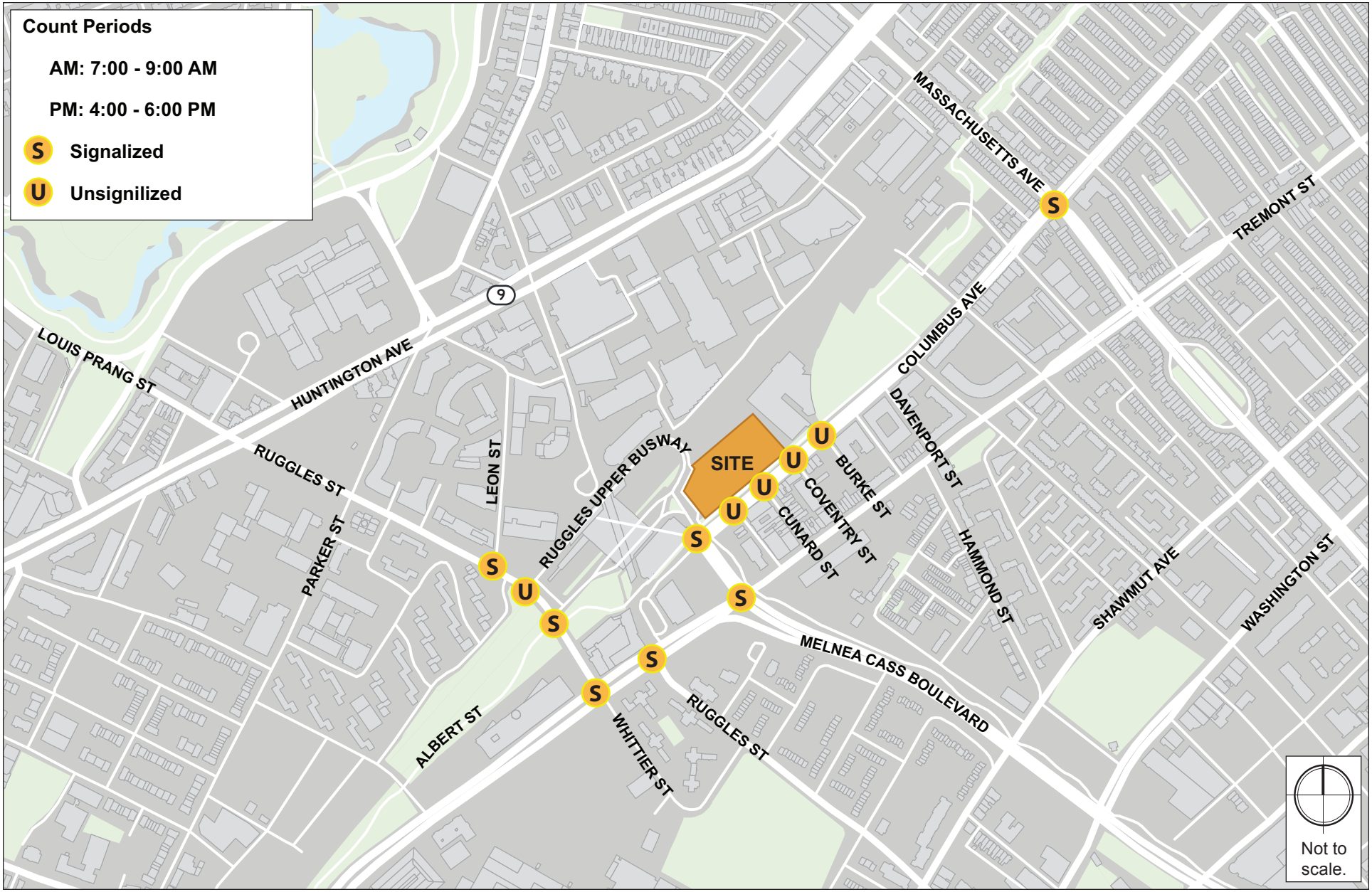
The majority of the transportation study area runs along Columbus Avenue and consists of the following twelve intersections, also shown in Figure 3-1:

Signalized Intersections:

- Ruggles Street/Leon Street
- Ruggles Street/Ruggles Station Lower Busway
- Ruggles Street & Whittier Street/Tremont Street
- Tremont Street/Columbus Driveways & Ruggles Street
- Tremont Street/Melnea Cass Boulevard
- Columbus Avenue/Melnea Cass Boulevard
- Columbus Avenue/Massachusetts Avenue

Unsignalized Intersections:

- Ruggles Street/Ruggles Station Upper Busway
- Columbus Avenue/St Cyprians Place
- Columbus Avenue/Cunard Street
- Columbus Avenue/Coventry Street
- Columbus Avenue/Burke Street



EXP **Boston, Massachusetts**

HOWARD STEIN HUDSON
Engineers + Planners

Figure 3-1
Study Area Intersections

3.1.2 Study Methodology

This transportation study and its supporting analyses were conducted in accordance with BTD guidelines as described below.

The Existing Condition analysis includes an inventory of the existing transportation conditions, such as traffic characteristics, parking, curb usage, transit, pedestrian circulation, bicycle facilities, loading, and site conditions. Existing counts for vehicles, bicycles, and pedestrians were collected at the study area intersections. A traffic data collection effort forms the basis for the transportation analysis conducted as part of this evaluation.

The future transportation conditions analysis evaluates potential transportation impacts associated with the Project. The long-term transportation impacts are evaluated for the year 2025, based on a six-year horizon from the year of the existing data collection.

The No-Build (2025) Condition analysis includes general background traffic growth, traffic growth associated with specific developments (not including this Project), and transportation improvements that are planned in the vicinity of the Project site.

The Build (2025) Condition analysis includes a net change in traffic volume due to the addition of Project-generated trip estimates to the traffic volumes developed as part of the No-Build (2025) Condition analysis. The transportation study identifies expected roadway, parking, transit, pedestrian, and bicycle accommodations, as well as loading capabilities and deficiencies.

The final part of the transportation study identifies measures to mitigate Project-related impacts and to address any traffic, pedestrian, bicycle, transit, safety, or construction related issues that are necessary to accommodate the Project.

3.2 Existing Condition

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

3.2.1 Existing Roadway Conditions

The study area includes the following roadways, which are categorized according to the Massachusetts Department of Transportation (MassDOT) Office of Transportation Planning functional classifications:

Columbus Avenue, an urban principal arterial under the jurisdiction of the City of Boston, runs north-south from Melnea Cass Boulevard to Arlington Street. Within the study area, Columbus Avenue provides one travel lane in each direction. On-street parking is provided on both sides of the roadway near the study area. Sidewalks on each side range in width from eight to 28 feet.

Leon Street, an urban local roadway under the jurisdiction of the City of Boston, runs north-south from Greenleaf Street to Ruggles Street. Leon Street is a two-way, three-lane roadway for approximately 175 feet from Ruggles Street, providing access to the Ryder Hall parking lot on the east side of the roadway as well as the West Village parking garage on the west side of the roadway. Beyond the entrance to the parking garage, Leon Street is a one-way, one lane southbound street. Parking is not allowed on either side of Leon Street. There are two curb cuts that provide access to Northeastern facilities along the roadway as well. There are two speed bumps on Leon Street as well as a raised crossing between Northeastern University's West Village and Centennial Quad. While vehicular traffic is very low at Leon Street, pedestrian volumes are high, particularly at the raised crossing.

Ruggles Street, an urban minor arterial under the jurisdiction of the City of Boston, runs east-west from Huntington Avenue to Tremont Street. Ruggles Street generally consists of two lanes westbound and one lane eastbound. There is no on-street parking provided on either side of the roadway. There are three MBTA bus stops located along Ruggles Street. Sidewalks provided along both sides of the roadway range in width from eight to 12 feet

Whittier Street, an urban local roadway under the jurisdiction of the City of Boston, runs west from Cabot Street to Tremont Street. Whittier Street provides one westbound lane with on-street parking along both sides of the roadway; however, parking is constrained to the south side of the roadway in the vicinity of the intersection with Tremont Street and is restricted within 30 feet of the intersection. This restriction provides adequate space within the roadway for two vehicles to idle adjacent to one another at the stop bar, however, there are no lane markings to illustrate this. Sidewalks along both sides of the road are approximately eight feet wide.

Massachusetts Avenue, an urban principal arterial under the jurisdiction of the City of Boston, runs east–west from Cambridge and the northwestern part of the Boston metropolitan area to Columbia Road to the southeast. Within the study area, Massachusetts Avenue provides two travel lanes in each direction, which are separated by a raised median. On-street parking is provided on both sides of the roadway within the study area. Bus stops are located regularly on both sides of Massachusetts Avenue. Sidewalks on each side range in width from seven to 23 feet. Massachusetts Avenue carries about 40,000 vehicles total in both directions on an average weekday.

Melnea Cass Boulevard, an urban principal arterial under the jurisdiction of the City of Boston, generally runs east-west from Columbus Avenue to Massachusetts Avenue in the South End of Boston. At its intersection with Massachusetts Avenue, Melnea Cass Boulevard becomes the "Massachusetts Avenue Connector," which provides access to I-93 northbound and southbound and I-90 eastbound and westbound. Melnea Cass Boulevard provides two lanes in each direction with additional left turn lanes at Tremont Street, Washington Street, Harrison Avenue, Hampden Street, and Massachusetts Avenue. All of the intersections along the street are signalized, except the intersection with Northampton Street (Crosstown Drive). While varying in width from block

to block, the roadway is generally 55-feet wide, with seven-foot wide sidewalks on either side. On-street parking is prohibited along the entire roadway. MBTA Buses 8, 19, 43, and 47 run along Melnea Cass Boulevard within the study area. On the north side of the street, a 40-foot wide easement has been provided to accommodate Urban Ring public transportation. Today this easement is planted with a pedestrian/bicycle path, the South Bay Harbor Trail (SBHT), running through it.

Tremont Street, an urban principal arterial under the jurisdiction of the City of Boston, extends from Huntington Avenue in Mission Hill to Cambridge Street in Downtown Boston. Tremont Street runs primarily north-south in the vicinity of the study area. In the study area, Tremont Street provides two lanes in each direction with additional turning lanes at Massachusetts Avenue, Columbus Avenue, and Ruggles Street. Near Massachusetts Avenue there is on-street parking provided along both sides of the roadway; however, there is no parking near any other intersection in the vicinity of the study area. Sidewalks provided along both sides of the street range in width from nine to 24 feet.

Coventry Street, an urban local roadway under the jurisdiction of the City of Boston, runs one-way westbound from Tremont Street to Columbus Avenue. The roadway consists of one travel lane with on-street parking along the north side and no-parking allowed on the south side. A five-foot wide sidewalk is provided on each side of the roadway.

Cunard Street, an urban local roadway under the jurisdiction of the City of Boston, runs one-way eastbound from Columbus Avenue to Tremont Street. Cunard Street provides one lane with on-street, resident parking along the west side and two-hour parking along the east side of the roadway. Sidewalks on each side of the road are approximately eight feet wide.

Burke Street, an urban local roadway under the jurisdiction of the City of Boston, runs one way eastbound from Columbus Avenue to Tremont Street. Burke Street provides one lane with on-street parking along the south side of the roadway. Sidewalks provided along both sides of the roadway range in width from five to seven feet.

St. Cyprians Place, an urban local roadway under the jurisdiction of the City of Boston, runs one-way westbound from Tremont Street to Columbus Avenue. St. Cyprians Place provides one lane, with on-street parking along both sides of the roadway for residents or 2-hour parking. Sidewalks are provided along both sides of the road and are approximately five feet wide

3.2.2 Existing Intersection Conditions

The existing study area intersections are described below. Intersection characteristics such as traffic control, lane usage, pedestrian facilities, and pavement markings are described.

Ruggles Street/Leon Street is a three-way signalized intersection with three approaches. The Leon Street southbound approach consists of a 10-foot left-turn lane and a 13-foot right-turn lane. Both lanes have 135 feet of storage. The Ruggles Street westbound approach consists of an 11-foot through lane and a 12-foot shared through/right-turn lane. The Ruggles Street eastbound approach consists of a 14-foot shared left-turn/through lane. Sharrows exist in both directions of Ruggles Street. Albert Street is located on the west side of Ruggles Street 45 feet east of the intersection. The Ryder surface parking lot driveway is located soon after the intersection on the east side of Leon Street. On-street parking is restricted on all approaches.

Concrete sidewalks are provided along both sides of Ruggles Street and Leon Street. Sidewalks range in width from seven to nine feet. Crosswalks, handicap-accessible ramps, and count-down pedestrian signals are provided at each intersection approach. Pavement markings are in good condition.

Ruggles Street/Ruggles Station Upper Busway is an unsignalized intersection with two approaches. The Ruggles Street westbound approach consists of an 11-foot through lane and a 12-foot shared through/right-turn lane. The Ruggles Street eastbound approach consists of one 11-foot shared left-turn/through lane and one 11-foot through lane. On-street parking is restricted on all approaches.

Sidewalk widths range from 10 to 15-feet. Crosswalks and handicap-accessible ramps are provided across the eastbound leg of Ruggles Street, across the Upper Busway entrance to the median island, and across the Upper Busway to Ruggles Station. Crosswalk pavement markings are in good to poor condition, varying from approximately 10 to 15-feet wide.

Ruggles Street/Ruggles Station Lower Busway is a signalized intersection with three approaches. The Ruggles Station Lower Busway one-way southbound approach consists of one 41-foot wide multi-use lane with no pavement markings. The road is accessible to MBTA vehicles only. The Ruggles Street westbound approach consists of one approximately 12-foot wide through lane and one approximately 12-foot wide shared through/right-turn lane. The Ruggles Street eastbound approach consists of two approximately 11-foot wide through lanes and a six-foot bicycle lane. It was observed in the field that buses typically form two lanes, including a left-turn lane and a right-turn lane. On-street parking is restricted on all approaches.

The Southwest Corridor runs north to south across the intersection and consists of dual paths. Concrete sidewalks are provided along both sides of Ruggles Street and the west side of Ruggles Station Lower Busway in the vicinity of the intersection. Sidewalks are approximately 10-feet wide. Crosswalks, handicap-accessible ramps, and count-down pedestrian signal indications are provided on all Ruggles Street approaches. The handicap ramps are very narrow and do not adequately accommodate the high volume of cyclists traveling through the Southwest Corridor.

The Ruggles Station Lower Busway provides a crosswalk, but there are no count-down pedestrian signal indicators on either side of the approach. Crosswalk pavement markings are in good to poor condition, varying from approximately 10 to 15-feet wide.

Tremont Street/Ruggles Street/Whittier Street is a four-way signalized intersection with four approaches. The Tremont Street northbound approach consists of an 11-foot left-turn lane with 190 feet of storage and three approximately 11-foot through lanes. The Tremont Street southbound approach consists of two approximately 11-foot through lanes and one 12-foot right-turn lane. At the intersection, there is an approximately four to 12-foot wide raised median separating the northbound and southbound movements along Tremont Street. The one-way westbound Whittier Street approach consists of one approximately 30-foot wide multi-use lane with no visible pavement markings. Unrestricted on-street parking is provided along the south side of Whittier Street. The Ruggles Street eastbound approach consists of two approximately 11-12-foot wide left-turn lanes with approximately 270 feet of storage, a five-foot bicycle lane, and a 12-foot right-turn lane.

Concrete sidewalks are provided along both sides of Ruggles Street, Tremont Street, and Whittier Street in the vicinity of the intersection. Sidewalks range in width from seven feet to 24 feet. Crosswalks, handicap accessible ramps, and count-down pedestrian signal indications are provided across all of the intersection approaches. Pavement markings are in fair to poor condition with some crosswalk markings badly worn.

Tremont Street/Columbus Avenue/Ruggles Street is a signalized intersection with three approaches. The Tremont Street northbound approach consists of two approximately 10 to 12-foot through lanes and an 11-foot shared through/right-turn lane. The Tremont Street northbound through/right-turn lane also accommodates an MBTA bus stop. The Tremont Street southbound approach consists of two approximately 11 to 12-foot through lanes, and a 13-foot right-turn lane. The Tremont Street westbound right-turn lane storage length is approximately 200-feet long. The Columbus Avenue one-way westbound approach consists of one 25-foot right-turn lane. It was observed that the Tremont Street approaches only receive a red light when there is a vehicle detected at the Columbus Avenue southbound approach or a pedestrian call is made. When Tremont Street does receive a red light, many cars do not stop and simply drive through the red light.

Sidewalks are provided along both sides of Tremont Street, Ruggles Street, and Columbus Avenue, ranging in width from eight to 21 feet. Crosswalks, handicap-accessible ramps, and count-down pedestrian signals are provided across the Tremont Street westbound approach and the Columbus Avenue southbound approach. Crosswalks are approximately 11-feet wide.

Tremont Street/Melnea Cass Boulevard is a four-way signalized intersection. The Tremont Street northbound right-turn lane is channelized by a 16-foot long and 10-foot wide raised island. The Tremont Street southbound approach consists of a 12-foot shared left-turn/through lane, a nine-

foot through lane, and a 24-foot channelized right-turn lane. MBTA bus stops are located adjacent to the Tremont street southbound approach and the northbound departure legs. The Tremont Street westbound approach consists of an 11-foot shared left-turn/through lane and an 18-foot shared through/right-turn lane. The Melnea Cass Boulevard westbound approach consists of a 14-foot left turn lane with 325 feet of storage, a 12-foot shared left-turn/through lane, and a 17-foot shared through/right-turn lane. The Melnea Cass Boulevard southbound approach consists of an 11-foot shared left-turn/through lane and a 13-foot exclusive right-turn lane. The Melnea Cass Boulevard eastbound and westbound travel lanes are separated by an approximately six to seven-foot-wide raised median in the vicinity of the intersection. Right-turn-on-red is not permitted for the Tremont Street northbound approach or the Melnea Cass Boulevard westbound approach.

Parking is prohibited along all legs of the intersection. Concrete sidewalks ranging from six to 12 feet in width are provided along both sides of Tremont Street and Melnea Cass Boulevard. Crosswalks, handicap-accessible ramps, and count-down pedestrian signal indications are located at all approaches of the intersection. Crosswalks are approximately 10 to 11-feet wide. Pavement markings are in good condition.

Melnea Cass Boulevard/Columbus Avenue/MBTA Ruggles Station Driveway is a four-way signalized intersection. The Columbus Avenue eastbound approach consists of one 23-foot shared left-turn/through/right-turn lane. The Columbus Avenue westbound approach consists of an 11-foot shared left-turn/through/right-turn lane, a four-foot bicycle lane, and an eight-foot parking lane. The Columbus Avenue westbound through movement does not permit through traffic, trucks and through traffic must turn left. A seven-foot wide cobblestone median separates the eastbound and westbound Columbus Avenue travel lanes east of the intersection. Parking along Columbus Avenue in the vicinity of the intersection is resident permit or two-hour parking from 8:00 a.m. until 6:00 p.m. from Monday through Friday. The Melnea Cass Boulevard northbound approach consists of a 14-foot shared left-turn/through lane, and a 14-foot shared through/right-turn lane. The northbound and southbound travel lanes are separated by an approximately seven-foot wide raised median in the vicinity of the intersection. The MBTA Ruggles Station Driveway southbound approach consists of one 16-foot shared left-turn/through/right-turn lane. The MBTA Ruggles Station Driveway's use is restricted to MBTA vehicles.

Sidewalks ranging in width from seven to 28 feet are provided along both sides of Columbus Avenue, Melnea Cass Boulevard, and the MBTA Private Driveway. The Southwest Corridor's dual paths run along the north side of Columbus Avenue. Crosswalks, handicap-accessible ramps, and pedestrian signal indications are provided across all approaches of the intersection. Crosswalks are approximately 10-feet wide. The pavement markings on Columbus Avenue west of the intersection are very faded. Field observations noted heavy ponding at the wheel chair ramp located on the northeast corner of the intersection.

Massachusetts Avenue/Columbus Avenue is a four-way signalized intersection. The Columbus Avenue eastbound approach consists of a 10-foot left-turn lane with approximately 175 feet of storage, an 11-foot through lane, and a 10-foot shared through/right-turn lane. The Columbus Avenue westbound approach consists of an 11-foot left-turn lane with 160 feet of storage, a 12-foot shared through/right-turn lane, and a 12-foot unrestricted parking lane. The eastbound and westbound travel lanes are separated by a four-foot wide cobblestone median. The Massachusetts Avenue northbound approach consists of a 10-foot left-turn lane with 100 feet of storage, an 11-foot through lane, an 11-foot shared through/right turn-lane, and a six-foot bicycle lane. The Massachusetts Avenue northbound and southbound travel lanes are separated by a median that narrows to four-feet wide in the vicinity of the intersection. The Massachusetts Avenue southbound approach consists of a 10-foot left-turn lane with 100 feet of storage, an 11-foot through lane, an 11-foot shared through/right-turn lane, and a four-foot bicycle lane. The northbound and southbound approaches also accommodate MBTA bus stops. A Shell gas station located on the southwest corner of the intersection has driveways on both Columbus Avenue and Massachusetts Avenue.

Brick sidewalks ranging from eight to 13 feet in width and are provided along both sides of Columbus Avenue and Massachusetts Avenue in the vicinity of the intersection. Crosswalks, handicap-accessible ramps, and count-down pedestrian signal indications are provided at all of the intersection approaches. Crosswalks are approximately 14-feet wide and composed of both pavement markings and decorative, in-ground paint.

Columbus Avenue/Cunard Street is an unsignalized intersection with three approaches. The Columbus Avenue eastbound approach consists of a shared left-turn/through/right-turn lane, a bicycle lane, and an eight-foot parking lane. The westbound approach consists of an 11-foot shared left-turn/through/right-turn lane, a five-foot bicycle lane, and an eight-foot parking lane. The eastbound and westbound travel lanes are separated by a seven-foot cobblestone median. The Columbus Surface Parking Lot southbound approach consists of one approximately 20-foot shared left-turn/through/right-turn lane. South of the intersection, Cunard Street runs one-way southbound with resident parking along the west side and two-hour parking along the east side. Sidewalks are provided along both sides of both streets. Parking along Columbus Avenue is resident or two-hour parking from 8:00 a.m. until 6:00 p.m. Monday through Friday.

Sidewalks range in width from approximately eight feet to 13 feet. The Southwest Corridor dual paths, approximately 26 feet wide, run parallel to Columbus Avenue on the north side of the street. Crosswalks and handicap-accessible ramps are provided across the Columbus Avenue westbound approach, Cunard Street, and the Columbus Surface Parking Lot.

Columbus Avenue/Burke Street/Columbus Garage Driveway is an unsignalized intersection with two approaches. The Columbus Avenue eastbound approach consists of an 11-foot shared left-turn/through/right-turn lane, a four-foot bicycle lane, and an eight-foot parking lane. The Columbus Avenue westbound approach consists of a 10-foot shared left-turn/through/right-turn

lane, a five-foot bicycle lane, and a seven-foot parking lane. Parking along Columbus Avenue is resident parking or two-hour parking from 8:00 a.m. until 6:00 p.m. Monday through Friday. The Southwest Corridor eight-foot multi-use path runs along the north side of Columbus Avenue. The Columbus Avenue eastbound and westbound travel lanes are separated by a seven-foot cobblestone median in the vicinity of the intersection.

Brick and concrete sidewalks ranging in width from five to 19 feet are provided on both sides of Columbus Avenue and Burke Street. There are 8-foot wide crosswalks and handicap-accessible ramps across Burke Street and the Columbus Avenue eastbound approach. There is unmarked, unrestricted parking along the west side of Burke Street. As part of the LightView ACC Student Housing project, curb bump outs were added to shorten the Columbus Avenue crossing from 52 feet to 42 feet. The crossing across Burke Street has been reduced from 27 feet to 21 feet.

Columbus Avenue/St. Cyprians Place is an unsignalized intersection with three approaches. The Columbus Avenue eastbound approach consists of a 10-foot shared left-turn/through/right-turn lane, a four-foot bicycle lane, and an eight-foot parking lane. The westbound approach consists of an 11-foot shared left-turn/through/right-turn lane, a four-foot bicycle lane, and an eight-foot parking lane. The eastbound and westbound travel lanes are separated by a seven-foot wide cobblestone median. Parking along Columbus Avenue in the vicinity of the intersection is resident parking or two-hour parking Monday through Friday from 8:00 a.m. until 6:00 p.m. St. Cyprians Place northbound approach consists of a 12-foot through lane with approximately eight-foot parking on both sides of the roadway. Parking along St. Cyprians Place in the vicinity of the intersection is all marked residential and 2-hour restricted. The southbound approach is currently closed to vehicular access to the Columbus Parking lot.

Concrete and brick sidewalks ranging from eight to 34 feet are provided along both side of Columbus Avenue and five feet along St. Cyprians Place. Ten-foot wide crosswalks and handicap-accessible ramps are provided across the east and south legs of the intersection approaches. Pavement markings along St. Cyprians Place are in poor condition, along with both crosswalks. There are no stop-controls, or pedestrian signal indications.

Columbus Avenue/Coventry Street is an unsignalized intersection with three approaches. The Columbus Avenue eastbound approach consists of a 10-foot shared left-turn/through/right-turn lane, a four-foot bicycle lane, and an eight-foot parking lane. The westbound approach consists of an 11-foot shared left-turn/through/right-turn lane, a four-foot bicycle lane, and an eight-foot parking lane. The eastbound and westbound travel lanes are separated by a seven-foot wide cobblestone median. Parking along Columbus Avenue in the vicinity of the intersection is resident parking or two-hour parking Monday through Friday from 8:00 a.m. until 6:00 p.m. St. Cyprians Place northbound approach consists of a 12-foot through lane with approximately eight-foot parking on both sides of the roadway. Parking along Coventry Street in the vicinity of the intersection is all marked unrestricted on the west side and no parking on the east side of the roadway.

Concrete and brick sidewalks ranging from eight to 34 feet are provided along both sides of Columbus Avenue and five feet along Coventry Street. Ten-foot wide crosswalks and handicap-accessible ramps are provided across the east and south legs of the intersection approaches. Pavement markings along Coventry Street are in poor condition, along with both crosswalks. There are no stop-controls, or pedestrian signal indications.

3.2.3 Existing Parking

An inventory of the existing on-street parking as well as car sharing services in the vicinity of the Project was collected. The curb use surrounding the site consists of unregulated, metered, and resident only parking, as well as several bus stops. The on-street parking regulations within the study area are shown in Figure 3-2.

3.2.4 Car Sharing Services

Car sharing enables easy access to short term vehicular transportation. Vehicles are rented on an hourly or daily basis, and all vehicle costs (gas, maintenance, insurance, and parking) are included in the rental fee. Vehicles are checked out for a specific time period and returned to their designated location.

Car sharing, predominantly served by Zipcar in the Boston area, provides easy access to vehicular transportation for those who do not own cars. There are five Zipcar locations and one Maven location within approximately one quarter mile of the Project site. The Zipcar and Maven locations are shown in Figure 3-3. Four of the locations adjacent to the Project site are at Northeastern parking facilities.

3.2.5 Existing Traffic Data

Traffic volume data was collected in the study area intersections on December 13, 2018. Turning Movement Counts (TMCs) were conducted during the weekday a.m., and p.m. peak periods (7:00 – 9:00 a.m. and 4:00 – 6:00 p.m., respectively) at the study area intersections. The TMCs collected vehicle classification including car, heavy vehicle, pedestrian, and bicycle movements. The detailed traffic counts for the study area intersections are provided in Appendix C.

In order to account for seasonal variation in traffic volumes throughout the year, data provided by MassDOT were reviewed. The most recent (2017) MassDOT Weekday Seasonal Factors were used to determine the need for seasonal adjustments to the December 2018 TMCs. The seasonal adjustment factor for roadways similar to the study area (Group U3 – Urban Principal Arterials) during the month of December is 0.99. This indicates that average month traffic volumes are approximately one percent lower than the traffic volumes that were collected. The traffic counts were not adjusted to reflect average month conditions in order to provide a conservatively high analysis consistent with the peak season traffic volumes. The MassDOT 2017 Weekday Seasonal Factors table is provided in Appendix C.

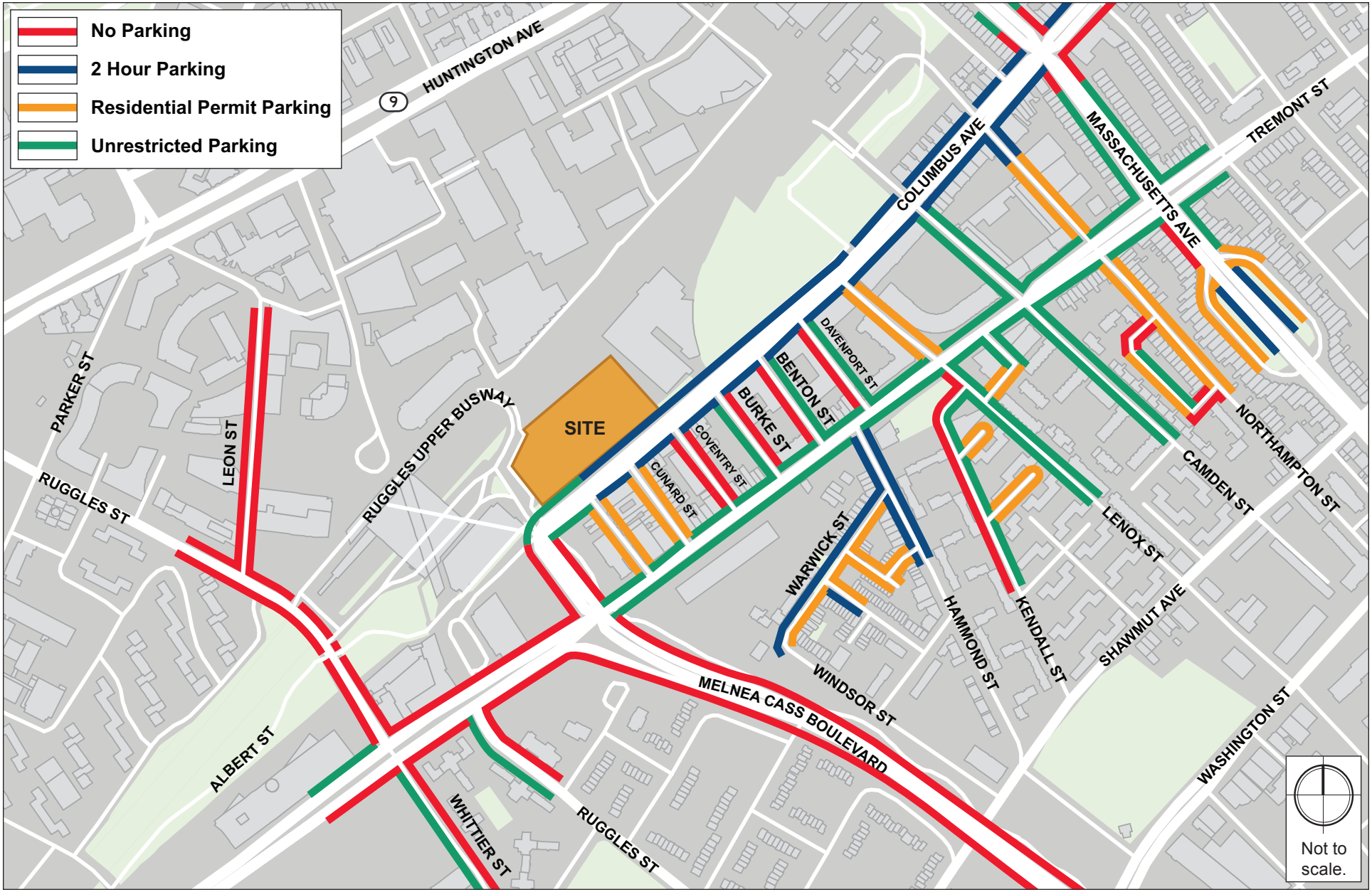


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Figure 3-2
On-street Parking

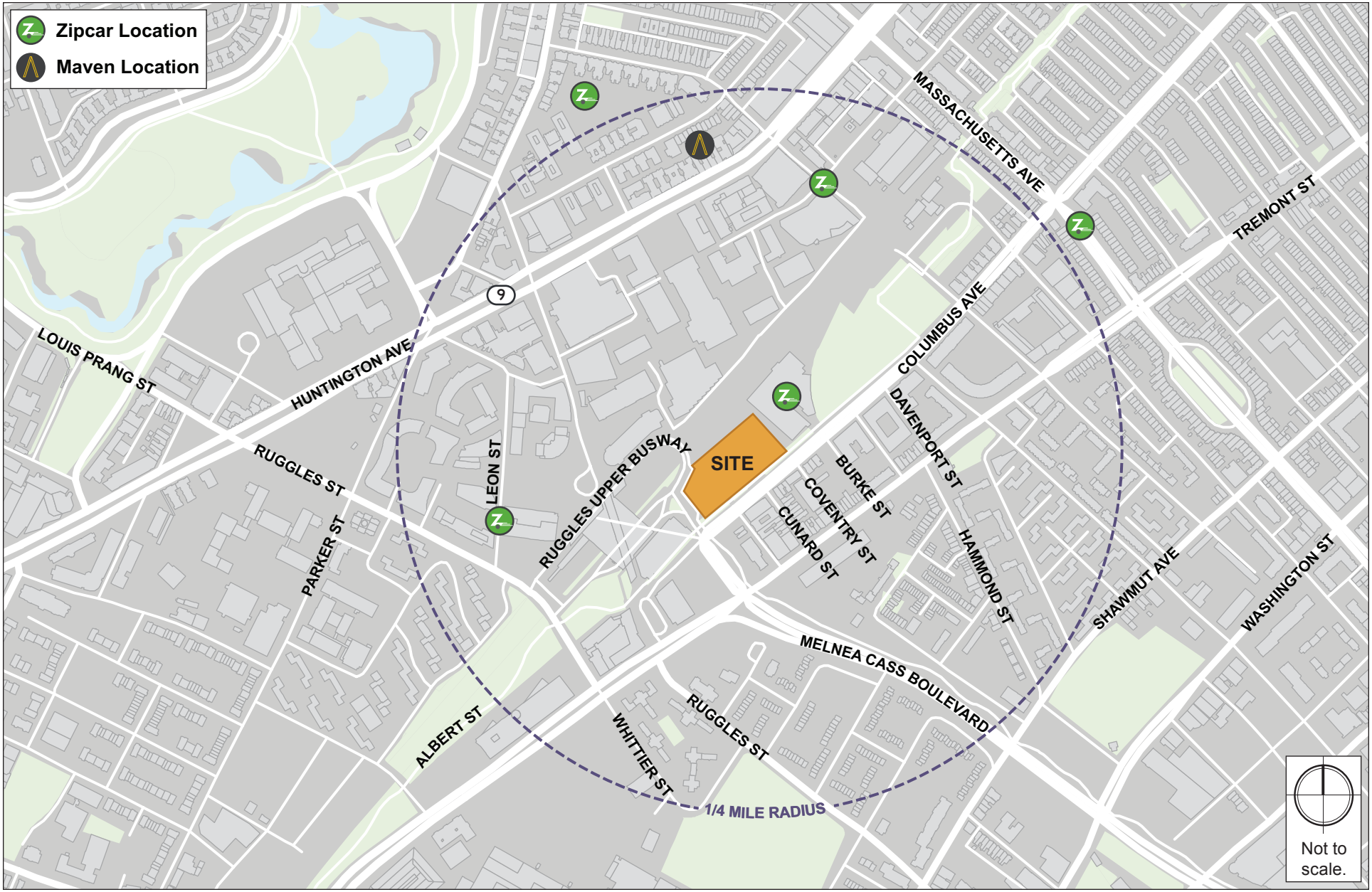

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Figure 3-3
Car Sharing Locations

3.2.5.1 Existing Traffic Volumes

Existing traffic volumes were balanced, where necessary to remove any discrepancies between data collection time frames and to provide a conservative estimate, to develop the Existing Condition vehicular traffic volumes. The Existing Condition weekday a.m. and p.m. peak hour traffic volumes are shown in Figures 3-4 and 3-5.

3.2.5.2 Existing Pedestrian Volumes and Accommodations

Sidewalks are provided along both sides of all the roadways in the study area. In general, the sidewalks provided along nearby roadways are in good condition with few cracks and level grades. The closest crosswalks to the Project site are located at the unsignalized intersection of Columbus Avenue/St. Cyprians Place and the existing parking lot curb-cut, adjacent to the Project site. Wheelchair ramps are typically provided along all intersections.

To determine the amount of pedestrian activity within the study area, pedestrian counts were conducted concurrent with the TMCs on December 13, 2018 at the study area intersections and are presented in Figure 3-6.

3.2.5.3 Existing Bicycle Volumes and Accommodations

In recent years, bicycle use has increased dramatically throughout the City of Boston and is expected to continue growing. The Project site is located in close proximity to bicycle facilities and the following roadways within the study area have bike infrastructure providing added safety to cyclists. Columbus Avenue has dedicated bicycle lanes in both the eastbound and westbound directions. Ruggles Street has sharrows indicating bicyclists share the roadway. Additionally, the southwest corridor pedestrian network runs adjacent to the south side of the Project site, along Columbus Avenue.

To determine the amount of cyclist activity within the study area, bicycle counts were conducted concurrent with the TMCs on December 13, 2018 at the study area intersections and are presented in Figure 3-7.

The Project site is also located in proximity to eight bicycle sharing stations provided by BLUEbikes. BLUEbikes is the Boston area's largest bicycle sharing service, which was launched in 2011 (as Hubway) and currently consists of more than 1,800 shared bicycles at more than 200 stations throughout Boston, Brookline, Cambridge, and Somerville. The nearest BLUEbikes stations to the Project site are located at Columbus Avenue at Massachusetts Avenue, Tremont Street at Northampton Street, and at the Ruggles T Station near the intersection of Columbus Avenue and Melnea Cass Boulevard. All of these stations are located within an approximately five-minute walk from the Project site. The BLUEbikes stations located in proximity to the Project site are shown in Figure 3-8.

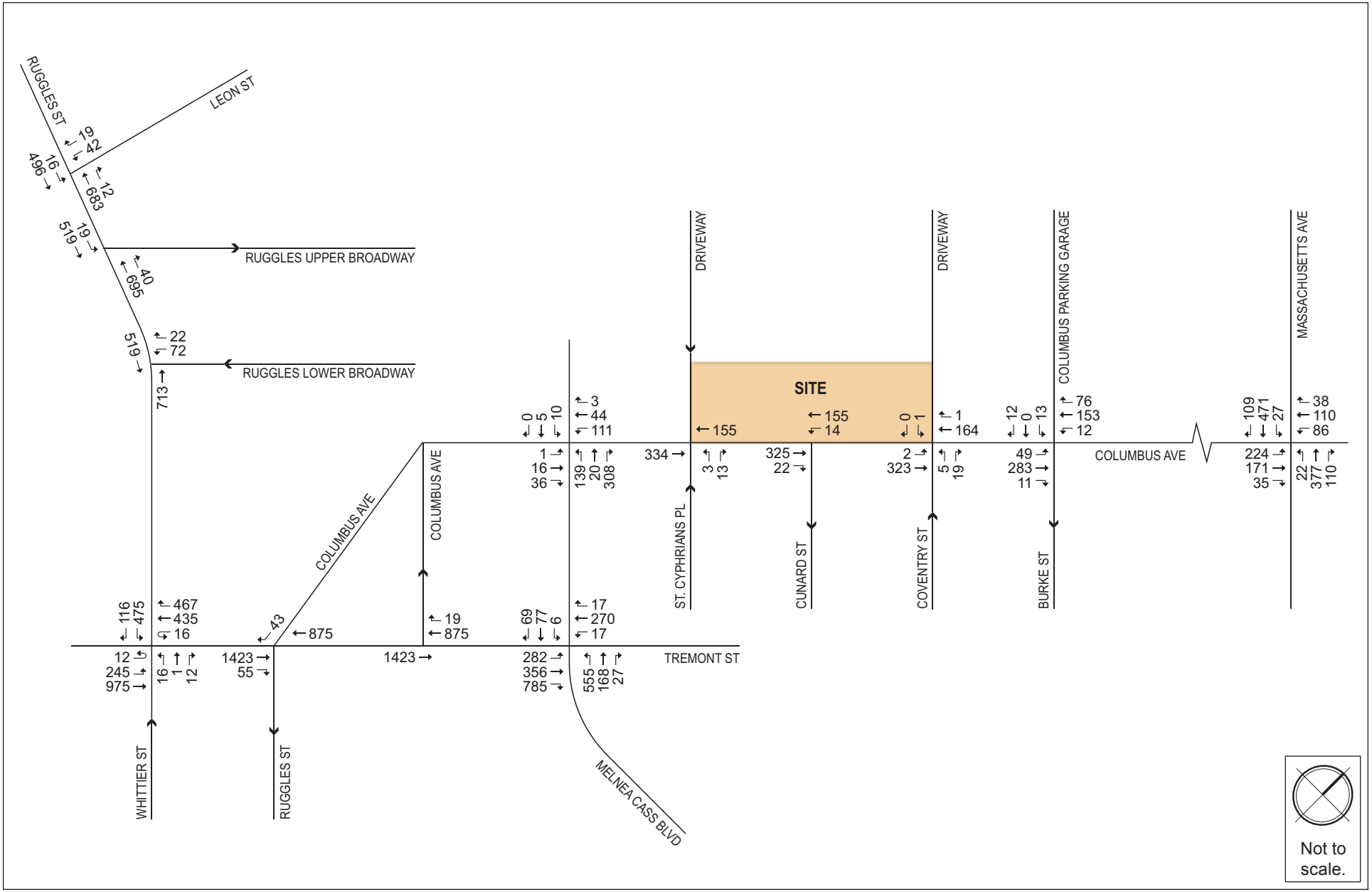

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Figure 3-4

Existing Condition Traffic Volumes, Weekday a.m. Peak Hour

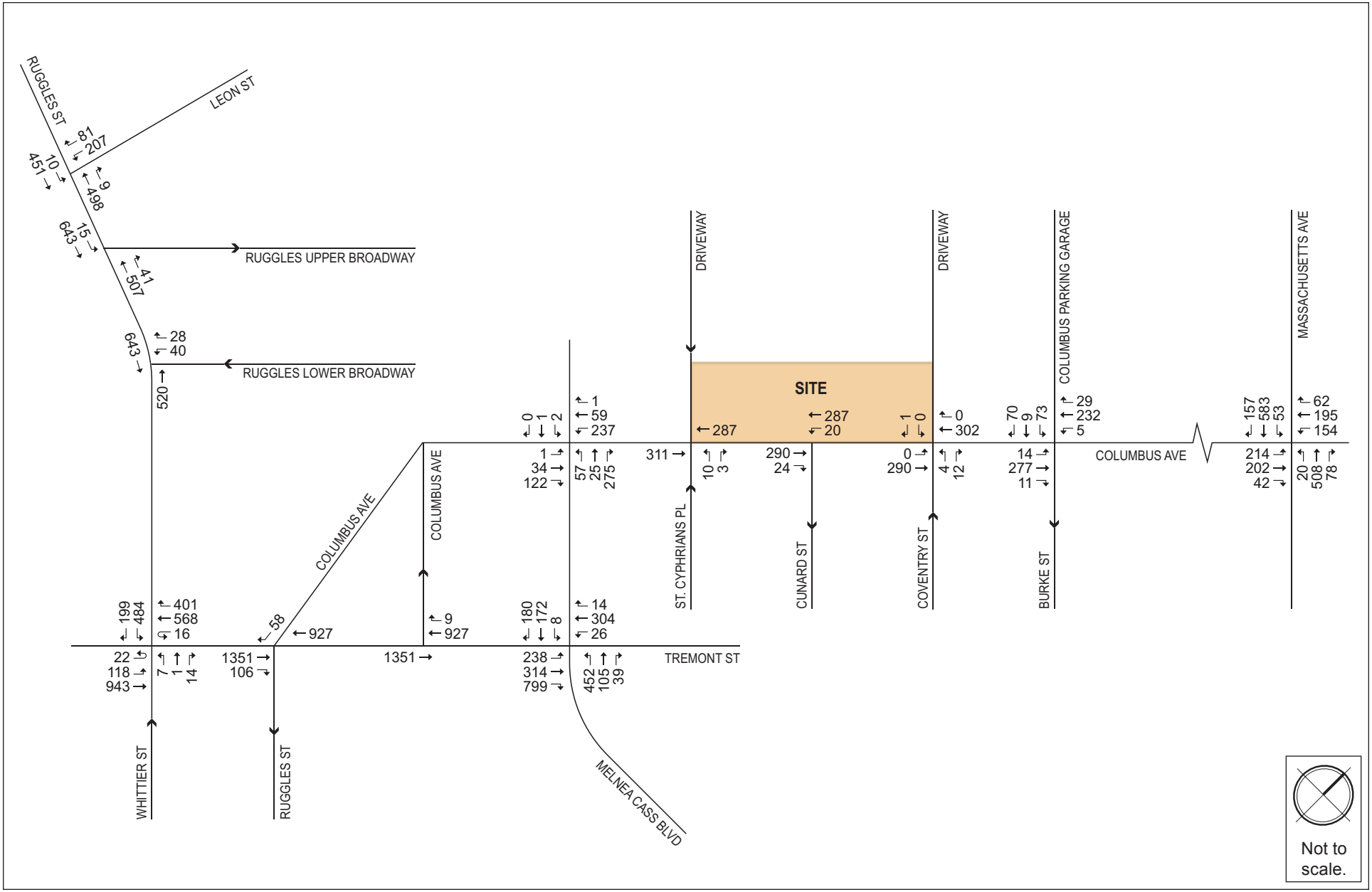

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Figure 3-5

Existing Condition Traffic Volumes, Weekday p.m. Peak Hour

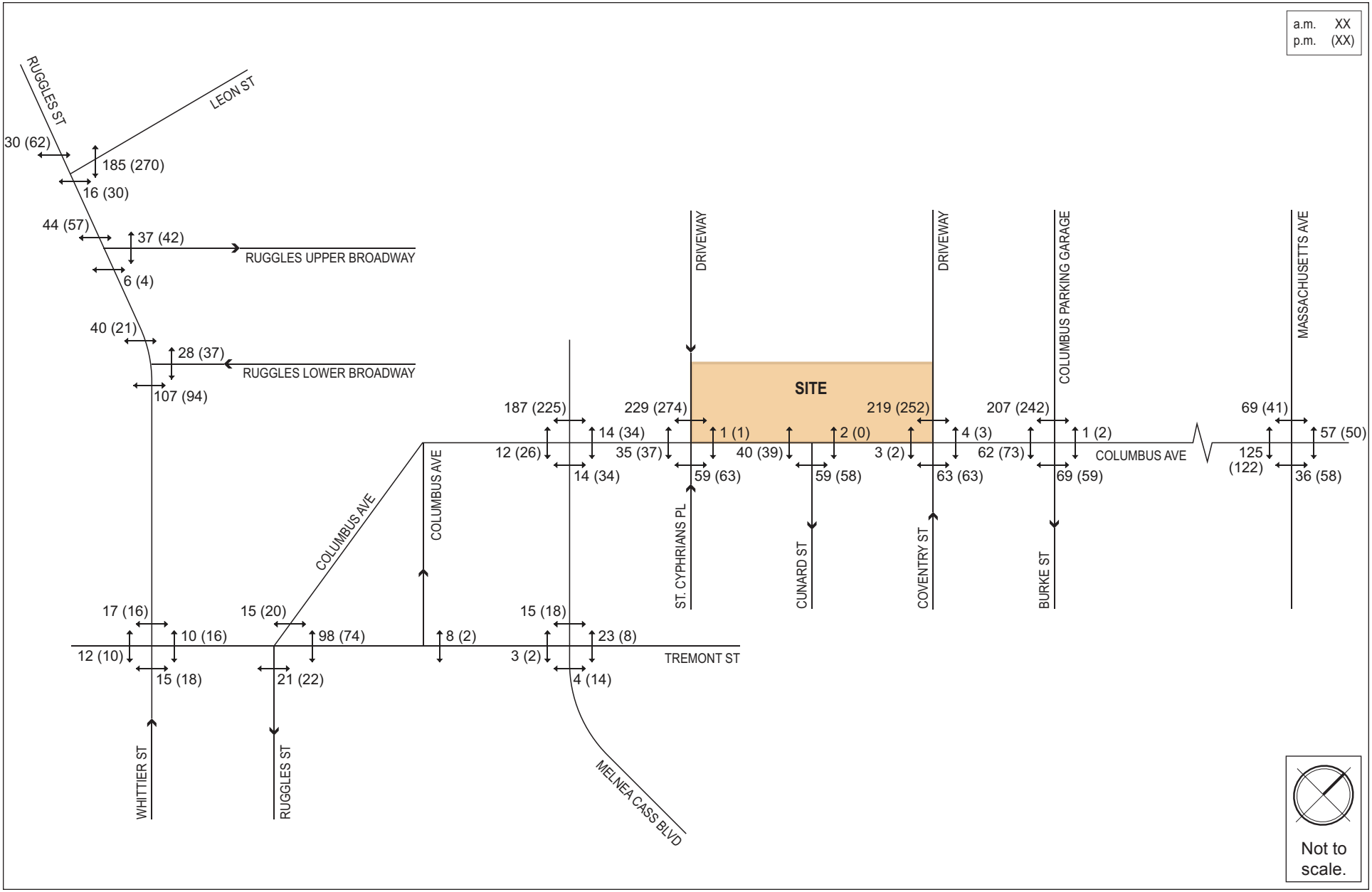

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Figure 3-6

Existing Condition Pedestrian Volumes, Weekday a.m. and p.m. Peak Hours

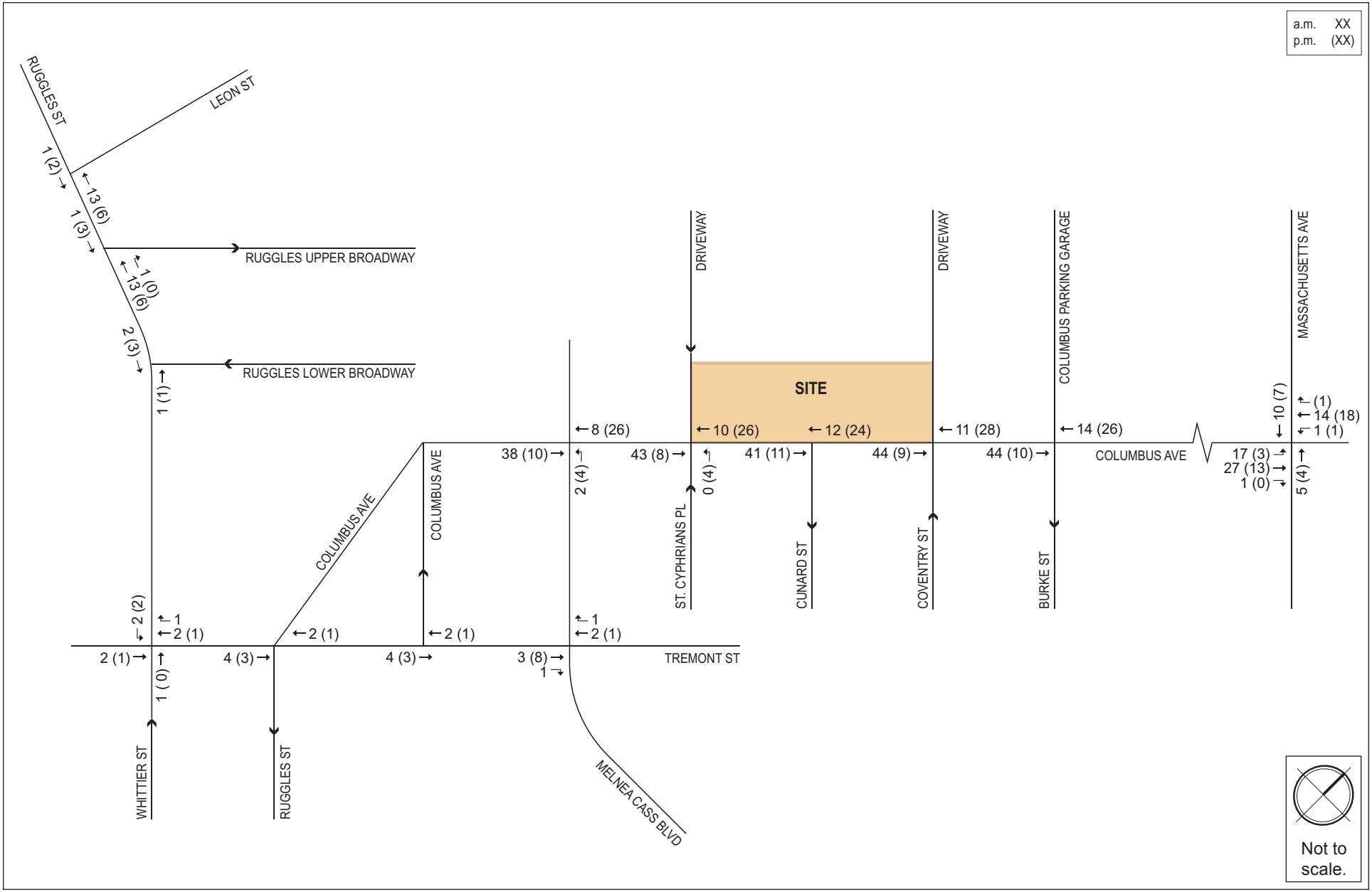

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Figure 3-7

Existing Condition Bicycle Volumes, Weekday a.m. and p.m. Peak Hours

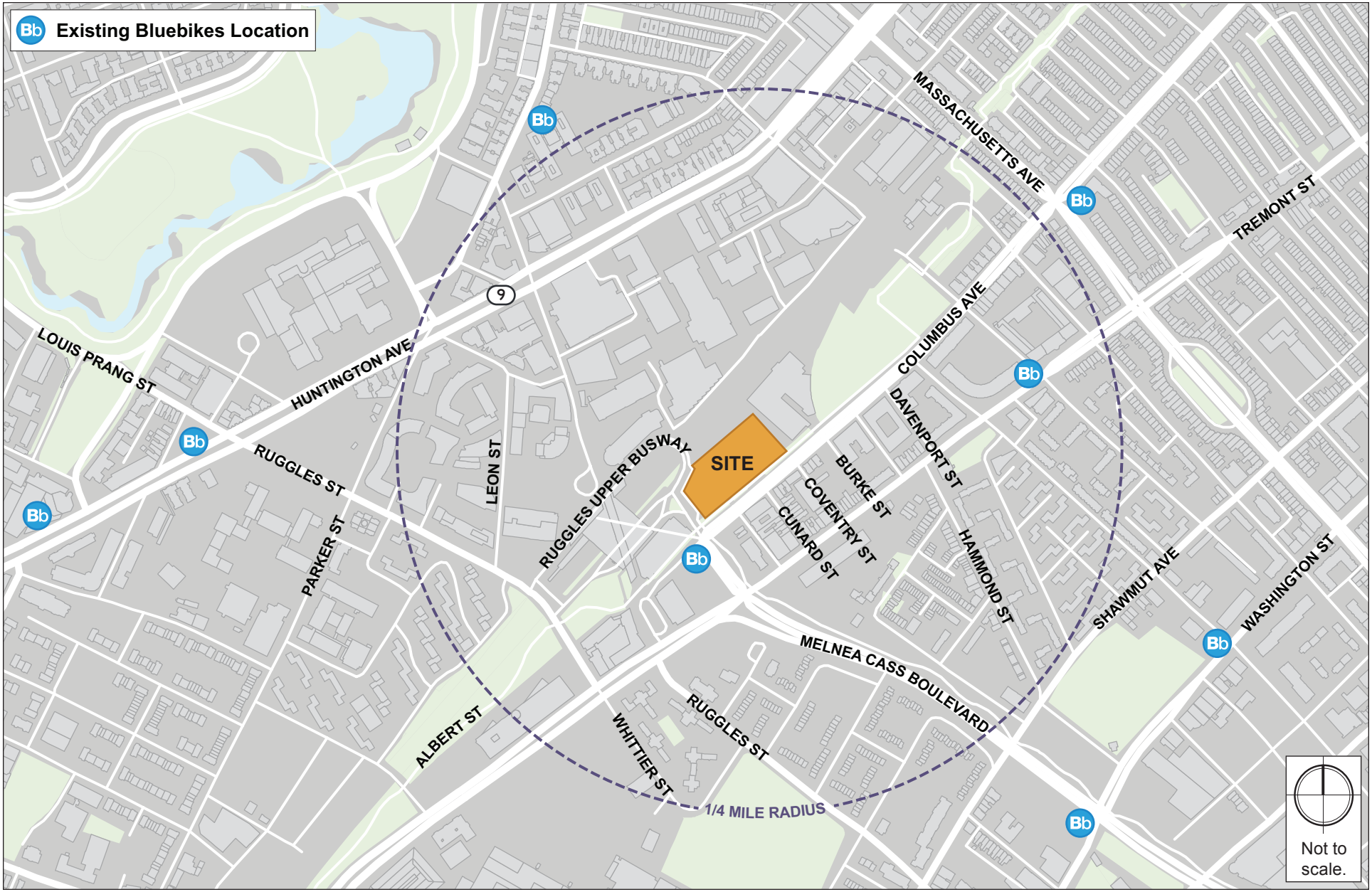

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Figure 3-8
Bike Sharing Locations

3.2.6 Existing Public Transportation

The Project site is located on the border of Boston's South End and Fenway/Kenmore neighborhoods and is well situated to take advantage of the City's public transportation system. The Project site is located approximately five minutes east of the Ruggles Station on the MBTA Orange Line. In addition to serving the MBTA Orange Line, Ruggles Station also serves the Franklin, Needham, and Providence/Stoughton MBTA Commuter Rail trains as well as the MBTA bus routes 8, 9, 15, 19, 22, 23, 28, 29, 43, 44, 45, 47, CT2, and CT3. There are ten MBTA bus stops serving route 43 along Tremont Street as well as one bus stop serving routes 8, 19, and 47 on Melnea Cass Boulevard within the study area. The Project site is also an approximately 7-minute walk from the MBTA Massachusetts Avenue Station, which provides access to Orange Line subway service, and an approximately 7-minute walk from the MBTA Northeastern Station which provides access to Green Line light rail service.

Figure 3-9 shows a map of all public transportation services located in close proximity to the Project site, and Table 3-1 provides a brief summary of all routes.

Table 3-1 Existing Public Transportation

Route	Description	Peak-hour Headway	Weekday Service Duration
Rapid Transit			
Orange Line	Forest Hills – Oak Grove	6	5:16 a.m. – 12:30 a.m.
Green Line – E Branch	Heath Street – Lechmere	6	5:01 a.m. – 12:47 a.m.
Bus Rapid Transit (Silver Line)			
SL4	Dudley Station – South Station	12	2:54 a.m. – 12:52 a.m.
SL5	Dudley Station – Downtown Crossing	8	5:15 a.m. – 1:18 a.m.
Local Bus Routes			
CT2	Central Square – Boston Medical Center	20	6:00 a.m. – 7:44 p.m.
CT3	Boston Medical Center – Andrew	10-15	6:05 a.m. – 8:40 p.m.
8	Harbor Point/UMass – Kenmore Station	15	5:15 a.m. – 12:56 a.m.
9	City Point via Andrew Station	5-6	5:13 a.m. – 1:13 a.m.
15	Haymarket via Dudley & Fields Corner	4	3:26 a.m. – 2:44 a.m.
19	Fields Corner – Kenmore Station/Ruggles Station	10	5:50 a.m – 7:45 a.m.
22	Ashmont Station – Ruggles Station	10	4:45 a.m. – 1:14 a.m.
23	Ashmont Station – Ruggles Station	7	5:09 a.m. – 1:29 a.m.
28	Mattapan Station – Ruggles Station	9	3:20 a.m – 1:42 a.m.
29	Mattapan Station – Jackson Square Station	9	5:55 a.m – 1:42 a.m.

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Figure 3-9
Public Transportation

Table 3-1 Existing Public Transportation (Continued)

Route	Description	Peak-hour Headway	Weekday Service Duration
Local Bus Routes			
43	Ruggles Station – Park & Tremont Streets	20	5:00 a.m. 12:43 a.m.
44	Jackson Square Station – Ruggles Station	16	5:10 a.m. – 12:55 a.m.
45	Franklin Park Zoo – Ruggles Station	11	5:14 a.m. – 1:03 a.m.
47	Central Square – Broadway Station	10	5:15 a.m. – 1:31 a.m.

Headway is the time between service, Headways vary. Source: MBTA October 2018.

3.3 No-Build (2025) Condition

The No-Build (2025) Condition reflects a future scenario that incorporates anticipated traffic volume changes associated with background traffic growth independent of any specific project, traffic associated with other planned specific developments, and planned infrastructure improvements that will affect travel patterns throughout the study area. These infrastructure improvements include roadway, public transportation, pedestrian and bicycle improvements.

3.3.1 Background Traffic Growth

The methodology to account for future traffic growth, independent of the Project, consists of two parts. The first part of the methodology accounts for general background traffic growth that may be affected by changes in demographics, automobile usage, and automobile ownership. Based on a review of recent and historic traffic data collected for nearby projects and to account for any additional unforeseen traffic growth, a one-half percent per year annual traffic growth rate was used to develop the future conditions traffic volumes.

3.3.2 Specific Development Traffic Growth

The second part of the methodology identifies any specific planned developments that are expected to affect traffic patterns throughout the study area within the future analysis time horizon. Figure 3-10 shows the specific development projects in the vicinity of the study area, which are summarized below:

Tremont Crossing (P-3) – The project includes approximately 1,928,400 sf of mixed-use space, including retail, art, educational, office, hotel, residential, and an above ground parking structure of 548,700 sf. The project is BPDA Board approved.

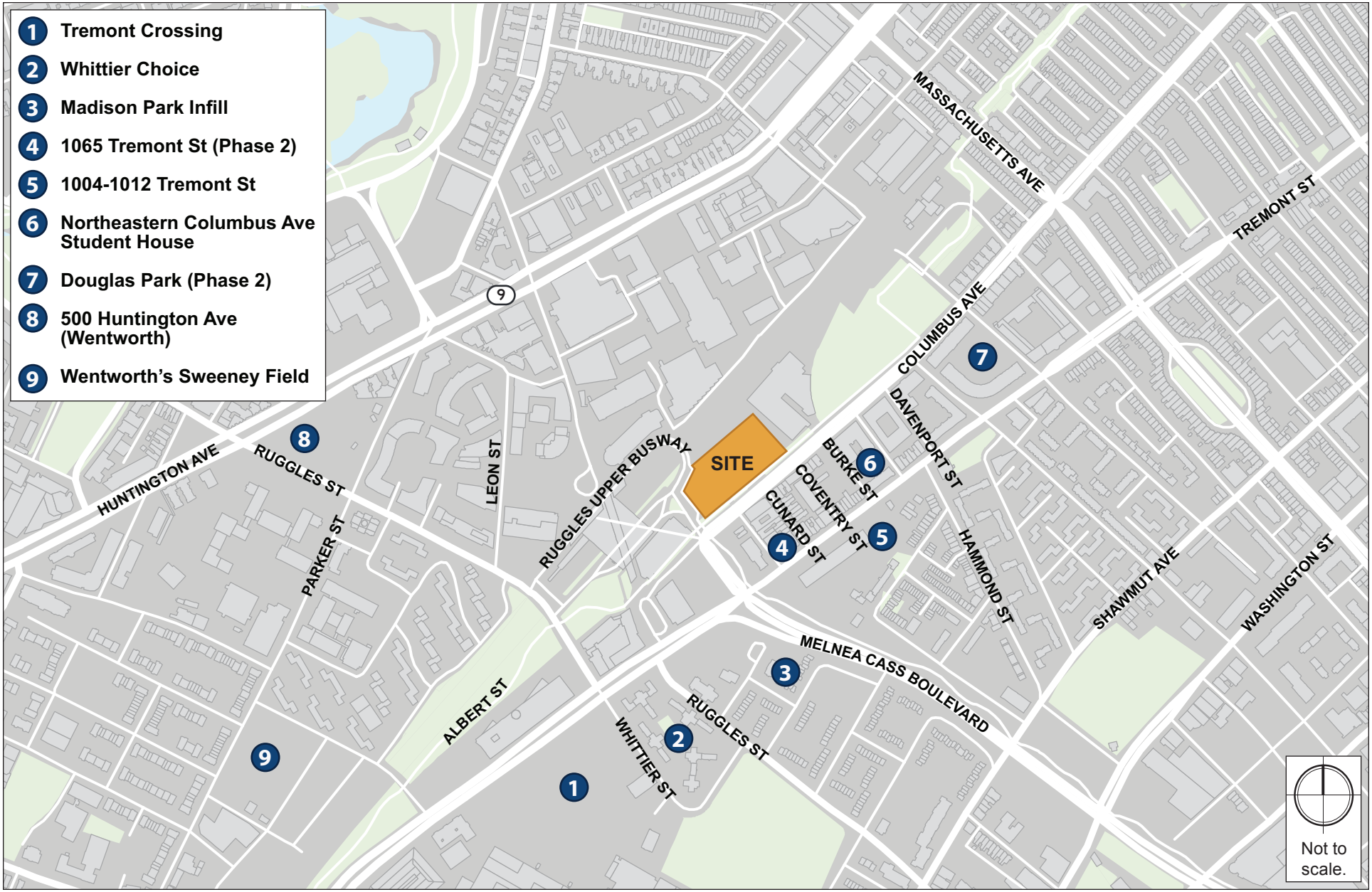

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Figure 3-10
Background Projects

Whittier Choice Neighborhood - The project includes the demolition of the existing 200-unit Whittier Street Apartments and the construction of 387 residential units in three new buildings, 135 parking spaces, and 7,680 sf of ground floor commercial/retail space. The project is currently under construction.

Madison Park Infill – The project includes the demolition of an existing one-story building at 40 Raynor Circle and creation of a new residential development consisting of 76 residential units along Melnea Cass Boulevard. The project is currently under construction.

1065 Tremont Street – The project includes the construction of a new 6-story building with 28 rental units. The project will not include parking due to the proximity to transit options. The project is currently under construction.

1004-1012 Tremont Street – The project includes the construction of a new 14,882 sf mixed-use building with 2,224 square feet of ground floor retail, 7 rental units, and 6 surface parking spaces. The project is currently under construction.

Northeastern University's Columbus Avenue Student Housing – The project includes the construction of a new 320,000 sf dormitory to house 825 students and approximately 3,000 sf of ground floor commercial space. The project will not provide parking. The project is currently under construction.

Douglas Park (Phase 2) – The project includes the construction of a new 5-story, 49,305 gsf residential building on a 15,500 sf portion of the existing Douglas Park project. The project will include 44 residential units, 8 of which will be income restricted. The project will supply parking by utilizing the existing underground parking garage. The project is currently under construction.

500 Huntington Avenue – The project includes two buildings totaling approximately 640,000 sf of mixed-use development. The project will include space for research and development, office, laboratories, cultural, day care, and retail/commercial uses. Additionally, the project will lease approximately 78,400 sf to the Wentworth Center for Innovation in Engineering and Technology. The project is BPDA Board approved.

Sweeney Field Athletics Complex – The project includes the development of a state-of-the-art athletic playing field atop a single-story parking structure that will contain approximately 330 parking spaces. The project will be constructed atop Wentworth's existing Parker Street lot. The project is BPDA Board approved

3.3.3 Proposed Infrastructure Improvements

A review of planned improvements to roadway, transit, bicycle, and pedestrian facilities was conducted to determine if there are any nearby improvement projects in the vicinity of the study area. Based on this review, there are three proposed infrastructure improvements within the study area.

Melnea Cass Boulevard will be rebuilt from Columbus Avenue to Massachusetts Avenue as a "complete street" in order to better serve not only drivers but pedestrians, cyclists and transit riders as well. The project will include improved sidewalk conditions with 8-foot wide sidewalks, separated bike lanes within the roadway, new traffic signal equipment and timings, and improved bus stops along the corridor.

Whittier Street will be reconstructed as part of the Tremont Crossing Development and will include two-way traffic between Tremont Street and the secondary garage entrance to the Tremont Crossing Development. The reconstruction will retain the on-street parking on both sides of the street while incorporating a designated pick-up/drop-off zone.

Tremont Street will be reconstructed from Prentis Street to Ruggles Street as part of the Tremont Crossing Development. The reconstruction will include a southbound left turn lane onto Whittier Street, a left turn lane onto South Drive, a median island and on-street parking along both sides of the roadway. Additionally, the reconstruction will include the construction of Traffic Signals at the intersections of Tremont Street/South Drive, and the improvement of signal timings at Tremont Street/Ruggles Street & Whittier Street.

Ruggles Station Commuter Rail Platform Extension will include the construction of a second, 800-foot long commuter rail platform at Track 2 that will allow passengers the ability to by-pass traveling to Back Bay Station on the commuter rail and transferring to the orange line to return to Ruggles Station. This project is under construction.

MBTA Better Bus Project is the first step of an effort to improve bus services in the greater Boston area. The MBTA has proposed near-term changes that will enable better service per dollar invested. Those changes include the consolidation of duplicate routes, improve the space available at some existing bus stops and eliminate obsolete variants of some bus routes. This first step could potentially reorient routes 8, 19, and 47 to by-pass Ruggles station.

3.3.4 No-Build (2025) Condition Traffic Volumes

The one-half percent per year annual growth rate, compounded annually, was applied to the Existing Condition traffic volumes, then the traffic volumes associated with the background development projects were added to develop the No-Build (2025) Condition traffic volumes. The No-Build (2025) Condition weekday a.m. peak hour and p.m. peak hour traffic volumes are shown on Figure 3-11 and 3-12 respectively.

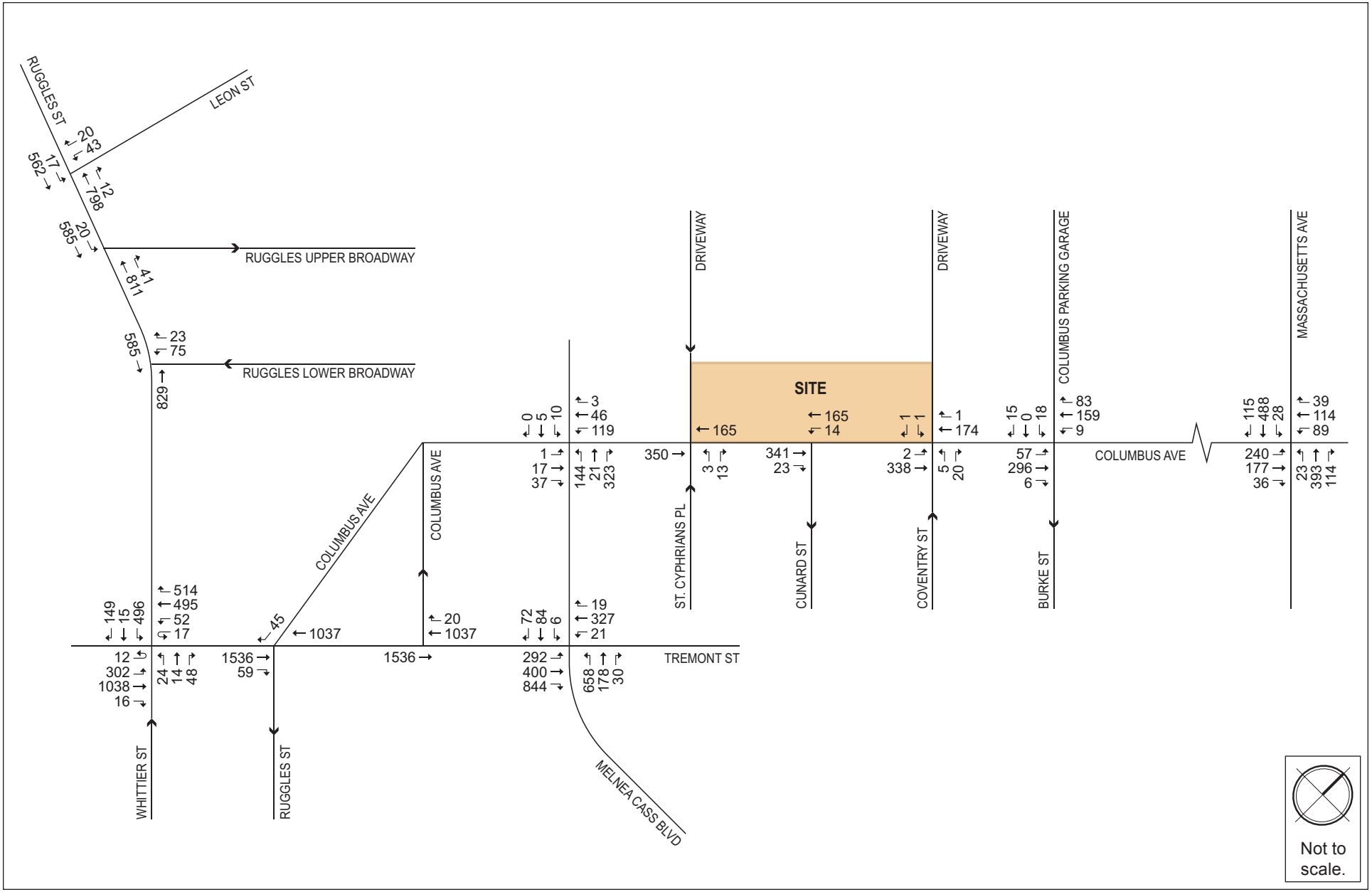

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Figure 3-11

No-build (2025) Condition Traffic Volumes, Weekday a.m. Peak Hour

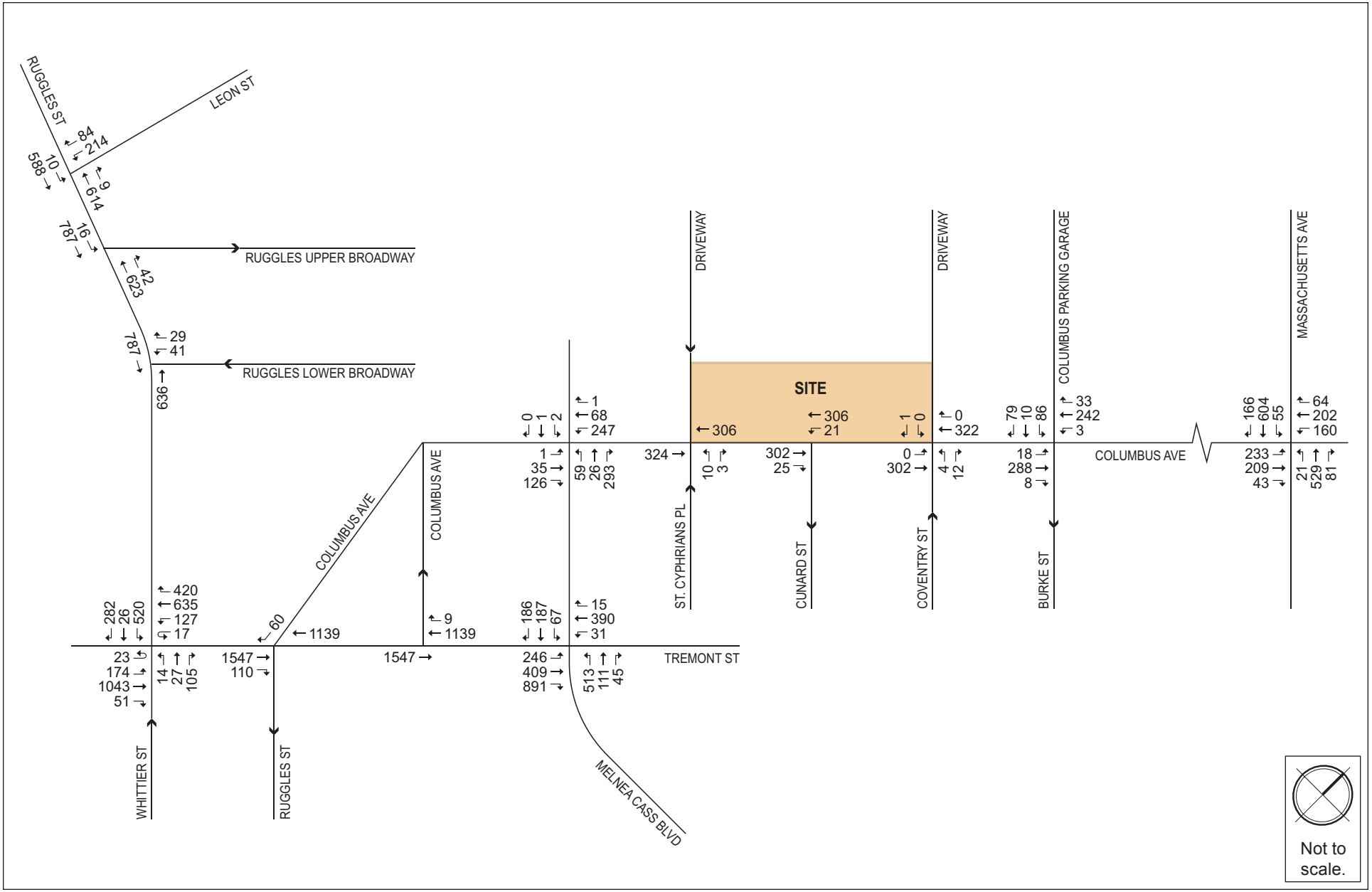

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Figure 3-12

No-build (2025) Condition Traffic Volumes, Weekday p.m. Peak Hour

3.4 Build (2025) Condition

As previously summarized, the Project will consist of an approximately 350,000 square foot interdisciplinary science center that includes classroom space, lab space, maker space, and other services typically associated with an educational building. No specific parking will be provided on-site but building users will be allowed to park in the existing Columbus Parking Garage or any other Northeastern parking facility.

3.4.1 Site Access and Vehicle Circulation

Vehicular users will likely utilize the Columbus Parking Garage off Columbus Avenue. The site will have access points for pedestrian access from Ruggles Station, the recently completed pedestrian bridge to the westerly Northeastern Campus, and the DCR pathway network along Columbus Avenue. A Project site plan is shown in Figure 3-13.

3.4.2 Loading and Service Accommodations

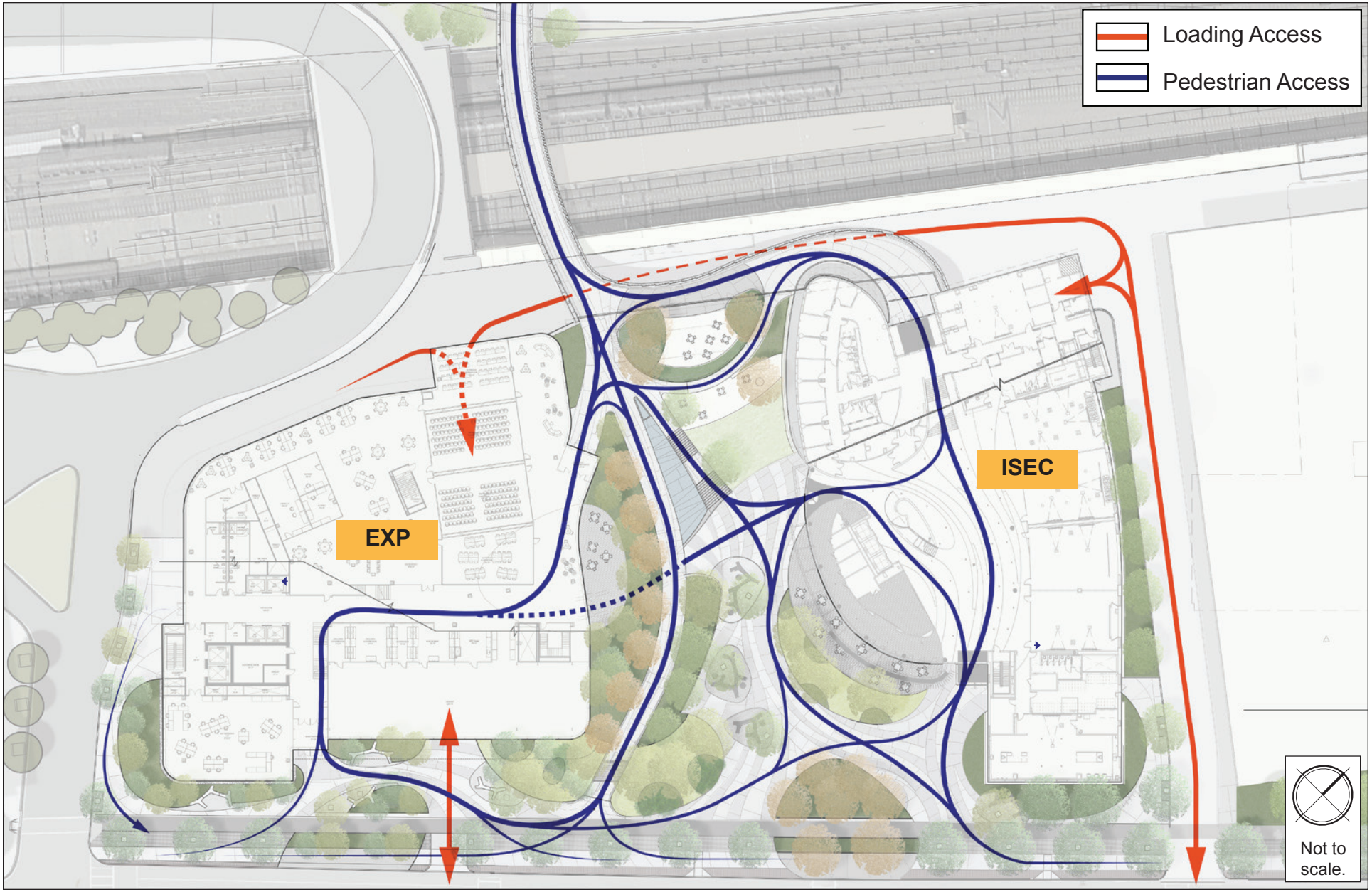
Loading and service access will be provided on the west side of the building with access provided via the driveway adjacent to the west side of the Columbus Avenue Garage. A dedicated loading area will be provided behind the building adjacent to the MBTA bus ramp and accessed under the track crossing structure.

3.4.3 Bicycle Accommodations

The Project will complete the final segment of the DCR Southwest Corridor Pathway abutting Northeastern University's campus between the ISEC building and the intersection of Columbus Avenue at Melnea Cass Boulevard.

3.4.4 Trip Generation Methodology

Determining the future trip generation of the Project is a complex, multi-step process that produces an estimate of vehicle trips, transit trips, and walk/bicycle trips associated with a proposed development and a specific land use program. A project's location and proximity to different travel modes determines how people will travel to and from a site. The new EXP building is projected to accommodate both students and staff to be relocated from existing buildings on the campus, as well as an estimated approximately 593 new graduate students and approximately 166 new faculty and support staff. Trip generation estimates for the Project are based on a variety of sources specific to Northeastern University, including 2018 DEP Rideshare survey data, and historical trip generation based on parking occupancy counts, parking lot/garage driveway counts, and parking permit data. No new housing is being proposed on campus as part of this Project, all trips being made by the Project are analyzed as commuter trips.



Source: Payette

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Figure 3-13
Site Access Plan

3.4.5 Commuter Mode Share

Commuter Mode share data was provided from the 2018 Northeastern University DEP Rideshare survey. Survey data from the sampled population indicate that 32% of its population travels to and from campus via transit, 61% walk/bike, 5% drive, and 2% use a form of ride hailing such as Taxis, Uber or Lyft.

Table 3-2 Travel Mode Shares

Land Use	Direction	Walk Share	Bicycle Share	Transit Share	Auto Share	Ride Hail
Daily						
EXP - Faculty/Staff	In	6%	5%	56%	32%	1%
	Out	6%	5%	56%	32%	1%
EXP - Students	In	54%	7%	32%	5%	2%
	Out	54%	7%	32%	5%	2%

3.4.6 Project Trip Generation

The mode share percentages previously described were applied to the number of person trips to develop walk/bicycle, transit, and vehicle trip generation estimates for the Project. The trip generation for the Project by mode is shown in Table 3-3. The detailed trip generation information is provided in Appendix C.

Table 3-3 Project Trip Generation

Land Use	Direction	Walk Share	Bicycle Share	Transit Share	Auto Share	Ride Hail
Daily						
EXP – Faculty/Staff	In	16	13	145	83	3
	Out	16	13	145	83	3
EXP - Students	In	526	68	311	49	19
	Out	526	68	311	49	19
a.m. Peak Hour						
EXP - Faculty/Staff	In	3	2	27	15	0
	Out	1	0	8	4	0
EXP - Students	In	43	6	311	49	19
	Out	10	1	68	11	4
p.m. Peak Hour						
EXP - Faculty/Staff	In	2	1	15	8	0
	Out	3	2	27	15	0
EXP - Students	In	63	8	37	6	2
	Out	117	15	69	11	4

3.4.7 Trip Distribution

The trip distribution identifies the various travel paths for vehicles associated with the Project. Trip distribution patterns for the Project were based on the zip code data of 2018 DEP Rideshare survey data provided by Northeastern University. Trip Distribution is shown in Figure 3-14.

3.4.8 Build (2025) Condition Traffic Volumes

The new Project-generated trips for the a.m. and p.m. peak hours are shown in Figures 3-15 and 3-16. The trip assignments were added to the No-Build (2025) Condition vehicular traffic volumes to develop the Build (2025) Condition vehicular traffic volumes. The Build (2025) Condition a.m. and p.m. peak hour traffic volumes are shown in Figures 3-17 and 3-18 respectively.

3.5 Traffic Capacity Analysis

Trafficware's Synchro (version 9) software package was used to calculate average delay and associated LOS at the study area intersections. This software is based on the traffic operational analysis methodology of the Transportation Research Board's 2010 Highway Capacity Manual (HCM).

LOS designations are based on the average delay per vehicle for all vehicles entering an intersection. Table 3-4 displays the intersection LOS criteria. LOS A indicates the most favorable condition, with minimum traffic delay, while LOS F represents the worst condition, with significant traffic delay. LOS D or better is typically considered acceptable in an urban area. However, LOS E or F is often typical for a stop controlled minor street that intersects a major roadway.

Table 3-4 Vehicle Level of Service Criteria

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

Source: 2010 Highway Capacity Manual, Transportation Research Board.

In addition to delay and LOS, the operational capacity and vehicular queues are calculated and used to further quantify traffic operations at intersections. The following describes these other calculated measures.

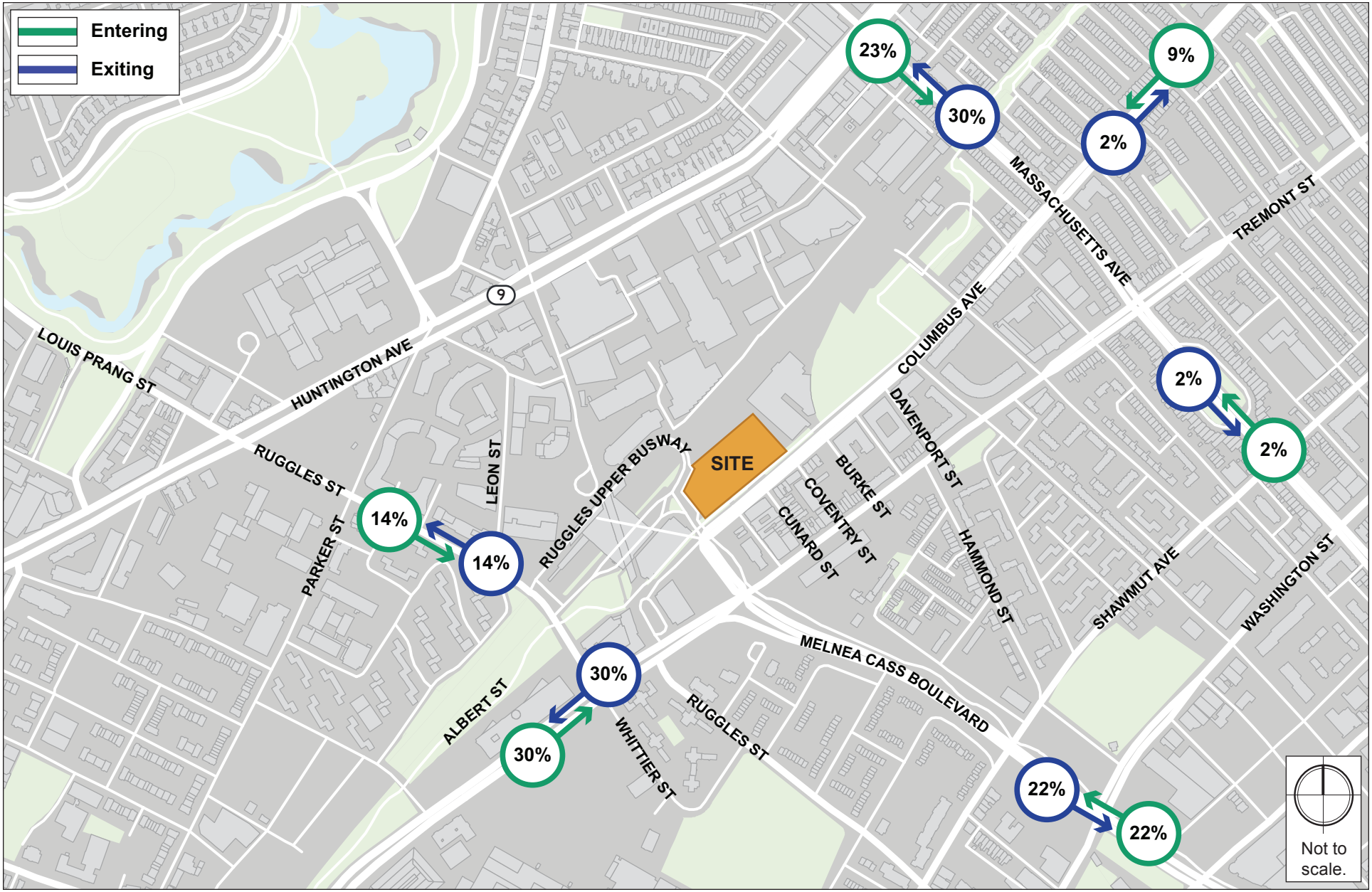

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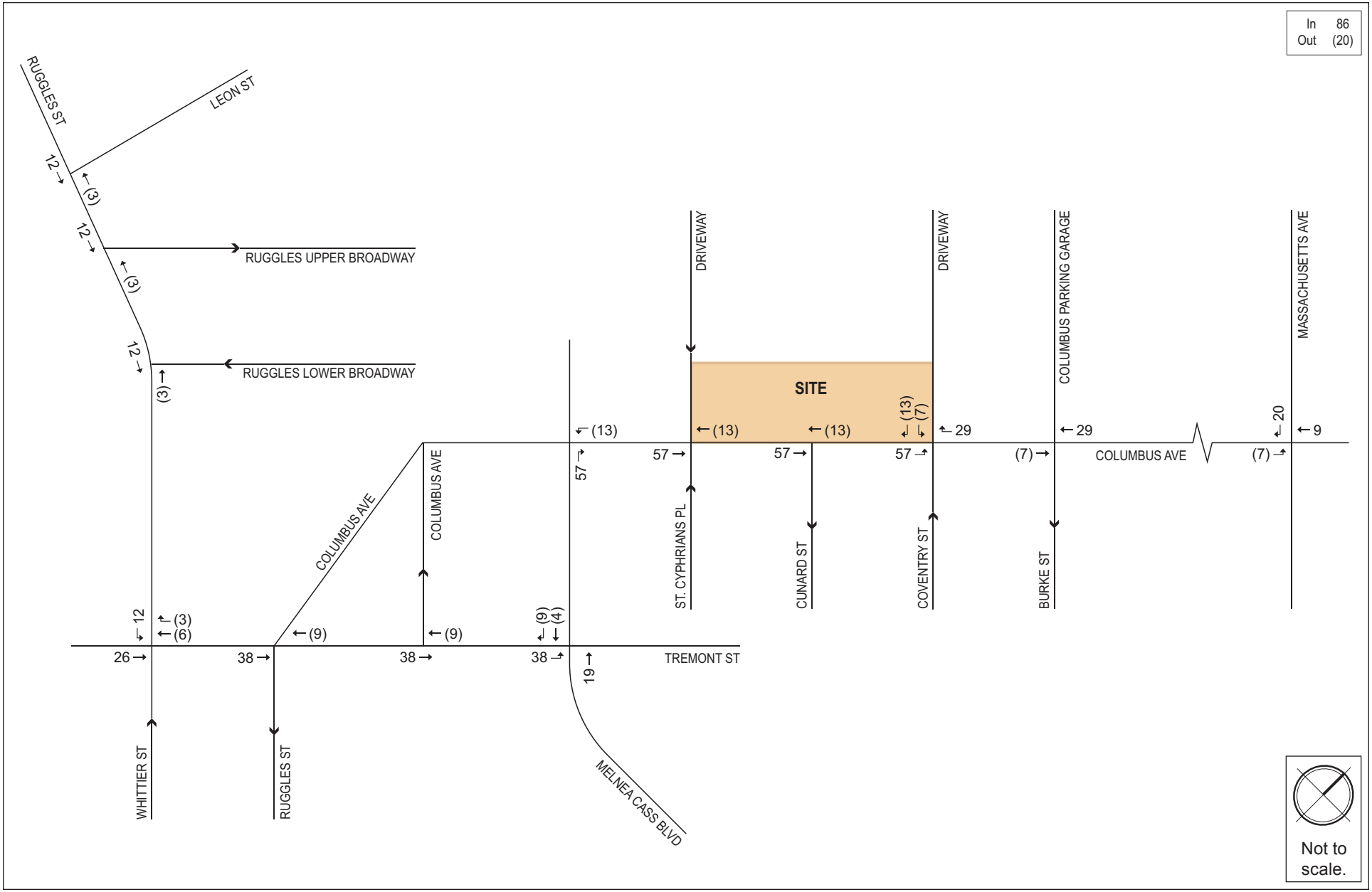
Figure 3-14
Trip Distribution



EXP **Boston, Massachusetts**

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Figure 3-15

Project-generated Traffic Volumes, Weekday a.m. Peak Hour

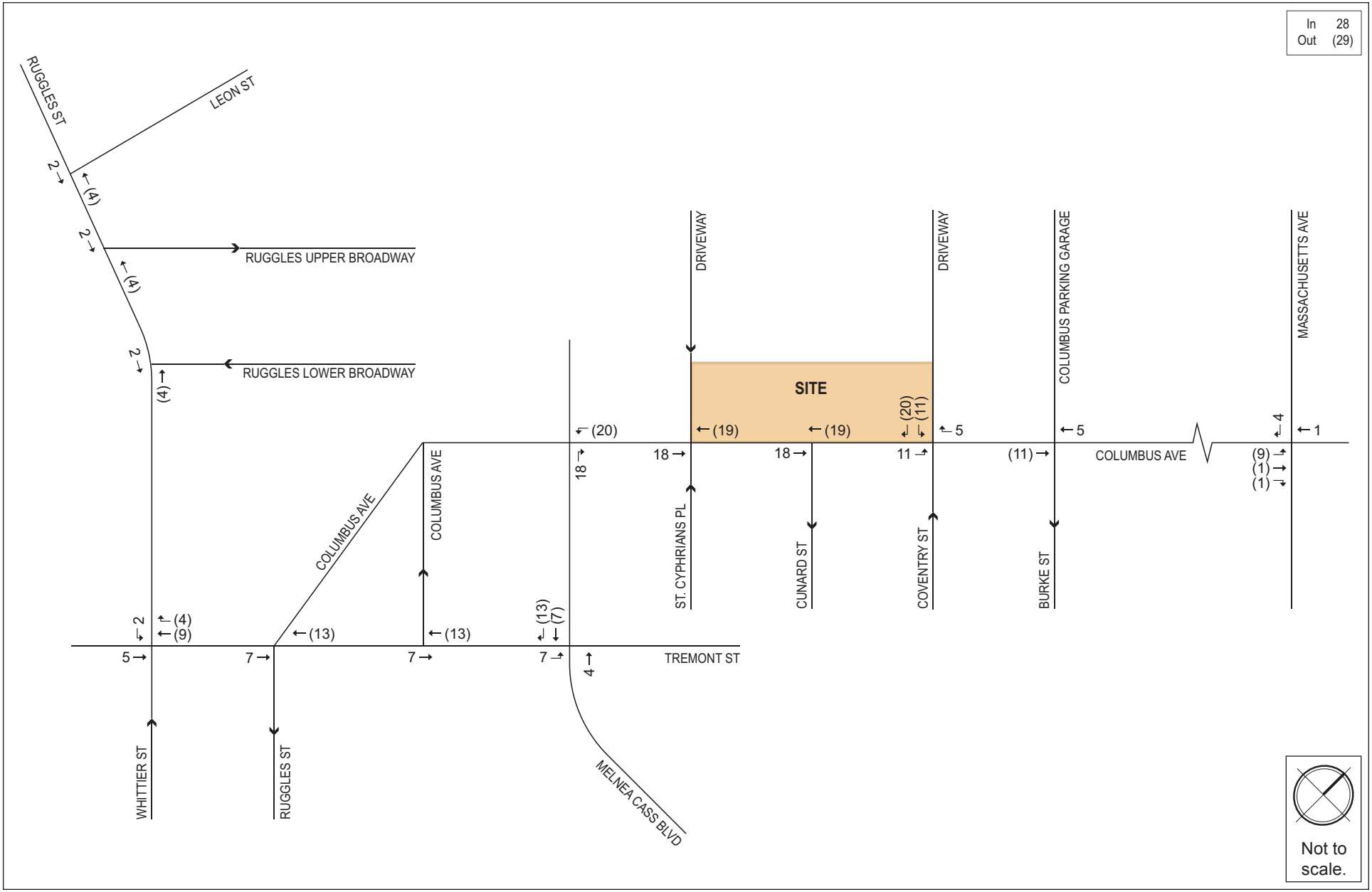

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Figure 3-16

Project-generated Traffic Volumes, Weekday p.m. Peak Hour

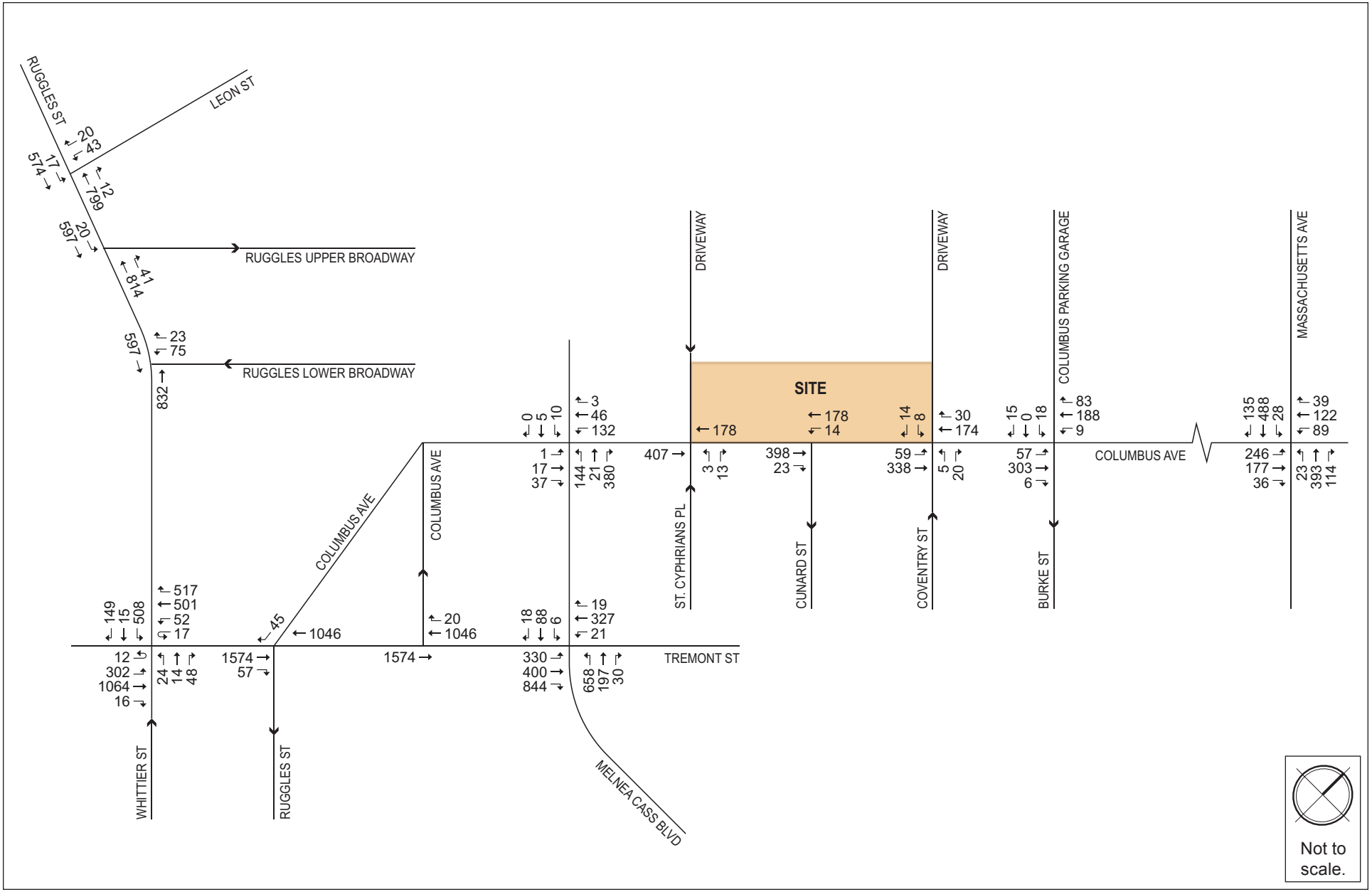

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Figure 3-17

Build (2025) Condition Traffic Volumes, Weekday a.m. Peak Hour

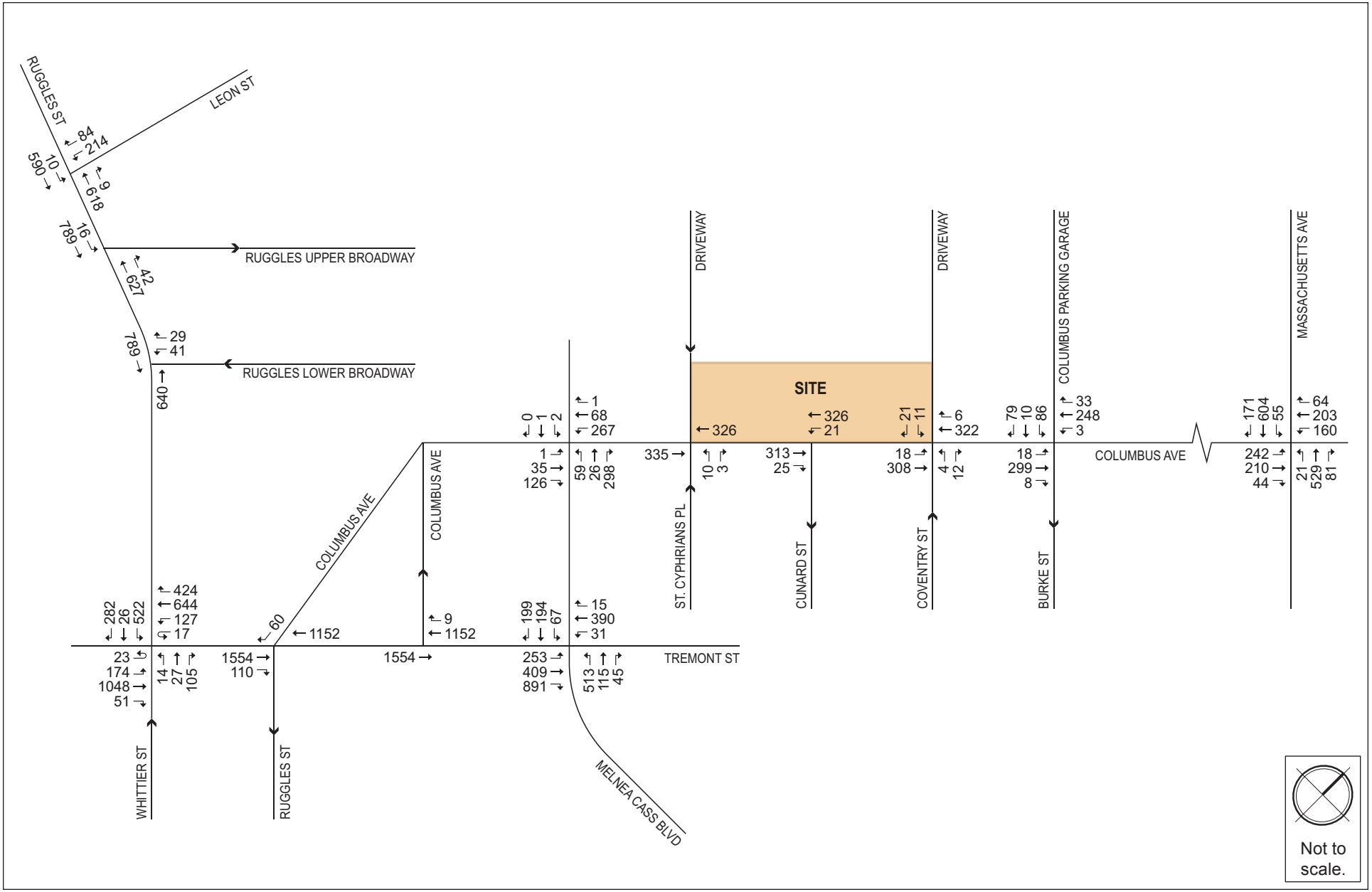

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Figure 3-18

Build (2025) Condition Traffic Volumes, Weekday p.m. Peak Hour

The volume-to-capacity (v/c) ratio is a measure of congestion at an intersection approach. A v/c ratio below one indicates that the intersection approach has adequate capacity to process the arriving traffic volumes over the course of an hour. A v/c ratio of one or greater indicates that the traffic volume on the intersection approach exceeds capacity.

The 50th percentile queue length, measured in feet, represents the maximum queue length during a cycle of the traffic signal with typical (or median) entering traffic volumes.

The 95th percentile queue length, measured in feet, represents the farthest extent of the vehicle queue (to the last stopped vehicle) upstream from the stop line during five percent of all signal cycles. The 95th percentile queue will not be seen during each cycle. The queue would be this long only five percent of the time and would typically not occur during off-peak hours. Since volumes fluctuate throughout the hour, the 95th percentile queue represents what can be considered a "worst case" scenario. Queues at the intersection are generally below the 95th percentile queue throughout the course of the peak hour. It is also unlikely that the 95th percentile queues for each approach to the intersection will occur simultaneously.

Table 3-5 and Table 3-6 summarize the Existing Condition, the No-Build (2025) Condition, and the Build (2025) Condition capacity analysis for the study area intersections during the weekday a.m. and p.m. peak hours, respectively. The detailed analysis of the Synchro results is provided in Appendix C.

3.5.1 Existing Condition Traffic Capacity Analysis

As shown under the Existing Condition of Table 3-5 and Table 3-6, a majority of the study area intersections and approaches operate at acceptable levels of service (LOS D or better) during the weekday a.m. and p.m. peak hours, with the exception of the following movements:

The signalized **Ruggles Street/Whittier Street/Tremont Street** intersection operates at LOS F during both the a.m. and p.m. peak hours. The Ruggles Street eastbound left-turn movement operates at LOS E during both the a.m. and p.m. peak hour. The Tremont Street northbound left-turn movement operates at LOS F during both the a.m. and p.m. peak hours. The longest queues at the intersection occur at the Tremont Street northbound left-turn movement during the a.m. peak hour and the Tremont Street southbound right-turn movement during the p.m. peak hour.

The signalized **Tremont Street/Melnea Cass Boulevard** intersection operates at LOS F during the a.m. peak hour and LOS D during the p.m. peak hour. The Melnea Cass Boulevard eastbound through movement operates at LOS F during both the a.m. and p.m. peak hours. The Melnea Cass Boulevard westbound left-turn movement operates at LOS E during both the a.m. and p.m. peak hours. The Melnea Cass Boulevard westbound through movement operates at LOS E during both the a.m. and p.m. peak hours. The Tremont Street northbound through movement operates at

LOS F during the a.m. peak hour. The longest queues at the intersection occur at the Tremont Street northbound through movement during the a.m. peak hour and at the Melnea Cass eastbound through movement during the p.m. peak hour.

While the signalized **Columbus Avenue/Melnea Cass Boulevard** intersection operates at LOS B during the a.m. peak hour and LOS D during the p.m. peak hour, the Columbus Avenue southbound through movement operates at LOS F during the p.m. peak hour. The longest queues at the intersection occur at the Melnea Cass Boulevard westbound through movement during the a.m. peak hour and at the Columbus Avenue southbound through movement during the p.m. peak hour.

At the **Columbus Avenue/Burke Street** unsignalized intersection, the Columbus Avenue Parking Garage driveway operates at LOS E during the p.m. peak hour. The longest queues occur at this approach during both the a.m. and p.m. peak hour.

3.5.2 No-Build (2025) Condition Traffic Capacity Analysis

As shown under the No-Build (2025) Condition of Table 3-5 and Table 3-6, a majority of the study area intersections and approaches continue to operate at acceptable levels of service (LOS D or better) during the weekday a.m. and p.m. peak hours, with the exception of the following movements:

The signalized **Ruggles Street/Whittier Street/Tremont Street** intersection continues to operate at LOS F during both the a.m. and p.m. peak hours. The Ruggles Street eastbound left-turn movement deteriorates from LOS E to LOS F during both the a.m. and p.m. peak hour. The Tremont Street northbound left-turn movement continues to operate at LOS F during both the a.m. and p.m. peak hours. The Tremont Street southbound left-turn, a newly proposed movement through the Tremont Crossing Development, operates at LOS F during both the a.m. and p.m. peak hours. The Tremont Street southbound through movement deteriorates from LOS D to LOS E during both the a.m. and p.m. peak hours. The longest queues at the intersection occur at the Ruggles Street eastbound left-turn movement during both the a.m. and p.m. peak hours.

While the signalized **Tremont Street/Melnea Cass Boulevard** intersection improves from LOS F to LOS E during the a.m. peak hour, it deteriorates from LOS D to LOS F during the p.m. peak hour. The Tremont Street northbound through movement deteriorates from LOS B to LOS F during the p.m. peak hour. The longest queues at the intersection occur at the Tremont Street northbound through movement during both the a.m. and p.m. peak hours.

At the **Columbus Avenue/Burke Street** unsignalized intersection, the Columbus Avenue Parking Garage driveway deteriorates from LOS E to LOS F during the p.m. peak hour. The longest queues occur at this approach during both the a.m. and p.m. peak hour.

3.5.3 Build (2025) Condition Traffic Capacity Analysis

As shown under the Build (2025) Condition of Table 3-5 and Table 3-6, all study area intersections and approaches continue to operate at similar overall LOS during the a.m. and p.m. peak hours as in the No-Build (2025) Condition. The signalized intersection of Tremont Street/Melnea Cass Boulevard deteriorates from LOS E to LOS F during the a.m. peak hour. As shown in Table 3-4, the threshold for LOS F is 80 seconds. Although the change in overall intersection delay during the a.m. peak hour is on the upper limit of an LOS E, it does change the operation designation to LOS F.

Table 3-5 Capacity Analysis Summary, Weekday a.m. Peak Hour

Intersection/Approach	Existing Condition					No-Build (2025) Condition					Build (2025) Condition				
	LOS	Delay (sec.)	V/C Ratio	50th Queue (ft)	95th Queue (ft)	LOS	Delay (sec.)	V/C Ratio	50th Queue (ft)	95th Queue (ft)	LOS	Delay (sec.)	V/C Ratio	50th Queue (ft)	95th Queue (ft)
Signalized Intersections															
1. Ruggles Street / Leon Street	**A**	**5.8**	-	-	-	**A**	**6.1**	-	-	-	**A**	**6.1**	-	-	-
Ruggles St EBT	A	4.8	0.42	58	161	A	5.4	0.48	70	200	A	5.5	0.49	72	206
Ruggles St WBT	A	5.3	0.28	67	98	A	5.5	0.32	87	m111	A	5.5	0.32	87	m111
Leon St SBL	C	23.4	0.20	16	37	C	23.5	0.21	16	37	C	23.5	0.21	16	37
Leon St SBR	B	10.8	0.10	0	14	B	10.6	0.11	0	15	B	10.6	0.11	0	15
2. Ruggles Street / Ruggles Station Lower Busway	**B**	**14.5**	-	-	-	**B**	**17.6**	-	-	-	**B**	**17.6**	-	-	-
Ruggles St EBT	A	7.1	0.26	70	38	A	7.0	0.29	77	43	A	7.0	0.29	78	44
Ruggles St WBT	B	19.0	0.67	243	#453	C	24.5	0.78	~362	#558	C	24.7	0.78	~365	#561
Lower Busway SBL	C	24.2	0.25	25	57	C	24.4	0.26	26	59	C	24.4	0.26	26	59
Lower Busway SBR	B	11.2	0.09	0	17	B	11.0	0.10	0	17	B	11.0	0.10	0	17
3. Ruggles Street & Whittier Street / Tremont Street	**F**	**245.0**	-	-	-	**F**	**363.6**	-	-	-	**F**	**362.1**	-	-	-
Ruggles St EBL	E	66.4	0.83	224	279	F	277.1	1.50	~684	#921	F	291.5	1.53	~708	#947
Ruggles St EBT	-	-	-	-	-	D	42.7	0.04	11	33	D	42.7	0.04	11	33
Ruggles St EBR	B	11.5	0.37	0	57	B	11.2	0.43	0	64	B	11.2	0.43	0	64
Whittier St WBT	D	40.9	0.23	19	43	C	34.1	0.36	52	95	D	35.7	0.36	54	97
Tremont St NBL	F	2316.9	6.02	~438	#622	F	2913.7	7.36	~553	#753	F	2913.7	7.36	~553	#753
Tremont St NBT	B	16.1	0.37	161	280	C	27.9	0.54	269	317	C	28.2	0.55	278	327
Tremont St SBL	-	-	-	-	-	F	101.7	0.65	67	#150	F	98.5	0.67	67	#153
Tremont St SBT	D	35.7	0.42	157	266	E	74.7	0.63	255	316	E	74.5	0.64	257	320
Tremont St SBR	C	22.3	0.62	223	440	D	43.5	0.81	269	#458	D	44.1	0.82	276	#468
4. Tremont Street / Renaissance Park EB & Ruggles Street	**A**	**1.9**	-	-	-	**A**	**3.7**	-	-	-	**A**	**3.9**	-	-	-
Renaissance Park EBR	A	1.5	0.18	0	0	A	2.8	0.23	0	0	A	2.9	0.24	0	0
Tremont St NBT	A	2.3	0.38	35	214	A	5.9	0.41	209	m217	A	6.2	0.42	217	m224
Tremont St SBT	A	1.3	0.22	27	32	A	0.4	0.91	4	10	A	0.4	0.26	5	13

Table 3-5 Capacity Analysis Summary, Weekday a.m. Peak Hour (Continued)

Intersection/Approach	Existing Condition					No-Build (2025) Condition					Build (2025) Condition				
	LOS	Delay (sec.)	V/C Ratio	50th Queue (ft)	95th Queue (ft)	LOS	Delay (sec.)	V/C Ratio	50th Queue (ft)	95th Queue (ft)	LOS	Delay (sec.)	V/C Ratio	50th Queue (ft)	95th Queue (ft)
Signalized Intersections															
5. Tremont Street / Melnea Cass Boulevard	**F**	**457.6**	-	-	-	**E**	**76.4**	-	-	-	**F**	**85.1**	-	-	-
Melnea Cass EBT	F	88.8	0.61	89	144	F	85.9	0.60	90	150	F	86.9	0.61	93	155
Melnea Cass EBR	A	9.8	0.36	0	27	A	8.7	0.14	1	22	B	10.4	0.16	1	41
Melnea Cass WBL	E	75.3	0.86	303	356	E	63.7	0.87	305	365	E	63.3	0.87	305	365
Melnea Cass WBT	E	63.6	0.57	193	267	D	50.4	0.53	170	243	D	51.8	0.57	187	266
Tremont St NBT	F	1218.1	3.64	~548	#710	F	120.5	1.10	~374	#514	F	145.2	1.17	~421	#562
Tremont St SBT	C	34.4	0.34	115	184	D	43.0	0.44	147	218	D	43.4	0.45	148	220
6. Columbus Avenue / Melnea Cass Boulevard	**B**	**13.9**	-	-	-	**B**	**12.4**	-	-	-	**B**	**11.7**	-	-	-
Melnea Cass EBT	C	20.9	0.07	7	18	C	20.3	0.07	7	17	C	20.3	0.07	7	17
Melnea Cass WBT	D	39.2	0.68	65	112	C	27.8	0.68	72	m114	C	26.1	0.68	73	m109
Melnea Cass WBR	A	1.1	0.24	0	13	A	3.4	0.26	51	m123	A	4.0	0.30	90	m148
Columbus Ave NBT	C	21.3	0.38	8	38	C	21.5	0.39	8	39	C	21.5	0.39	8	39
Columbus Ave SBT	A	10.0	0.18	32	85	B	10.4	0.19	35	93	B	10.5	0.20	38	100
7. Columbus Avenue / Massachusetts Avenue	**C**	**26.4**	-	-	-	**C**	**26.9**	-	-	-	**C**	**27.1**	-	-	-
Massachusetts Ave EBL	B	15.0	0.07	10	26	B	15.1	0.07	11	27	B	15.2	0.07	11	27
Massachusetts Ave EBT	C	21.6	0.39	161	222	C	22.1	0.40	173	232	C	22.3	0.42	180	240
Massachusetts Ave WBL	B	15.0	0.06	8	22	B	15.2	0.07	9	23	B	15.3	0.07	9	23
Massachusetts Ave WBT	C	20.1	0.31	123	175	C	20.5	0.33	132	183	C	20.6	0.33	133	183
Columbus Ave NBL	C	31.5	0.56	129	191	C	32.2	0.59	137	205	C	32.8	0.61	141	211
Columbus Ave NBT	D	37.3	0.45	134	205	D	37.3	0.46	137	212	D	37.2	0.46	137	212
Columbus Ave SBL	C	26.9	0.29	47	82	C	26.9	0.30	47	84	C	26.9	0.30	47	84
Columbus Ave SBT	D	44.2	0.48	102	172	D	45.1	0.50	107	178	D	46.1	0.52	114	187

Table 3-5 Capacity Analysis Summary, Weekday a.m. Peak Hour (Continued)

Intersection/Approach	Existing Condition					No-Build (2025) Condition					Build (2025) Condition				
	LOS	Delay (sec.)	V/C Ratio	50th Queue (ft)	95th Queue (ft)	LOS	Delay (sec.)	V/C Ratio	50th Queue (ft)	95th Queue (ft)	LOS	Delay (sec.)	V/C Ratio	50th Queue (ft)	95th Queue (ft)
Unsignalized Intersections															
8. Ruggles Street / Ruggles Station Upper Busway	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ruggles St EBL	A	1.1	0.02	-	2	A	1.2	0.03	-	2	A	1.2	0.03	-	2
Ruggles St EBT	A	0.0	0.21	-	0	A	0.0	0.23	-	0	A	0.0	0.24	-	0
Ruggles St WBT	A	0.0	0.28	-	0	A	0.0	0.33	-	0	A	0.0	0.33	-	0
Ruggles St WBR	A	0.0	0.16	-	0	A	0.0	0.19	-	0	A	0.0	0.19	-	0
9. Columbus Avenue / St Cyprians Place	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
St Cyprians WBL	B	11.5	0.03	-	2	B	11.6	0.03	-	2	B	12.2	0.03	-	2
Columbus Ave NBT	A	0.0	0.20	-	0	A	0.0	0.21	-	0	A	0.0	0.24	-	0
Columbus Ave SBT	A	0.0	0.10	-	0	A	0.0	0.11	-	0	A	0.0	0.12	-	0
10. Columbus Avenue / Cunard Street	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Columbus Ave NBT	A	0.0	0.21	-	0	A	0.0	0.22	-	0	A	0.0	0.26	-	0
Columbus Ave SBT	A	0.8	0.01	-	1	A	0.8	0.01	-	1	A	0.7	0.01	-	1
11. Columbus Avenue / Coventry Street	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ISEC Driveway EBL	C	23.2	0.01	-	1	C	18.2	0.01	-	1	C	21.2	0.17	-	15
Coventry St WBR	B	12.6	0.07	-	6	B	12.8	0.07	-	6	B	14.1	0.09	-	7
Columbus Ave NBT	A	0.1	0.00	-	0	A	0.1	0.00	-	0	A	2.1	0.07	-	5
Columbus Ave SBT	A	0.0	0.11	-	0	A	0.0	0.12	-	0	A	0.0	.014	-	0
12. Columbus Avenue / Burke Street	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Garage Driveway EBT	C	21.5	0.14	-	12	C	23.7	0.20	-	18	D	25.2	0.21	-	20
Columbus Ave NBT	A	1.9	0.06	-	5	A	2.1	0.07	-	6	A	2.2	0.07	-	6
Columbus Ave SBT	A	0.5	0.01	-	1	A	0.4	0.01	-	1	A	0.4	0.01	-	4

95th percentile volume exceeds capacity. Queue shown is the maximum after two cycles.

Table 3-6 Capacity Analysis Summary, Weekday p.m. Peak Hour

Intersection/Approach	Existing Condition					No-Build (2025) Condition					Build (2025) Condition				
	LOS	Delay (sec.)	V/C Ratio	50th Queue (ft)	95th Queue (ft)	LOS	Delay (sec.)	V/C Ratio	50th Queue (ft)	95th Queue (ft)	LOS	Delay (sec.)	V/C Ratio	50th Queue (ft)	95th Queue (ft)
Signalized Intersections															
1. Ruggles Street / Leon Street	**B**	**10.6**	-	-	-	**B**	**11.3**	-	-	-	**B**	**11.3**	-	-	-
Ruggles St EBT	A	7.8	0.48	79	137	B	10.1	0.62	117	206	B	10.1	0.63	118	208
Ruggles St WBT	A	5.4	0.27	37	47	A	5.8	0.33	48	61	A	5.8	0.33	48	61
Leon St SBL	C	30.6	0.64	74	#154	C	31.9	0.66	76	#161	C	31.9	0.66	76	#161
Leon St SBR	A	6.9	0.23	0	30	A	7.2	0.24	1	31	A	7.2	0.24	1	31
2. Ruggles Street / Ruggles Station Lower Busway	**A**	**9.0**	-	-	-	**A**	**9.4**	-	-	-	**A**	**9.4**	-	-	-
Ruggles St EBT	A	8.0	0.30	113	124	A	8.9	0.36	153	161	A	9.0	0.37	154	161
Ruggles St WBT	A	6.1	0.23	73	92	A	6.5	0.28	94	116	A	6.5	0.28	95	117
Lower Busway SBL	E	56.9	0.29	33	70	E	57.0	0.30	34	72	E	57.0	0.30	34	72
Lower Busway SBR	C	20.7	0.21	0	30	C	20.5	0.22	0	32	C	20.5	0.22	0	32
3. Ruggles Street & Whittier Street / Tremont Street	**F**	**87.9**	-	-	-	**F**	**169.8**	-	-	-	**F**	**170.1**	-	-	-
Ruggles St EBL	E	62.0	0.78	222	277	F	272.7	1.49	~708	#946	F	274.9	1.49	~711	#950
Ruggles St EBT	-	-	-	-	-	D	42.5	0.07	20	48	D	42.5	0.07	20	48
Ruggles St EBR	B	13.3	0.56	0	77	B	13.7	0.66	0	93	B	13.7	0.66	0	93
Whittier St WBT	C	25.3	0.08	8	30	D	43.9	0.52	115	162	D	44.2	0.52	116	163
Tremont St NBL	F	1013.3	3.09	~225	#366	F	1579.2	4.37	~336	#499	F	1579.2	0.14	~336	#499
Tremont St NBT	C	26.0	0.45	212	266	C	30.1	0.56	270	317	C	30.1	0.56	271	319
Tremont St SBL	-	-	-	-	-	F	235.1	1.33	~172	#318	F	235.1	1.33	~172	#318
Tremont St SBT	D	48.3	0.71	278	355	E	66.7	0.78	288	364	E	69.7	0.79	294	371
Tremont St SBR	D	42.3	0.60	365	440	D	42.7	0.63	342	470	D	43.1	0.64	347	474
4. Tremont Street / Renaissance Park EB & Ruggles Street	**A**	**4.6**	-	-	-	**A**	**5.0**	-	-	-	**A**	**5.0**	-	-	-
Renaissance Park EBR	A	0.8	0.16	0	0	A	1.2	0.19	0	0	A	1.3	0.19	0	0
Tremont St NBT	A	6.1	0.42	210	228	A	4.8	0.48	174	m157	A	4.8	0.48	175	m158
Tremont St SBT	A	2.5	0.26	39	39	A	5.6	0.32	114	134	A	5.6	0.33	116	135

Table 3-6 Capacity Analysis Summary, Weekday p.m. Peak Hour (Continued)

Intersection/Approach	Existing Condition					No-Build (2025) Condition					Build (2025) Condition				
	LOS	Delay (sec.)	V/C Ratio	50th Queue (ft)	95th Queue (ft)	LOS	Delay (sec.)	V/C Ratio	50th Queue (ft)	95th Queue (ft)	LOS	Delay (sec.)	V/C Ratio	50th Queue (ft)	95th Queue (ft)
Signalized Intersections															
5. Tremont Street / Melnea Cass Boulevard	**D**	**39.9**	-	-	-	**F**	**175.6**	-	-	-	**F**	**181.5**	-	-	-
Melnea Cass EBT	F	86.5	0.82	176	m205	F	218.5	1.29	~361	#552	F	230.8	1.33	~377	#572
Melnea Cass EBR	C	25.1	0.54	40	m74	A	9.5	0.38	0	67	A	9.5	0.40	0	71
Melnea Cass WBL	E	66.4	0.81	214	262	E	76.2	0.84	289	348	E	76.2	0.84	289	348
Melnea Cass WBT	E	56.7	0.50	125	186	E	64.0	0.50	159	232	E	64.4	0.51	163	236
Tremont St NBT	B	12.7	0.44	114	146	F	414.5	1.82	~535	#673	F	430.5	1.86	~548	#686
Tremont St SBT	C	24.3	0.26	104	157	C	32.0	0.36	173	232	C	32.0	0.36	173	232
6. Columbus Avenue / Melnea Cass Boulevard	**D**	**40.1**	-	-	-	**D**	**44.1**	-	-	-	**D**	**53.6**	-	-	-
Melnea Cass EBT	A	9.3	0.01	2	4	A	9.3	0.01	2	4	A	9.3	0.01	2	4
Melnea Cass WBT	B	13.4	0.12	26	43	B	10.3	0.13	18	45	B	10.3	0.13	18	45
Melnea Cass WBR	A	1.3	0.25	0	0	A	1.5	0.26	0	17	A	1.6	0.26	0	18
Columbus Ave NBT	B	16.0	0.53	14	63	B	15.7	0.54	15	64	B	15.7	0.54	15	64
Columbus Ave SBT	F	96.6	1.02	~137	#286	F	106.7	1.08	~162	#309	F	129.4	1.15	~181	#332
7. Columbus Avenue / Massachusetts Avenue	**C**	**28.4**	-	-	-	**C**	**29.7**	-	-	-	**C**	**30.1**	-	-	-
Massachusetts Ave EBL	B	13.8	0.14	18	43	B	14.0	0.15	19	44	B	14.0	0.15	19	44
Massachusetts Ave EBT	B	19.1	0.45	163	288	C	21.0	0.49	211	304	C	21.1	0.49	213	306
Massachusetts Ave WBL	B	13.5	0.06	7	21	B	13.7	0.07	7	22	B	13.7	0.07	7	22
Massachusetts Ave WBT	C	20.3	0.35	147	215	C	20.8	0.37	155	225	C	20.9	0.37	155	225
Columbus Ave NBL	D	37.3	0.67	125	176	D	40.9	0.74	138	191	D	43.1	0.77	144	199
Columbus Ave NBT	D	44.4	0.59	172	244	D	44.7	0.60	179	253	D	44.7	0.60	181	255
Columbus Ave SBL	C	31.5	0.50	86	129	C	31.8	0.52	90	133	C	31.8	0.52	90	133
Columbus Ave SBT	D	52.5	0.71	189	268	D	54.0	0.73	198	279	D	54.4	0.74	198	280

Table 3-6 Capacity Analysis Summary, Weekday p.m. Peak Hour (Continued)

Intersection/Approach	Existing Condition					No-Build (2025) Condition					Build (2025) Condition				
	LOS	Delay (sec.)	V/C Ratio	50th Queue (ft)	95th Queue (ft)	LOS	Delay (sec.)	V/C Ratio	50th Queue (ft)	95th Queue (ft)	LOS	Delay (sec.)	V/C Ratio	50th Queue (ft)	95th Queue (ft)
Unsignalized Intersections															
8. Ruggles Street / Ruggles Station Upper Busway	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ruggles St EBL	A	0.7	0.02	-	1	A	0.7	0.02	-	1	A	0.7	0.02	-	1
Ruggles St EBT	A	0.0	0.27	-	0	A	0.0	0.33	-	0	A	0.0	0.33	-	0
Ruggles St WBT	A	0.0	0.21	-	0	A	0.0	0.25	-	0	A	0.0	0.25	-	0
Ruggles St WBR	A	0.0	0.13	-	0	A	0.0	0.15	-	0	A	0.0	0.15	-	0
9. Columbus Avenue / St Cyprians Place	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
St Cyprians WBL	B	14.4	0.05	-	4	B	14.8	0.05	-	4	C	15.2	0.05	-	4
Columbus Ave NBT	A	0.0	0.19	-	0	A	0.0	0.20	-	0	A	0.0	0.21	-	0
Columbus Ave SBT	A	0.0	0.18	-	0	A	0.0	0.19	-	0	A	0.0	0.20	-	0
10. Columbus Avenue / Cunard Street	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Columbus Ave NBT	A	0.0	0.19	-	0	A	0.0	0.20	-	0	A	0.0	0.21	-	0
Columbus Ave SBT	A	0.7	0.02	-	1	A	0.7	0.02	-	1	A	0.7	0.02	-	1
11. Columbus Avenue / Coventry Street	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ISEC Driveway EBL	B	13.8	0.01	-	1	B	14.0	0.01	-	1	D	33.4	0.51	-	66
Coventry St WBR	B	12.9	0.05	-	4	B	13.2	0.05	-	4	C	15.1	0.06	-	5
Columbus Ave NBT	A	0.0	0.00	-	0	A	0.0	0.00	-	0	A	0.5	0.02	-	1
Columbus Ave SBT	A	0.0	0.19	-	0	A	0.0	0.00	-	0	A	0.0	0.20	-	0
12. Columbus Avenue / Burke Street	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Garage Driveway EBT	E	42.8	0.65	-	102	F	58.5	0.78	-	143	F	62.2	0.80	-	149
Columbus Ave NBT	A	0.6	0.02	-	1	A	0.8	0.02	-	2	A	0.8	0.02	-	2
Columbus Ave SBT	A	0.2	0.00	-	0	A	0.1	0.00	-	0	A	0.1	0.00	-	0

95th percentile volume exceeds capacity. Queue shown is the maximum after two cycles.

3.6 Transportation Demand Management

Northeastern has made a strong commitment and continues to make improvements to transportation demand management (TDM) initiatives to help reduce single-occupant auto commuting to and from its campus and to promote non-auto alternatives. Notably, since the 2000 IMP, drive alone commuter trips to/from the campus have declined substantially – from 27% to only 4% for students and from 49% to only 26% for employees. Northeastern's on-going efforts to incorporate sustainable transportation on campus have been recognized, including but not limited to, the 2012 Massachusetts Excellence in Commuter Options (ECO) Pinnacle Award.

Northeastern University provides a number of transportation demand management (TDM) programs to reduce single-occupant automobile use and parking by students, faculty and staff, and to help improve the environment of the campus, as described below:

- On-Site sale of MBTA passes. Northeastern currently provides MBTA pass sales on-campus through the Husky Card office. In addition, MBTA maps and schedules are posted at a number of different locations around campus.
- MBTA Semester Pass Program. Northeastern participates in the MBTA's Semester Pass Program. This program allows students to receive a discount on transit passes for the semester when purchased in advance.
- Providing Pre-tax purchase of MBTA passes for employees. Northeastern allows MBTA passes to be purchased by employees by means of a pre-tax payroll deduction for up to $260 per month. This effectively reduces the employee cost of purchasing passes.
- Negotiation with Bus Providers. Northeastern is actively involved with the MBTA, BTD and the BPDA, as well as adjacent institutions of higher learning and other government agencies to enhance access, as well as the aesthetics of the public transit facilities located adjacent to campus.
- Posting of Bus Schedules. Information on the MBTA including maps, fares, schedules, updates and recommended routes to campus are available at various websites and information centers on campus.

  Bicycling Incentives. Northeastern supports bicycling to campus with sponsorship of the BlueBikes bike sharing system. Northeastern University Police Department's (NUPD) new voluntary bicycle registration program is available to any faculty, staff, or student. NUPD records the information and provides a sticker. Four bicycle repair stations have been installed on campus for use by the entire Northeastern community. The Northeastern bookstore offers an automatic 20% on the U-type locks that it sells, and Northeastern has secured a 15% discount on bicycle safety and security gear at a nearby bicycle shop. Bicycle racks are available throughout campus, and secure bicycle storage space is provided on the ground level of the Renaissance Park Garage and in ISEC. Showers and lockers for cyclists are available at three athletic centers on the campus.

- Off-Campus Student Services Office. Northeastern operates a Commuter Referral Office providing commuting students information on commuting options (bus and train schedules and carpooling information).
- Sponsorship of the Fenway Alliance. Northeastern University has been instrumental in supporting the Fenway Alliance as a consortium for planning in the area. The Alliance serves as a forum for the institutions centered in the Fenway Cultural District to coordinate on transportation and parking issues in addition to other concerns of a district-wide nature.
- Linking the Corridors - The Emerald Necklace/Southwest Corridor Connector. Over a period of years, Northeastern has worked to promote the proposed bicycle and pedestrian connection between the Back Bay Fens and the Southwest Corridor Park. Working in partnership, the Boston Parks and Recreation Department and Northeastern are seeking to develop a bicycle/pedestrian connection linking the Back Bay Fens to the Southwest Corridor Park by way of public roads within and adjacent to Northeastern.
- Ride-matching Program. Northeastern participates in the MassRides program. Faculty, staff and students who are interested in carpooling or vanpooling are matched through a Northeastern University website to MassRides. Posters and literature promoting MassRides have been distributed campus-wide. The Office of Environmental Health and Safety maintains information and links to MassRides on their website. Information is also available at the Off-Campus Student Services office located at the Curry Student Center and the Human Resources Management Office at 250 Columbus Place. Note this program is ending June 30, 2019.
- Preferential Parking for Carpools and Vanpools. Up to two preferred parking spaces have been provided in the Columbus and Gainsborough Garage first floors for faculty and staff with daytime decals who travel with at least two total occupants.
- Car Sharing. As noted elsewhere, Northeastern has Zipcar car sharing services available on or near the Boston Campus with three locations across campus with access to eight vehicles. Several Northeastern departments have Zipcar accounts.
- Electric Vehicle Charging. The campus has ten Chargepoint stalls at the Columbus garage and two additional Chargepoint locations at the Gainsborough Garage. The charge time is currently at no cost to campus users.
- Electric Vehicles. Northeastern has acquired several small electric vehicles for use on campus by facilities personnel.
- Walking. Northeastern provides many facilities that encourage people to walk before, during and after work hours, including restaurants and other dining facilities, recreation centers, banking services, counseling services, a notary public, a library and the bookstore.

Chapter 4.0

Assessment of Development Review Components

4.0 ASSESSMENT OF DEVELOPMENT REVIEW COMPONENTS

This chapter provides detailed green building strategies, as well as discussions and qualitative analyses of other environmental impacts related to the Project.

4.1 Environmental Protection

4.1.1 Wind

The Project will have a height of approximately 126 feet to the top of the highest occupiable floor. A qualitative wind analysis will be conducted, as required by the BPDA for buildings under 150 feet. Results of the wind analysis will be included in the Draft PIR.

4.1.2 Shadow

The building is being designed to minimize new shadows on open spaces, sitting areas or pathways. The Proponent will conduct a shadow study for the Project and report the results in the Draft PIR.

4.1.3 Daylight

The purpose of a daylight analysis is to estimate the extent to which a proposed project affects the amount of daylight reaching public streets in the immediate vicinity of a project site. The daylight obstruction related to the Project is anticipated to be similar to daylight obstruction on streets in the surrounding area. The extent of daylight obstruction resulting from the Project and measures to mitigate adverse impacts will be included in the Draft PIR.

4.1.4 Solar Glare

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

4.1.5 Air Quality

4.1.5.1 Introduction

The BPDA requires that proposed projects evaluate the air quality in the local area, and assess any adverse air quality impacts attributable to a project.

The Project does not generate enough traffic to require a mesoscale vehicle emissions quantification analysis. However, the Project creates new trips through local intersections operating at LOS D or worse. Therefore, a microscale analysis of carbon monoxide has been completed to provide information on the Project's impact to air quality from mobile sources.

Any new stationary sources will be reviewed by the Massachusetts Department of Environmental Protection (MassDEP) during permitting under the Environmental Results Program, as required. It is expected that all stationary sources will be small, and any impacts from stationary sources would be minimal.

4.1.5.2 National Ambient Air Quality Standards and Background Concentrations

Background air quality concentrations and federal air quality standards were utilized to conduct the microscale analysis mentioned above. Federal National Ambient Air Quality Standards (NAAQS) were developed by the U.S. Environmental Protection Agency (EPA) to protect the human health against adverse health effects with a margin of safety. The modeling methodologies were developed in accordance with the latest Massachusetts Department of Environmental Protection (MassDEP) modeling policies and Federal modeling guidelines.[1] The following sections outline the NAAQS standards and detail the sources of background air quality data.

National Ambient Air Quality Standards

The 1970 Clean Air Act was enacted by the U.S. Congress to protect the health and welfare of the public from the adverse effects of air pollution. As required by the Clean Air Act, EPA promulgated NAAQS for the following criteria pollutants: nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM) (PM10 and PM2.5), carbon monoxide (CO), ozone (O_3), and lead (Pb). The NAAQS are listed in Table 4-1. Massachusetts Ambient Air Quality Standards (MAAQS) are typically identical to NAAQS (differences are highlighted in **bold** in Table 4-1).

NAAQS specify concentration levels for various averaging times and include both "primary" and "secondary" standards. Primary standards are intended to protect human health, whereas secondary standards are intended to protect public welfare from any known or anticipated adverse effects associated with the presence of air pollutants, such as damage to vegetation. The more stringent of the primary or secondary standards were applied when comparing to the modeling results for this Project.

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

[1] 40 CFR 51 Appendix W, Guideline on Air Quality Models, 70 FR 68228, Nov. 9, 2005

Table 4-1 National (NAAQS) and Massachusetts (MAAQS) Ambient Air Quality Standards

Pollutant	Averaging Period	NAAQS (µg/m³)		MAAQS (µg/m³)	
		Primary	Secondary	Primary	Secondary
NO_2	Annual (1)	100	Same	100	Same
	1-hour (2)	**188**	None	**None**	None
SO_2	Annual (1)(9)	80	None	80	None
	24-hour (3)(9)	365	None	365	None
	3-hour (3)	None	1300	None	1300
	1-hour (4)	**196**	None	**None**	None
PM2.5	Annual (1)	**12**	**15**	**None**	**None**
	24-hour (5)	**35**	**Same**	**None**	**None**
PM10	Annual (1)(6)	**None**	None	**50**	Same
	24-hour (3)(7)	150	Same	150	Same
CO	8-hour (3)	10,000	Same	10,000	Same
	1-hour (3)	40,000	Same	40,000	Same
Ozone	8-hour (8)	**147**	Same	**235**	Same
Pb	3-month (1)	1.5	Same	1.5	Same

Source: http://www.epa.gov/ttn/naaqs/criteria.html and 310 CMR 6.04
(1) Not to be exceeded.
(2) 98th percentile of one-hour daily maximum concentrations, averaged over three years.
(3) Not to be exceeded more than once per year.
(4) 99th percentile of one-hour daily maximum concentrations, averaged over three years.
(5) 98th percentile, averaged over three years.
(6) EPA revoked the annual PM10 NAAQS in 2006.
(7) Not to be exceeded more than once per year on average over three years.
(8) Annual fourth-highest daily maximum eight-hour concentration, averaged over three years.
(9) EPA revoked the annual and 24-hour SO_2 NAAQS in 2010. However, they remain in effect until one year after the area's initial attainment designation, unless designated as "nonattainment".

Background Concentrations

To estimate background pollutant levels representative of the area, the most recent air quality monitor data reported by the MassDEP in their Annual Air Quality Reports was obtained for 2015 to 2017. The three-hour and 24-hour SO_2 values are no longer reported in the annual reports. Data for these pollutant and averaging time combinations were obtained from the EPA's AirData website.

The Clean Air Act allows for one exceedance per year of the CO and SO_2 short-term NAAQS per year. The highest second-high accounts for the one exceedance. Annual NAAQS are never to be exceeded. The 24-hour PM10 standard is not to be exceeded more than once per year on average over three years. To attain the 24-hour PM2.5 standard, the three-year average of the 98th percentile of 24-hour concentrations must not exceed 35 µg/m³. For annual PM2.5 averages, the average of the highest yearly observations was used as the background concentration. To attain the one-hour NO_2 standard, the three-year average of the 98th percentile of the maximum daily one-hour concentrations must not exceed 188 µg/m³.

Background concentrations were determined from the closest available monitoring stations to the Project. All pollutants are not monitored at every station, so data from multiple locations are necessary. The closest monitor is at Harrison Avenue (0.6 miles south-southeast). A summary of the background air quality concentrations are presented in Table 4-2. MassDEP provided the values to be used.

Table 4-2 Observed Ambient Air Quality Concentrations and Selected Background Levels

Pollutant	Avg Time	Form	Background Concentration (µg/m³)	NAAQS	Percent of NAAQS
SO_2 (1)(5)	1-Hr (4)	99th %	15.8	196.0	8%
	3-Hr	H2H	32.2	1300.0	2%
	24-Hr	H2H	11.3	365.0	3%
	Annual	H	2.1	80.0	3%
PM_{10} (6)	24-Hr	H2H	27.0	150.0	18%
	Annual	H	11.7	50.0	23%
$PM_{2.5}$	24-Hr (4)	98th %	15.8	35.0	45%
	Annual (4)	H	6.6	12.0	55%
NO_2 (3)	1-Hr (4)	98th %	92.8	188.0	49%
	Annual	H	28.2	100.0	28%
CO (2)	1-Hr	H2H	2760.0	40000.0	7%
	8-Hr	H2H	1375.0	10000.0	14%

Notes:
From MassDEP, Email from G. Pacheco to V. Tino, March 12, 2019

Air quality in the vicinity of the Project site is generally good, with all local background concentrations found to be well below the NAAQS.

4.1.5.3 Mobile Sources

Mobile sources of air pollution include emissions from gasoline, diesel, and natural gas fueled vehicle traffic. Emissions from mobile sources have continually decreased as engine technology and efficiency have been improved.

Methodology

As described above, a "microscale" analysis is typically requested for any intersection where (1) Project traffic would impact intersections or roadway links currently operating at LOS D, E, or F, or would cause LOS to decline to D, E, or F; (2) Project traffic would increase traffic volumes on nearby roadways by 10% or more (unless the increase in traffic volume is less than 100 vehicles per hour); or, (3) the Project will generate 3,000 or more new average daily trips on roadways providing access to a single location. The microscale analysis involves modeling of CO emissions from vehicles idling at and traveling through signaled intersections. Predicted ambient concentrations of CO for the Build and No-Build cases are compared with federal (and state) ambient air quality standards for CO.

The microscale analysis typically examines ground-level CO impacts due to traffic queues in the immediate vicinity of a project. CO is used in microscale studies to indicate roadway pollutant levels since it is the most abundant pollutant emitted by motor vehicles and can result in so-called "hot spot" (high concentration) locations around congested intersections. The NAAQS standards do not allow ambient CO concentrations to exceed 35 parts per million (ppm) for a one-hour averaging period, and 9 ppm for an eight-hour averaging period, more than once per year at any location. The widespread use of CO catalysts on current vehicles has reduced the occurrences of CO hotspots. Air quality modeling techniques (computer simulation programs) are typically used to predict CO levels for both existing and future conditions to evaluate compliance of the roadways with the standards. The microscale analysis has been conducted using the latest versions of EPA's MOVES and CAL3QHC programs to estimate CO concentrations at sidewalk receptor locations. Existing (2018) and future year (2025) emission factor data calculated from the MOVES model, along with traffic data, were input into the CAL3QHC program to determine CO concentrations due to traffic flowing through the selected intersections. The modeling methodology was developed in accordance with the latest MassDEP modeling policies and Federal modeling guidelines.[2]

Existing background values of CO at the nearest monitor location at Harrison Avenue were obtained from MassDEP. CAL3QHC results were then added to background CO values of 2.4 ppm (one-hour) and 1.2 ppm (eight-hour), as provided by MassDEP, to determine total air quality impacts due to the Project. These values were compared to the NAAQS for CO of 35 ppm (one-hour) and 9 ppm (eight-hour).

Intersection Selection

Three signalized intersections included in the traffic study meet the conditions described at the beginning of this section. The traffic volumes and LOS calculations provided in Chapter 3 form the basis of evaluating the traffic data versus the microscale thresholds. The following intersections were analyzed:

- Columbus Avenue and Melnea Cass Boulevard;
- Tremont Street and Melnea Cass Boulevard ; and,
- Tremont Street and Ruggles Street /Whittier Street.

Microscale modeling was performed for these intersections based on the aforementioned methodology. The 2018 Existing and 2025 No-Build and Build conditions were each evaluated for both morning (a.m.) and afternoon (p.m.) peak.

[2] 40 CFR 51 Appendix W, Guideline on Air Quality Models, 70 FR 68228, Nov. 9, 2005

It can be reasonably concluded that if the worst performing intersections (with respect to LOS) do not cause a condition of air pollution, then better performing intersections also do not cause a condition of air pollution.

Emissions Calculations (MOVES)

The EPA MOVES computer program was used to estimate motor vehicle emission factors on the roadway network. Emission factors calculated by the MOVES model are based on motor vehicle operations typical of daily periods. The Commonwealth's statewide annual Inspection and Maintenance (I&M) program was included, as well as the county specific vehicle age registration distribution, fleet mix, meteorology, and other inputs. The inputs for MOVES for the existing (2018) and future year (2025) are provided by MassDEP.

All link types for the modeled intersections were input into MOVES. Idle emission factors are obtained from factors for a link average speed of zero miles per hour (mph). Moving emissions are calculated based on speeds at which free-flowing vehicles travel through the intersection as stated in traffic modeling (Synchro) reports. A speed of 25 mph is used for all free-flow traffic, consistent with the City of Boston speed limit. Speeds of 10 and 15 mph were used for right (and U-turns, if necessary), and left turns, respectively. Roadway emissions factors were obtained from MOVES using EPA guidance.[3]

Winter CO emission factors are typically higher than summer. Therefore, January weekday emission factors were conservatively used in the microscale analysis. The emission factors are presented in Table 4-3.

Table 4-3 Observed Ambient Air Quality Concentrations and Selected Background Levels

Carbon Monoxide Only			
		2018	**2025**
Free Flow	25 mph	3.162	2.101
Right Turns	10 mph	4.947	3.241
Left Turns	15 mph	4.249	2.827
Queues	Idle	11.850	5.249

Notes: Winter CO emission factors are higher than summer and are conservatively used

Urban Unrestricted Roadway type used

[3] U.S. EPA, 2010. Using MOVES in Project-Level Carbon Monoxide Analyses. EPA-420-B-10-041

Receptors & Meteorology Inputs

Sets of up to 187 receptors were placed in the vicinity of the modeled intersections. Receptors extended approximately 300 feet on the sidewalks along the roadways approaching the intersections. The roadway links and receptor locations of the modeled intersections are presented in Figures 4-1 through 4-4. Note that the configuration for the intersection of Tremont Street and Ruggles Street/Whittier Street changes due to proposed infrastructure improvements as part of the Tremont Crossing Development.

For the CAL3QHC model, limited meteorological inputs are required. Following EPA guidance[4], a wind speed of one meter per second, stability class D(4), and a mixing height of 1,000 meters were used. To account for the intersection geometry, wind directions from 0° to 350°, at every 10° were selected. A surface roughness length of 321 centimeters was selected and is consistent with the environment near the Project.[5]

Impact Calculations (CAL3QHC)

The CAL3QHC model predicts one-hour concentrations using queue-links at signalized intersections, worst-case meteorological conditions, and traffic input data. The CAL3QHC methodology was based on EPA CO modeling guidance. Signal timings were provided directly from the traffic modeling outputs.

For use in the microscale analysis, background concentrations of CO in ppm were required for the 2018 Existing and 2025 No-Build and Build scenarios. The corresponding maximum background concentrations in ppm were 2.4 ppm (2,760 µg/m^3) for one-hour and 1.2 ppm (1,375 µg/m^3) for eight-hour CO.

Air Quality Results

The results of the maximum one-hour predicted CO concentrations from CAL3QHC are provided in Tables 4-4 through 4-6 for the 2018 Existing, 2025 No-Build and Build scenarios. Eight-hour average concentrations are calculated by multiplying the maximum one-hour concentrations by a factor of 0.9.[6]

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

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

6 U.S. EPA, AERSCREEN User's Guide; EPA-454/B-11-001, March 2011.

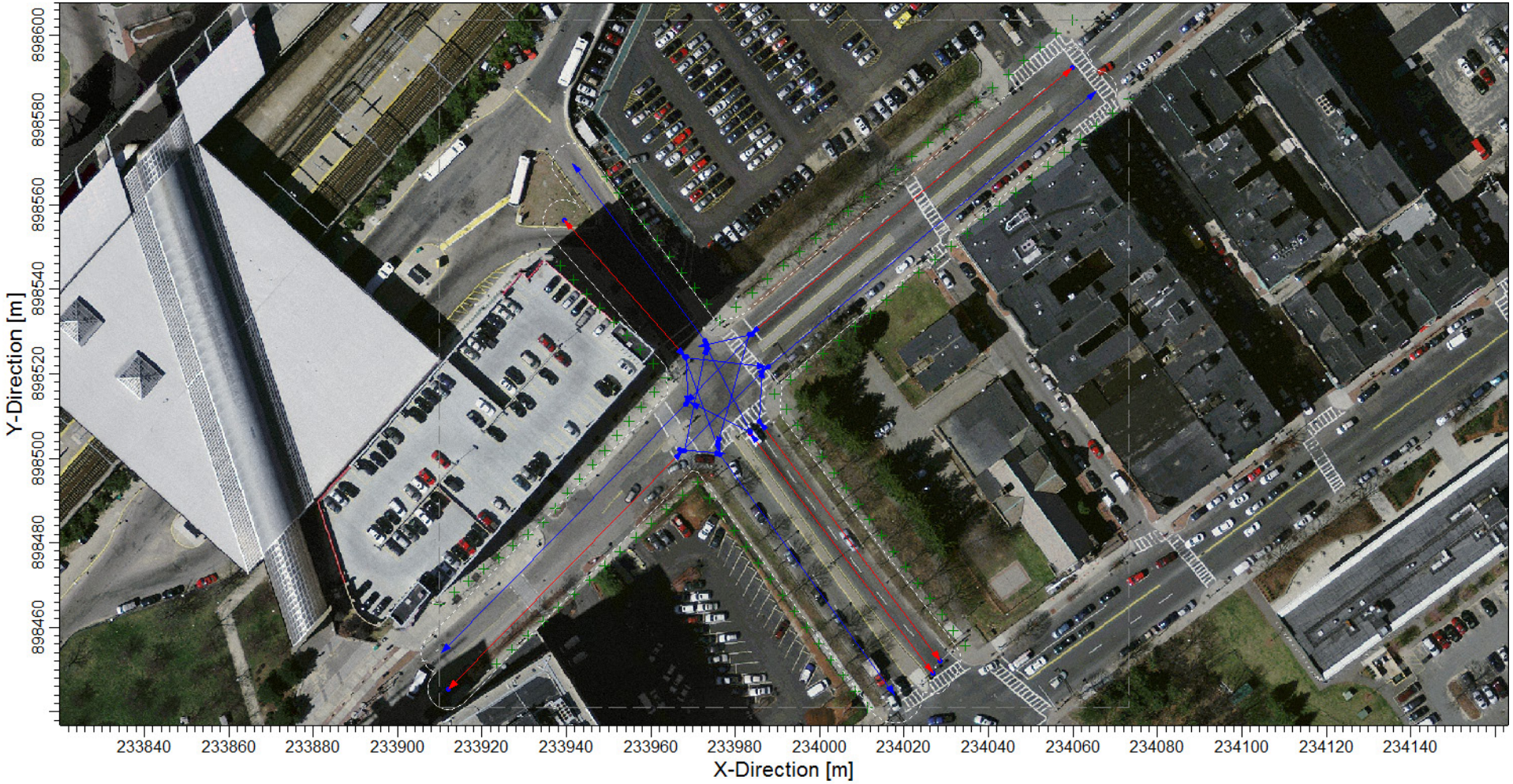


Figure 4-1

Intersection of Columbus Avenue And Melnea Cass Boulevard

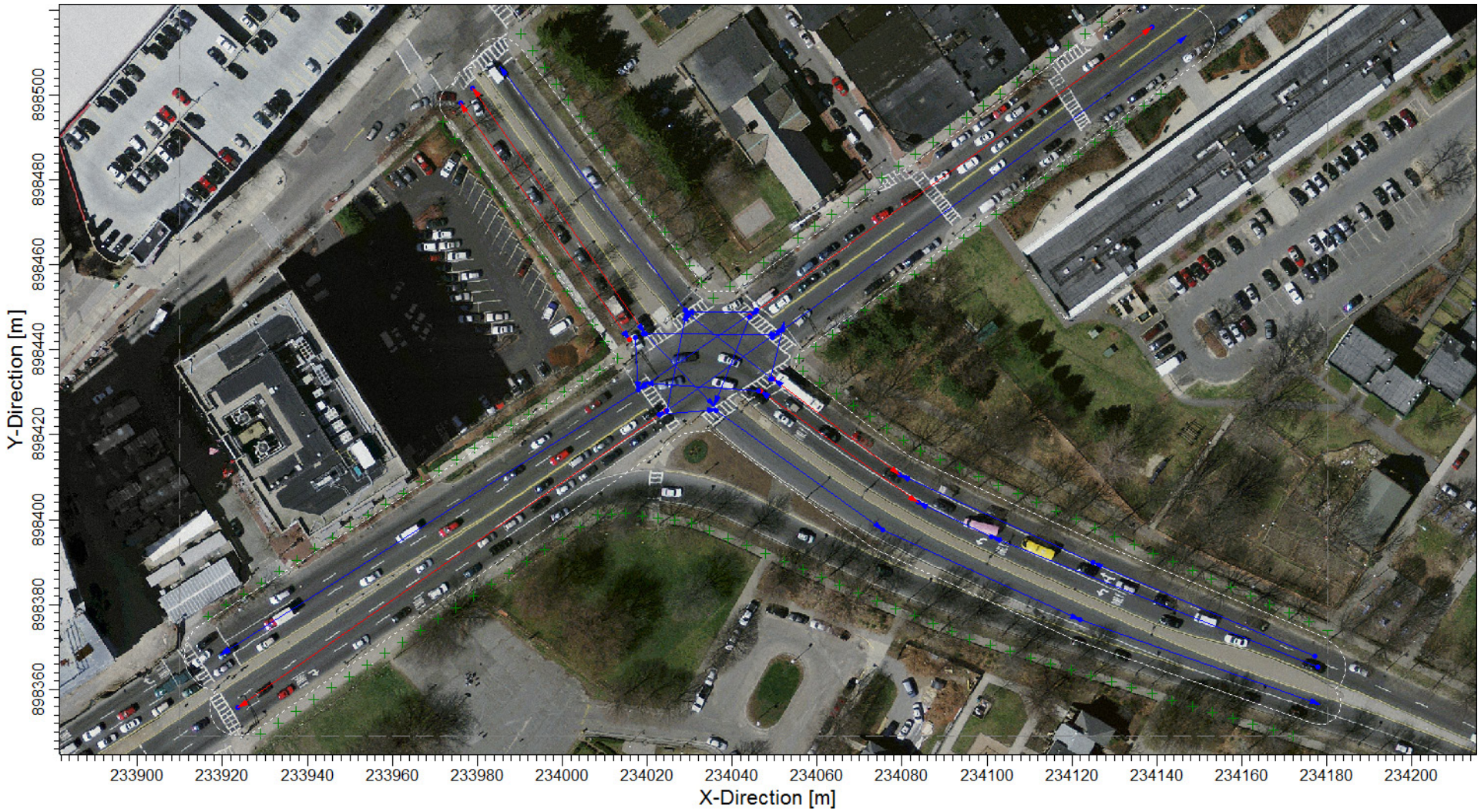


Figure 4-2

Intersection of Tremont Street and Melnea Cass Boulevard

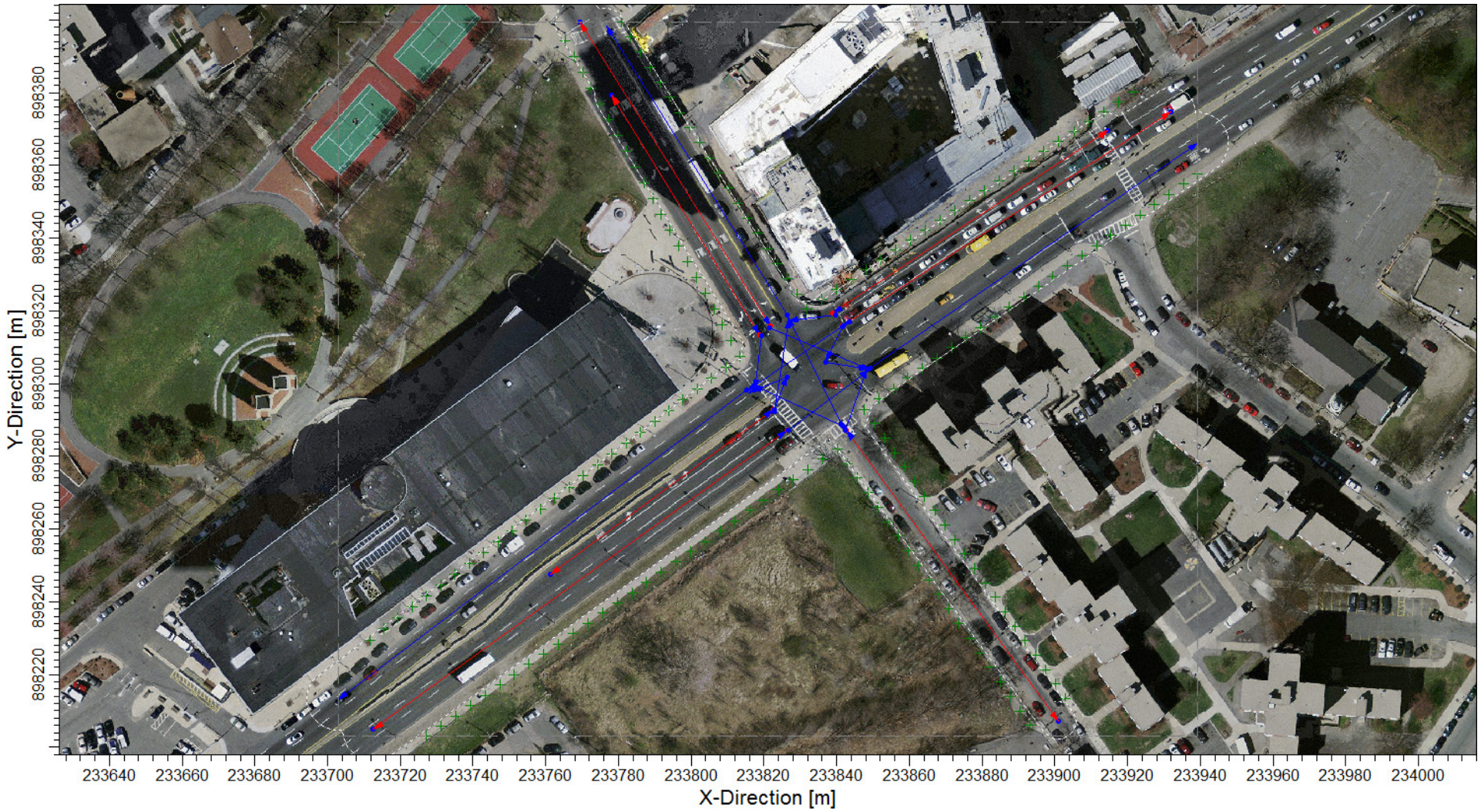


Figure 4-3

Intersection of Tremont Street and Ruggles Street/Whittier Street (Existing)

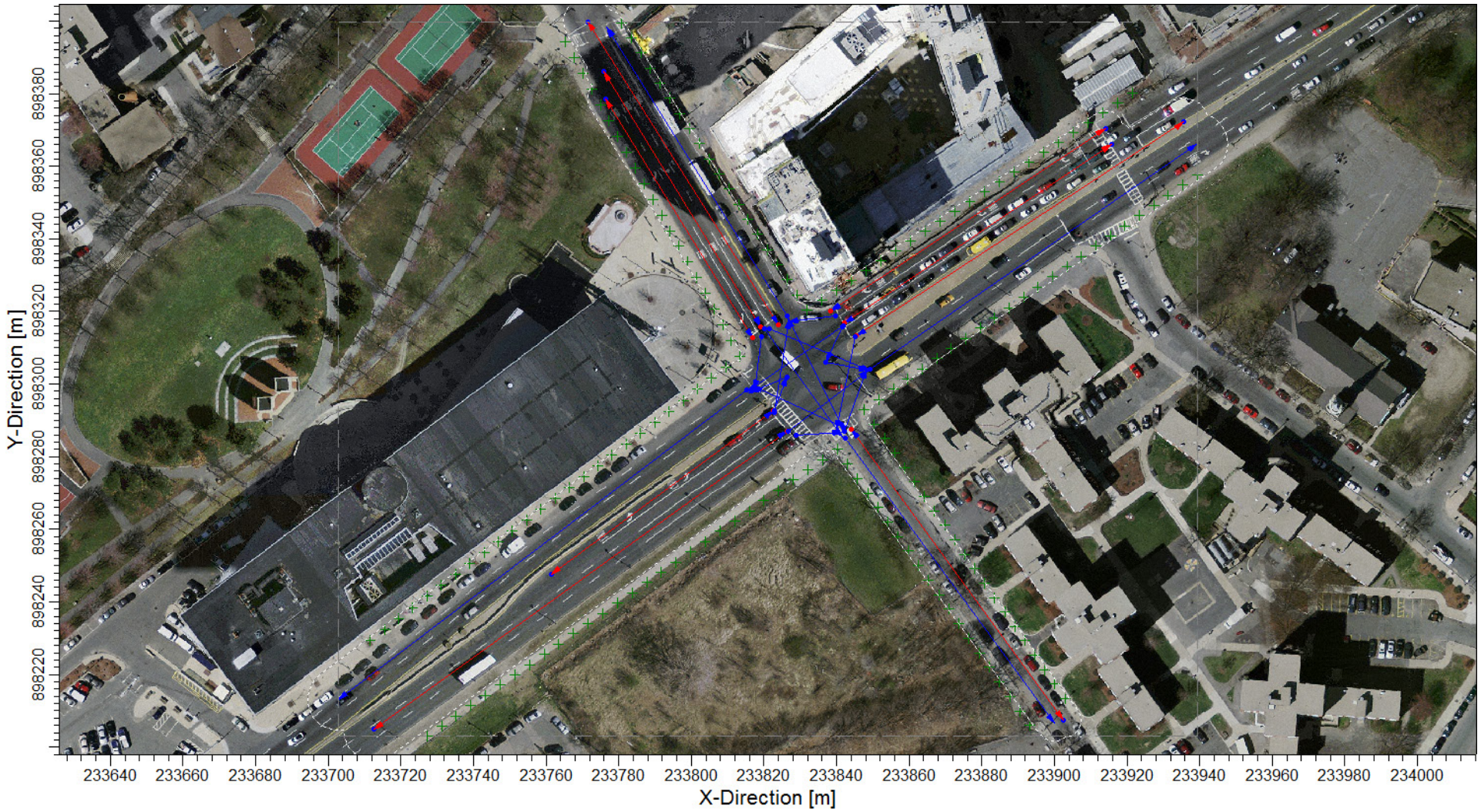


Figure 4-4

Intersection of Tremont Street and Ruggles Street/Whittier Street (Future)

The results of the one-hour and eight-hour maximum modeled CO ground-level concentrations from CAL3QHC were added to EPA supplied background levels for comparison to the NAAQS. These values represent the highest potential concentrations at the intersection as they are predicted during the simultaneous occurrence of "defined" worst case meteorology. The highest one-hour traffic-related concentration predicted in the area of the Project for the future modeled conditions (0.4 ppm) plus background (2.4 ppm) is 2.8 ppm. The highest eight-hour traffic-related concentration predicted in the area of the Project for the future modeled conditions (0.4 ppm) plus background (1.2 ppm) is 1.6 ppm.

All concentrations are well below the one-hour NAAQS of 35 ppm and the eight-hour NAAQS of 9 ppm.

Table 4-4 Summary of Microscale Modeling Analysis (Existing 2018)

Intersection	Peak	CAL3QHC Modeled CO Impacts (ppm)	Monitored Background Concentration (ppm)	Total CO Impacts (ppm)	NAAQS (ppm)
1-Hour					
Columbus Avenue and Melnea Cass Boulevard	AM	0.1	2.4	2.5	35
	PM	0.1	2.4	2.5	35
Tremont Street and Melnea Cass Boulevard	AM	0.3	2.4	2.7	35
	PM	0.3	2.4	2.7	35
Tremont Street and Ruggles Street /Whittier Street	AM	0.5	2.4	2.9	35
	PM	0.5	2.4	2.9	35
8-Hour					
Columbus Avenue and Melnea Cass Boulevard	AM	0.1	1.2	1.3	9
	PM	0.1	1.2	1.3	9
Tremont Street and Melnea Cass Boulevard	AM	0.3	1.2	1.5	9
	PM	0.3	1.2	1.5	9
Tremont Street and Ruggles Street /Whittier Street	AM	0.5	1.2	1.7	9
	PM	0.5	1.2	1.7	9

Notes: CAL3QHC eight-hour impacts were conservatively obtained by multiplying one-hour impacts by a screening factor of 0.9.

Table 4-5 Summary of Microscale Modeling Analysis (No-Build 2025)

Intersection	Peak	CAL3QHC Modeled CO Impacts (ppm)	Monitored Background Concentration (ppm)	Total CO Impacts (ppm)	NAAQS (ppm)
1-Hour					
Columbus Avenue and Melnea Cass Boulevard	AM	0.1	2.4	2.5	35
	PM	0.1	2.4	2.5	35
Tremont Street and Melnea Cass Boulevard	AM	0.1	2.4	2.5	35
	PM	0.1	2.4	2.5	35
Tremont Street and Ruggles Street /Whittier Street	AM	0.3	2.4	2.7	35
	PM	0.4	2.4	2.8	35
8-Hour					
Columbus Avenue and Melnea Cass Boulevard	AM	0.1	1.2	1.3	9
	PM	0.1	1.2	1.3	9
Tremont Street and Melnea Cass Boulevard	AM	0.1	1.2	1.3	9
	PM	0.1	1.2	1.3	9
Tremont Street and Ruggles Street /Whittier Street	AM	0.3	1.2	1.5	9
	PM	0.4	1.2	1.6	9

Notes: CAL3QHC eight-hour impacts were conservatively obtained by multiplying one-hour impacts by a screening factor of 0.9.

Table 4-6 Summary of Microscale Modeling Analysis (Build 2025)

Intersection	Peak	CAL3QHC Modeled CO Impacts (ppm)	Monitored Background Concentration (ppm)	Total CO Impacts (ppm)	NAAQS (ppm)
1-Hour					
Columbus Avenue and Melnea Cass Boulevard	AM	0.1	2.4	2.5	35
	PM	0.1	2.4	2.5	35
Tremont Street and Melnea Cass Boulevard	AM	0.1	2.4	2.5	35
	PM	0.1	2.4	2.5	35
Tremont Street and Ruggles Street /Whittier Street	AM	0.3	2.4	2.7	35
	PM	0.4	2.4	2.8	35
8-Hour					
Columbus Avenue and Melnea Cass Boulevard	AM	0.1	1.2	1.3	9
	PM	0.1	1.2	1.3	9
Tremont Street and Melnea Cass Boulevard	AM	0.1	1.2	1.3	9
	PM	0.1	1.2	1.3	9
Tremont Street and Ruggles Street /Whittier Street	AM	0.3	1.2	1.5	9
	PM	0.4	1.2	1.6	9

Notes: CAL3QHC eight-hour impacts were conservatively obtained by multiplying one-hour impacts by a screening factor of 0.9.

Conclusions

Results of the microscale analysis show that all predicted CO concentrations are well below one-hour and eight-hour NAAQS. There is no discernable change to the modeled concentrations from the No-Build to Build cases. Therefore, it can be concluded that there are no anticipated adverse air quality impacts resulting from increased traffic from the Project.

4.1.6 Flood Hazard Zones/Wetlands

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for the site located in the City of Boston - Community Panel Number 25025C0079J indicates the FEMA Flood Zone Designations for the site area. The map shows that the Project is located in a Zone X "Areas determined to be outside the 0.2% annual chance floodplain."

The site does not contain wetlands.

4.1.7 Geotechnical/Groundwater

4.1.7.1 Subsurface Soil Characteristics

Previous subsurface investigations were undertaken at and adjacent to the site from 1966 to 2019, and have been reviewed and evaluated to define subsurface conditions. In general, the subsurface soil profile at the Project site consists of about 5 to 16 feet of fill over a thick layer of marine sand and clay, underlain by glacial till and bedrock at depths exceeding 100 ft. Table 4--7 summarizes the subsurface conditions encountered in the borings completed to date, and anticipated at the Project site, in order of increasing depth below the ground surface.

Table 4-7 Subsurface Soil Profile

Generalized Description	Depth[(1)] to Top of Layer (feet)	Thickness of Layer (feet)
Fill	–	5 to 16
Marine Sand	5 to 16	0 to 12
Marine Clay	12 to 22	129 to 173
Glacial Deposits	147 to 198	0.5 to 14
Bedrock	155 to 212	–

[(1)] Exterior site grades within the Columbus Avenue parking lot range from El. 19 along Columbus Avenue to El. 15 near the along the MBTA right-of-way in Boston City Base (BCB) datum.

4.1.7.2 Groundwater Conditions

Groundwater monitoring wells have been installed and monitored at or in the vicinity of the Project site. Groundwater level measurements between 2010 and 2018 ranged from about 8 to 14 feet below the ground surface, corresponding to approximately Elevation 1.3 to 9.5 Boston City Base Datum (BCB). Groundwater levels tend to slope down in elevation from Columbus Avenue towards the MBTA right-of-way.

Site groundwater levels will fluctuate naturally due to seasonal variation in such factors as precipitation and temperature. Area groundwater levels may be influenced by local construction activity, pumping from foundation drains, leakage into or out of sewers, storm drains, transit and water lines nearby to the site. Seasonal fluctuations can also be expected.

4.1.7.3 Groundwater Conservation Overlay District (GCOD)

The Project site is not located within the Groundwater Conservation Overlay District and specific requirements of Article 32 are not applicable. Project design criteria will be established to not negatively impact, by potentially lowering, area groundwater levels.

It is currently planned to install rain gardens and stormwater recharge systems as part of site development as designed by the Proponent's civil engineer.

4.1.7.4 Foundation Construction Methodology

It is anticipated that the building will be supported on shallow conventional footing and mat foundations. Deep foundations, such as driven piles, are not expected to be used for the Project. The basement slab is planned to be at about 18.5 ft below site grades. The basement will be below site groundwater level and will be constructed with groundwater cut off systems and fully waterproofed basement foundations walls. A pressure relief drainage system will be installed below the basement slab and be discharged to on-site recharge systems.

Excavation for basement construction will be conducted within a temporary earth support system designed and constructed as a groundwater seepage and cut-off wall to maintain groundwater levels outside of the excavation. Temporary construction dewatering of the excavation will be conducted within an impervious earth support system to drain the site soils prior to excavation. The dewatering will be conducted in accordance with appropriate permits to be obtained from City, State and Federal agencies, as applicable, to discharge into adjacent storm drain and combine sewer systems. It is anticipated the Proponent will obtain that temporary construction dewatering permits from the Massachusetts Water Resources Authority (MWRA) and Boston Water and Sewer Commission (BWSC).

4.1.7.5 Considerations for Off-site Impacts and Mitigation Measures

Based on the design and construction methodology developed for the Project, potential impacts to abutting facilities from foundation construction such as ground movement, vibration, and groundwater lowering are anticipated to be negligible. Although impacts to adjacent structures are anticipated to be negligible, the Proponent will perform a geotechnical monitoring program for documentation purposes.

4.1.8 Solid and Hazardous Wastes

4.1.8.1 Existing Hazardous Waste Conditions

Environmental studies conducted with a portion of the EXP site from 1987 to 2004 identified concentrations of chemical constituents exceeding reporting thresholds. As a result, Release Tracking Number (RTN) 3-3503 was assigned. A Response Action Outcome Statement (RAO) submitted by Northeastern University to DEP in July 2004 concluded that a condition of No Significant Risk exists at the Site under 310 CMR 40.0900, and therefore no remedial actions were necessary.

A September 2013 precharacterization program for proposed construction of the ISEC building identified levels of total petroleum hydrocarbons (TPH) and polycyclic aromatic hydrocarbons (PAHs) in soil samples which were higher than the levels observed in soil samples within the Disposal Site for RTN 3-3503. Accordingly, RTN 3-31926 was assigned to the site, which includes the ISEC building and the proposed EXP site. A Permanent Solution Statement (PSS) with No Conditions was submitted to MassDEP on December 20 ,2018 to close out RTN 3-31926 in accordance with the Massachusetts Contingency Plan (MCP). The PSS indicated that a condition of No Significant Risk of harm to human health, safety and the environment exists at the Project site for current and future unrestricted conditions and uses.

Based on the previous regulatory filing to date, the Project site is not subject to conditions or an Activity and Use Limitation (AUL) for redevelopment.

Excavation for below-grade and foundation construction for the new building will generate excess soil requiring off site transport. Chemical testing of the material will be undertaken during the design of the Project to define environmental quality and provide data required by receiving facilities prior to accepting the material. Material leaving the site will be legally transported in accordance with local, state and federal requirements. All work will be conducted in accordance with Massachusetts Department of Environmental Protection (MassDEP) requirements.

No buildings are present at the property requiring demolition. Construction debris may be encountered during excavation including potential buried structure or former foundations; and remnant materials such as asphalt, brick, concrete, wood and granite block. The

Proponent will ensure that waste removal and disposal during construction and operation will be in conformance with the City and the Massachusetts Department of Environmental Protection (MassDEP) Regulations for Solid Waste.

4.1.8.2 Operational Solid and Hazardous Wastes

The Project will generate hazardous waste in small quantities typical of academic uses. Hazardous wastes generated in laboratories will be temporarily brought to a central accumulation area, prior to shipment to an offsite licensed hazardous waste disposal facility. Non-hazardous liquid lab waste will be PH neutralized prior to being added to the building sewer waste stream.

The Project will include recycling areas for items such as paper, plastic, glass and cans.

4.1.9 Noise

The mechanical equipment for the Project will be similar to that used on similarly sized institutional buildings. Rooftop equipment will be screened, and acoustic screening will be included if necessary to meet local noise standards. The Project team will ensure that the buildings' mechanical equipment will meet the City of Boston Noise Standards.

Construction period noise impacts and mitigation are discussed below in Section 4.1.10.2.

4.1.10 Construction Impacts

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

A Construction Management Plan (CMP) will be submitted to the BTD for review and approval prior to issuance of a building permit. The CMP will define truck routes which will help in minimizing the impact of trucks on local streets.

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

Throughout Project construction, a secure perimeter will be maintained to protect the public from construction activities.

4.1.10.1 Construction Air Quality

Short-term air quality impacts from fugitive dust may be expected during site demolition, excavation and the early phases of construction. Plans for controlling fugitive dust during site demolition, excavation and construction include mechanical street sweeping, wetting portions of the site during periods of high wind, and careful removal of debris by covered trucks. The construction contract will provide for a number of strictly enforced measures to be used by contractors to reduce potential emissions and minimize impacts. These measures are expected to include:

- Using wetting agents on areas of exposed soil on a scheduled basis;
- Using covered trucks;
- Minimizing spoils on the construction site;
- Monitoring of actual construction practices to ensure that unnecessary transfers and mechanical disturbances of loose materials are minimized;
- Minimizing storage of debris on the site; and
- Periodic street and sidewalk cleaning with water to minimize dust accumulations.

4.1.10.2 Construction Noise

The Proponent is committed to mitigating noise impacts from the construction of the Project. Periodic increased community sound levels, however, are an inherent consequence of construction activities. Construction work will comply with the requirements of the City of Boston Noise Ordinance. Every reasonable effort will be made to minimize the noise impact of construction activities, including:

- Instituting a proactive program to ensure compliance with the City of Boston noise limitation policy;
- Using appropriate mufflers on all equipment and ongoing maintenance of intake and exhaust mufflers;
- Muffling enclosures on continuously running equipment, such as air compressors and welding generators;
- Replacing specific construction operations and techniques by less noisy ones where feasible;
- Selecting the quietest of alternative items of equipment where feasible;

- Scheduling equipment operations to keep average noise levels low, to synchronize the noisiest operations with times of highest ambient levels, and to maintain relatively uniform noise levels;

- Turning off idling equipment; and

- Locating noisy equipment at locations that protect sensitive locations by shielding or distance.

4.1.10.3 Construction Waste Management

The Proponent will reuse or recycle demolition and construction materials to the greatest extent feasible. Construction procedures will allow for the segregation, reuse, and recycling of materials. Materials that cannot be reused or recycled will be transported in covered trucks by a contract hauler to a licensed facility.

4.1.11 Rodent Control

A rodent extermination certificate will be filed with the building permit application to the City. Rodent inspection monitoring and treatment will be carried out before, during, and at the completion of all construction work for the Project, in compliance with the City's requirements. Rodent extermination prior to work commencement will consist of treatment of areas throughout the site.

4.1.12 Wildlife Habitat

The site is currently developed and within a fully developed urban area and, as such, the Project will not impact wildlife habitats as designated on the National Heritage and Endangered Species Priority Habitats of Rare Species and Estimated Habitats of Rare Wildlife maps.

4.2 Sustainable Design and Green Buildings

Sustainability informs every design decision. Enduring and efficient buildings conserve embodied energy and preserve natural resources. The Project embraces the opportunity to positively influence the urban environment. Its urban location takes advantage of existing infrastructure while access to public transit will reduce dependence on single-occupancy vehicle trips and minimize transportation impacts.

To measure the results of their sustainability initiatives and to comply with Article 37 of the Code, Northeastern intends to use the framework of the Leadership in Energy and Environmental Design (LEED) rating system promulgated by the US Green Building Council (USGBC). The Projects will use LEED for New Construction (LEED v4 for BD+C) as the rating system to demonstrate compliance with Article 37 for both Projects. The LEED rating

system tracks the sustainable features of a project by achieving points in the following categories: Location and Transportation, Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, Indoor Environmental Quality, Innovation and Design Process, and Regional Priority Credits.

A LEED checklist for the Project is included at the end of this section, and details the credits the Project anticipates achieving. This is a preliminary evaluation of the LEED checklist, and applicable credits may change as the building design advances.

The following is a summary of the Project team's approach to each credit category. The Proponent is committed to LEED certification at the Fold level. The Project will strive for Platinum level certification and also look for creative ways to achieve sustainable building performance that may or may not be measured by LEED.

Integrative Process

The Proponent and Project team are committed to an integrated design approach using early modeling and extensive design team coordination to achieve synergies across disciplines and building systems.

Location and Transportation

The Location and Transportation credit category encourages development on previously developed land, minimizing a building's impact on ecosystems and waterways, regionally appropriate landscaping, and smart transportation choice.

The Project site has been previously developed, meeting the criteria for the sensitive land protection credit. The Project site is also located on a brownfield where soil or groundwater contamination has been identified, and where the local, state, or national authority requires its remediation. The Project team will perform remediation to the satisfaction of that authority.

The Project site area exceeds the density requirements of 35,000 SF/acre and is in a neighborhood with several amenities within 0.5 miles of the Project site. The Project is providing bicycle facilities and showers for the occupants of the building. The Project does not include any off-street parking, thus earning the Reduced Parking Footprint Credit.

The Project site's location supports extensive access to public transit. The Project is within 0.2 miles of the Ruggles T station, and the following busses; 43, 15, 19, 22, 23, 28, 29, 44, 45, 47, CT 33, 9 and 8. The Project also anticipates achieving an exemplary performance point for Access to Quality Transit.

Sustainable Sites

The development of sustainable sites is at the core of sustainable design. Sustainable site design provides quality open space with active landscape elements that can both mitigate stormwater and provide shade and thermal comfort for the building occupants.

The Project will evaluate Low Impact Development (LID) Strategies to promote infiltration for quality stormwater management. The Project will meet the 85th percentile of rainfall retained on site achieving 2 LEED points for Rainwater Management. The Project will also include a cistern that will help with stormwater mitigation.

The landscape design is still in development, but it is anticipated that the Project will achieve the Open Space credit and the Project team is striving to design for the Site Development- Protect or Restore credit as well.

The building roof and all hardscape material will comply with the SRI standards set forth by LEED and achieve both Heat Island credits. Additionally, all exterior lighting fixtures will comply with the Light Pollution Reduction credit.

As required by LEED, the Project will create and implement an erosion and sedimentation control plan for all construction activities associated with the Project. The plan will conform to the erosion and sedimentation requirements of the 2012 U.S. Environmental Protection Agency (EPA) Construction General Permit (CGP) or local equivalent, whichever is more stringent.

The Project will complete and document a site survey or assessment that will demonstrate the relationships between the Project site features and topics, Topography, Hydrology, Climate, Vegetation, Soils, Human use.

Water Efficiency

Buildings are major users of our potable water supply and conservation of water preserves a natural re-source while reducing the amount of energy and chemicals used for sewage treatment. The goal of the Water Efficiency credit category is to encourage smarter use of water, both inside and outside.

Water reduction is typically achieved through more efficient appliances, fixtures and fittings inside and water-wise landscaping outside. To satisfy the requirements of the Indoor Water Use Reduction Prerequisite and credit, the Project will incorporate water conservation strategies that include low-flow plumbing fixtures for water closets and faucets. To satisfy the requirements of the Outdoor Water Use Reduction Prerequisite and credit, the landscape will be designed to reduce potable water use by at least 50% and the design will only have plant material that is native and adaptive.

The Project is targeting significant indoor water use reduction from the baseline. All newly installed toilets, urinals, private lavatory faucets, kitchen sinks and showerheads that are eligible for labeling will be low-flow and have the Water Sense label. The Project will also include a cistern to meet the potable water demand for flushing fixtures in the building.

The Project will also install permanent water meters that measure the total potable water use for the building and associated grounds in addition to water meters for two or more of the following water sub-systems, as applicable to the project: irrigation, indoor plumbing fixtures and fittings, domestic hot water and the boiler for additional metering.

Metering data will be compiled into monthly and annual summaries, and the resulting whole-project water usage data will be shared with USGBC.

Energy and Atmosphere

According to the U.S. Department of Energy, buildings use 39 percent of the energy and 74 percent of the electricity produced each year in the United States. The Energy and Atmosphere credit category encourages a wide variety of energy strategies: commissioning; energy use monitoring; efficient design and construction; efficient appliances, systems and lighting; the use of renewable and clean sources of energy, generated on-site or off-site; and other innovative practices.

Fundamental Commissioning and Enhanced Commissioning will be pursued for the Project. Envelope Commissioning will also be evaluated as an alternative.

A whole-building energy simulation was performed for the Project and is included in Appendix D. Points were calculating using EA pilot credit 95 – Alternative Energy Performance Metric, the average of the energy cost and carbon emissions savings is 38%, resulting in 15 LEED points.

The Project team will continue to analyze efficiency measures during the design process and account for the results in design decision making. The team will use energy simulation of efficiency opportunities and past energy simulation analyses for similar buildings. The Project will also prove compliance with the Stretch Code, which requires a minimum of 10 percent improvement over ASHRAE Standard 90.1–2013.

The Project will evaluate installing new building-level energy meters, or submeters that can be aggregated to provide building-level data representing total building energy consumption (electricity, natural gas, chilled water, steam, fuel oil, propane, biomass, etc.).

The Project will also evaluate incorporating clean/renewable energy production. The Project intends to participate in a Demand Response program to reduce/shed energy loads. More information will be provided as the engagement advances.

As required by LEED, the Project will not use chlorofluorocarbon (CFC)-based refrigerants in new heating, ventilating, air-conditioning, and refrigeration (HVAC&R) systems. The Project will target the use of refrigerants used in heating, ventilating, air-conditioning, and refrigeration (HVAC&R) equipment that minimize or eliminate the emission of compounds that contribute to ozone depletion and climate change.

The Proponent is evaluating engaging in a contract for 50 percent and perhaps 100 percent of the Project's energy from green power, carbon offsets, or renewable energy certificates (RECs).

Materials and Resources

During both construction and operations, buildings generate tremendous waste and use many materials and resources. The Materials & Resources credit category encourages the selection of sustainable materials, including those that are harvested and manufactured locally, contain high-recycled content, and are rapidly renewable. It also promotes the reduction of waste through building and material reuse, construction waste management, and ongoing recycling programs.

As required by LEED, the Project will provide dedicated areas accessible to waste haulers and building occupants for the collection and storage of recyclable materials for the entire building. Collection and storage areas may be separate locations. Recyclable materials will include mixed paper, corrugated cardboard, glass, plastics, and metals. The Project will also take appropriate measures for the safe collection, storage, and disposal of two of the following: batteries, mercury-containing lamps, and electronic waste.

To comply with both the prerequisite and credit requirements related to construction waste management, the Project will develop and implement a construction and demolition waste management plan that will identifying at least five materials (both structural and nonstructural) targeted for diversion and approximate a percentage of the overall Project waste that these materials represent. The Project will divert a minimum of 50 percent of the total construction and demolition material; diverted materials will include at least four material streams.

Careful material selection will be performed for the Project. The Project will integrate products that have Environmental Product Declarations (EPDs), Sourcing of Raw Materials and Material Ingredients disclosures to meet the LEED Criteria.

The Project will also perform a Life Cycle Assessment per the LEED requirement and will make efforts to reduce the impact of materials selected for the Project.

Indoor Environmental Quality

The U.S. Environmental Protection Agency estimates that Americans spend about 90 percent of their day in-doors, where the air quality can be significantly worse than outside. The Indoor Environmental Quality credit category promotes strategies that can improve indoor air through low emitting materials selection and increased ventilation. It also promotes access to natural daylight and views.

As required by LEED, the Project will meet the minimum requirements of ASHRAE Standard 62.1–2010, Sections 4–7, Ventilation for Acceptable Indoor Air Quality (with errata), or a local equivalent, whichever is more stringent. Also, during building operations the Proponent will institute a No Smoking Policy to prohibit the use of all tobacco products inside the building and within 25 feet of the building entrance, air intakes, and operable windows.

The Project is exploring the use of entryway systems, interior cross-contamination prevention, and filtration. The Project will target low emitting materials for all materials within the building interior (defined as everything within the waterproofing membrane). This includes requirements for product manufacturing volatile organic compound (VOC) emissions in the indoor air and the VOC content of materials.

The Project will develop and implement an indoor air quality (IAQ) management plan for the construction and preoccupancy phases of the building, meeting or exceeding all applicable recommended control measures of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 2nd edition, 2007, ANSI/SMACNA 008–2008, Chapter 3. The Project will follow strict IAQ guidelines and protect absorptive materials stored on-site from moisture damage. The Project also will pursue either a building flush out or air quality testing.

The Project will evaluate the thermal comfort criteria both for controllability and the ASHRAE 55 standards.

Daylight is being evaluated for energy efficiency opportunities and benefits for the occupants. The Project will also evaluate the ability to provide views with a direct line of sight to the outdoors for at least 75 percent of all regularly occupied floor area. This is a challenge given the dense urban location.

Innovation and Design Process

The Innovation in Design and Innovation in Operations credit categories provide additional points for projects that use new and innovative technologies, achieve performance well beyond what is required by LEED credits, or utilize green building strategies that are not specifically addressed elsewhere in LEED. This credit category also rewards projects for including a LEED

Accredited Professional on the team to ensure a holistic, integrated approach to design, construction, operations and maintenance. The following five credits are being pursued and/or evaluated for the Project:

- Innovation in Design- Exemplary Performance Access to Quality Transit
- Innovation in Design: Education & Outreach
- Innovation in Design: Green Housekeeping & Integrated Pest Management
- Innovation in Design: Thermal Comfort Survey
- Innovation in Design: Hardscape Maintenance and Sustainable Purchasing
- Innovation in Design: LEED Accredited Professional

Regional Priority

The Project anticipates achieving the following regional priority credits.

- Regional Priority: Indoor Water Use Reduction
- Regional Priority: High Priority Site
- Regional Priority: Rainwater Management
- Regional Priority: Optimize Energy Performance

4.3 Climate Change Resilience

4.3.1 Introduction

Climate change conditions considered by the Project team include higher maximum and mean temperatures, more frequent and longer extreme heat events, more frequent and longer droughts, more severe freezing rain and heavy rainfall events, and increased wind gusts.

A copy of the completed Climate Resiliency Checklist is included in Appendix E. Given the preliminary level of design, the responses are also preliminary and may be updated as the Project design progresses.

LEED v4 for BD+C: New Construction and Major Renovation

Project Checklist

Project Name: Northeastern University, EXP

Date: 4/17/2019

Y	?	N			
1			Credit	Integrative Process	1

15	1	0	**Location and Transportation**		16
			Credit	LEED for Neighborhood Development Location	16
1			Credit	Sensitive Land Protection	1
2			Credit	High Priority Site	2
5			Credit	Surrounding Density and Diverse Uses	5
5			Credit	Access to Quality Transit	5
1			Credit	Bicycle Facilities	1
1			Credit	Reduced Parking Footprint	1
	1		Credit	Green Vehicles	1

6	3	1	**Sustainable Sites**		10
Y			Prereq	Construction Activity Pollution Prevention	Required
1			Credit	Site Assessment	1
	1	1	Credit	Site Development - Protect or Restore Habitat	2
	1		Credit	Open Space	1
2	1		Credit	Rainwater Management	3
2			Credit	Heat Island Reduction	2
1			Credit	Light Pollution Reduction	1

8	1	2	**Water Efficiency**		11
Y			Prereq	Outdoor Water Use Reduction	Required
Y			Prereq	Indoor Water Use Reduction	Required
Y			Prereq	Building-Level Water Metering	Required
1	1		Credit	Outdoor Water Use Reduction	2
6			Credit	Indoor Water Use Reduction	6
		2	Credit	Cooling Tower Water Use	2
1			Credit	Water Metering	1

21	10	2	**Energy and Atmosphere**		33
Y			Prereq	Fundamental Commissioning and Verification	Required
Y			Prereq	Minimum Energy Performance	Required
Y			Prereq	Building-Level Energy Metering	Required
Y			Prereq	Fundamental Refrigerant Management	Required
4	2		Credit	Enhanced Commissioning	6
15	3		Credit	Optimize Energy Performance	18
	1		Credit	Advanced Energy Metering	1
1	1		Credit	Demand Response	2
	1	2	Credit	Renewable Energy Production	3
1			Credit	Enhanced Refrigerant Management	1
	2		Credit	Green Power and Carbon Offsets	2

4	7	2	**Materials and Resources**		13
Y			Prereq	Storage and Collection of Recyclables	Required
Y			Prereq	Construction and Demolition Waste Management Planning	Required
1	2	2	Credit	Building Life-Cycle Impact Reduction	5
1	1		Credit	Building Product Disclosure and Optimization - Environmental Product Declarations	2
	2		Credit	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
1	1		Credit	Building Product Disclosure and Optimization - Material Ingredients	2
1	1		Credit	Construction and Demolition Waste Management	2

3	11	2	**Indoor Environmental Quality**		16
Y			Prereq	Minimum Indoor Air Quality Performance	Required
Y			Prereq	Environmental Tobacco Smoke Control	Required
	2		Credit	Enhanced Indoor Air Quality Strategies	2
	2	1	Credit	Low-Emitting Materials	3
1			Credit	Construction Indoor Air Quality Management Plan	1
1	1		Credit	Indoor Air Quality Assessment	2
	1		Credit	Thermal Comfort	1
1	1		Credit	Interior Lighting	2
	3		Credit	Daylight	3
	1		Credit	Quality Views	1
		1	Credit	Acoustic Performance	1

5	1	0	**Innovation**		6
1			Credit	Innovation in Design: Exemplary Performance Access to Quality Transit	1
1			Credit	Innovation in Design: Education & Outreach	1
1			Credit	Innovation in Design: Green Housekeeping & Integrated Pest Management	1
1			Credit	Innovation in Design: Thermal Comfort Survey	1
	1		Credit	Innovation in Design: Hardscape Maintenance and Sustainable Purchasing	1
1			Credit	LEED Accredited Professional	1

4	0	0	**Regional Priority**		4
1			Credit	Regional Priority: Optimize Energy Performance	1
1			Credit	Regional Priority: High Priority Site	1
1			Credit	Regional Priority: Rainwater Management	1
1			Credit	Regional Priority: Indoor Water Use Reduction	1

67	34	9	**TOTALS**	Possible Points:	110

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

4.3.2 Extreme Heat Events

The *Climate Ready Boston* report predicts that in Boston, there may be between 25 to 90 days over 90 degrees by 2070, compared to an average of 11 days per year over 90 degrees between 1971 to 2000. The Project design will include measures to adapt to these conditions, including planting street trees and using both vegetative and high reflectance "cool" roof assemblies. The Project is utilizing first principals of an energy efficient design to reduce loads (energy demands) through passive design strategies of a high-performance building envelope, daylighting and reduction in heat island effects. Active systems will be designed to be energy efficient, and the HVAC system capacity will be designed for higher temperatures.

4.3.3 Rain Events

As a result of climate change, the Northeast is expected to experience more frequent and intense storms. To mitigate this, the Proponent will take measures to minimize stormwater runoff and protect the Project's mechanical equipment, as necessary. The Project will be designed to reduce peak rates and volumes of storm water from the site and promote infiltration to the greatest extent practicable. The Project will decrease the impervious area onsite, use areas of green roof, collect rainwater for reuse in the building and construct surface and underground infiltration structures.

4.3.4 Drought Conditions

Although more intense rain storms are predicted, extended periods of drought are also predicted due to climate change. Under the high emissions scenario, the occurrence of droughts lasting one to three months could go up by as much as 75% over existing conditions by the end of the century. To minimize the Project's susceptibility to drought conditions, the landscape design is anticipated to incorporate native and adaptive plant materials and high efficiency irrigation systems will be installed. Aeration fixtures and appliances will be chosen for water conservation qualities, conserving potable water supplies.

4.4 Urban Design

The architectural expression responds to the Project site's unique conditions, arcs of connectivity and integration that extend the connected landscape of the campus across the tracks, gathering multiple campus paths together with the street patterns to the south. This collection and channeling of tributaries (similar to a watercourse) has been visually interpreted in the organic forms of the building, the design of the pedestrian track crossing, and the landscape development.

The building exposure facing Columbus Avenue and the urban plaza will be clad with curtainwall to create a visually open design placing science on display. This will also bring the active visual presence of the 24/7 research laboratory operations to the site. Combined with the open space design this helps to create a welcoming urban environment and safe pedestrian experience.

The high-performance curtainwall envelope will balance the openness with insulating spandrels to achieve the thermal performance requirements of the skin. The curtainwall will be wrapped with an outer skin of fixed solar shading responding to the building orientation. Primarily in response to the south and southwest exposure, the building is shrouded with shading devices tuned to the building exposure configured to create the expressive soft building forms. Careful integration of the curtainwall with the shading systems will minimize thermal bridging to maintain peak performance of the systems.

4.5 Historic and Archaeological Resources

4.5.1 Historic Resources in the Project Site

No historic resources listed in the State and National Registers of Historic Places or included in the Inventory of Historic and Archaeological Assets of the Commonwealth are within the Project site.

4.5.2 Historic Resources in the Project Vicinity

The Project site is located in the vicinity of several historic resources listed in the State and National Registers of Historic Places or included in the Inventory of Historic and Archaeological Assets of the Commonwealth. Table 4-8 identifies these resources within one-quarter mile of the Project site and corresponds to resources depicted in Figure 4-5.

G:\Projects2\MA\Boston\5259\MXD\Historic_Resources_20190423.mxd

Data Source: Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, Information Technology Division

EXP Boston, Massachusetts

Epsilon Associates Inc.

Figure 4-5

Historic Resources

Table 4-8 Historic Resources within and in the Vicinity of the Project Site

No.	Historic Resource	Address	Designation*
A	Northeastern Krentzman Quadrangle	Southside of Huntington Avenue and includes 324, 330, 346, 360, 370, 380 Huntington Avenue	INV
B	United Drug Company/Northeastern University	The survey area includes 35-37, 39-41, and 43 Leon Street; 105-107 and 111 Forsyth Street	INV
C	Lower Roxbury District	Roughly bound by Tremont Street to the south, Saint Cyprians Place to the west, Columbus Ave to the north, and Burke Street to the east	NRDIS
D	Frederick Douglas Square Historic District	Roughly bound by Hammond Street to the northwest, Westminster street to the southeast, and Windsor Street to the southwest	NRDIS
E	SS Francis De Sales – Philip Roman Catholic Church	The survey areas include 159 Ruggles Street, 34 Weston Street, and 1 Warwick Street	INV
F	Lenox Street Apartment	Roughly bound by Lenox Street to the northeast, Kendall Street southwest and Shawmut Avenue to the southeast	INV
1	Boston Young Men's Christian Association	312-320 Huntington Ave	NRIND
2	Orlansky Apartment Building	776-778 Columbus Ave	PR, NRDIS
3	Claude A and Cyril A. Wilson Apartment House	774 Columbus Ave	PR, NRDIS
4	Robert Treat Paine House	38 Sussex Street	PR, NRDIS

*Designation Legend

NRIND	Individually listed on the National Register of Historic Places
NRDIS	National Register of Historic Places historic district
PR	Preservation Restriction
INV	Inventory Listing

4.5.3 Archaeological Resources Within the Project Site

A review of Massachusetts Historical Commission's online archaeological base maps was conducted on January 23, 2019. No previously identified archaeological resources are located within or in the immediate vicinity of the Project site. No impacts to archaeological resources are expected.

4.5.4 Consistency with Historic Reviews

4.5.4.1 Boston Landmarks Commission

The submission of this PNF initiates review of the Project by the BLC under the City's Article 80 Review process.

4.5.4.2 Massachusetts Historical Commission

The MHC has review authority over projects requiring state funding, licensing, permitting and/or approvals that may have direct or indirect impacts to properties listed in the State Register of Historic Places. It is anticipated that a state permit will be required for the Project. The MHC review process will be initiated through the filing of an MHC Project Notification Form as prescribed in MHC's governing regulations.

4.6 Infrastructure Systems

The existing infrastructure surrounding the Project site is anticipated to be sufficient to service the needs of the Project. The following sections describe the existing sewer, water, and drainage systems surrounding the Project site and explain how these systems will service the Project. The analysis also discusses any anticipated Project-related impacts on utilities and identifies mitigation measures to address these potential impacts.

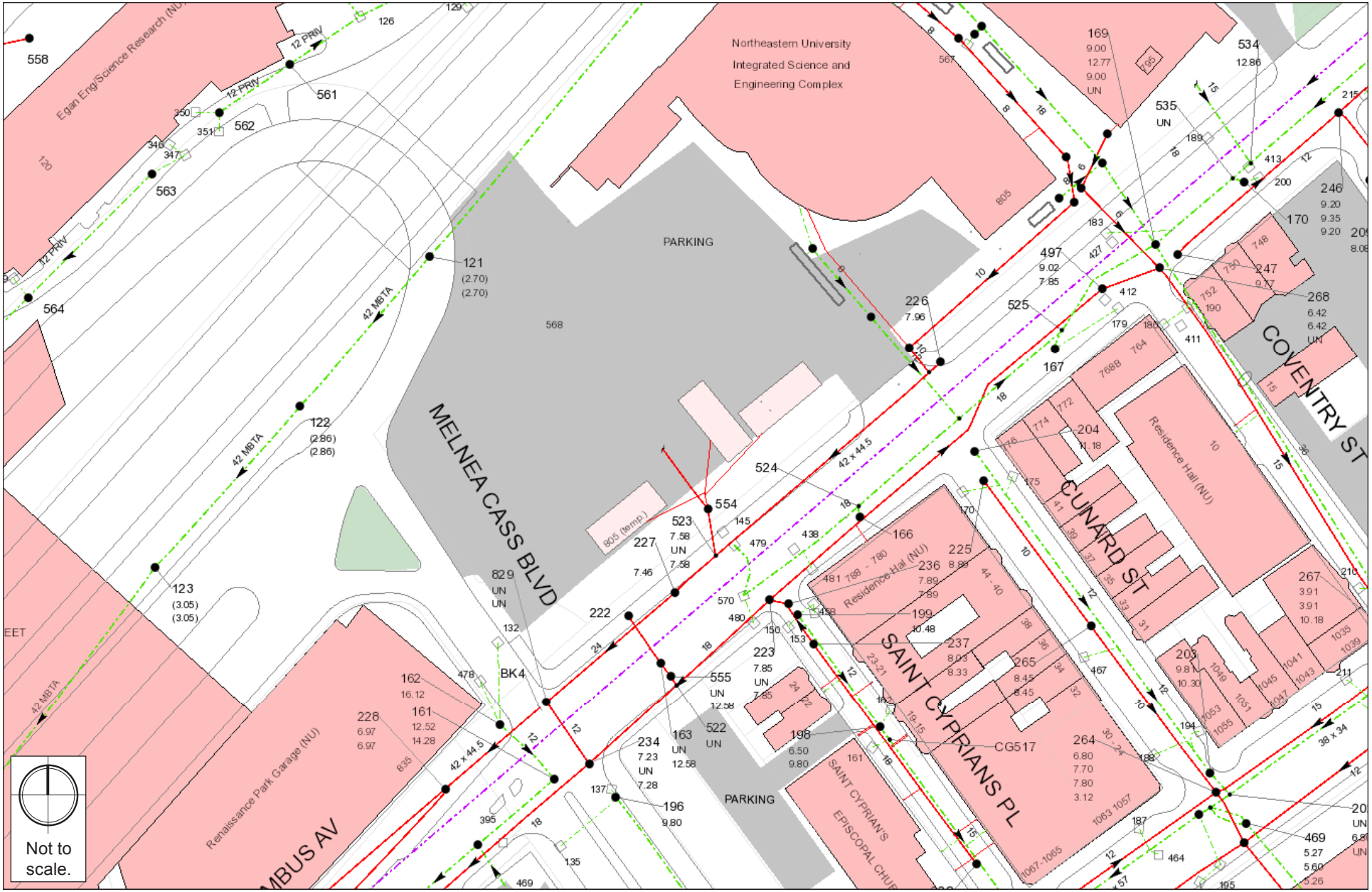
A detailed infrastructure analysis will be performed when the Project proceeds into the Design Development Phase. The Project team will coordinate with the appropriate utility providers to address the capacity of the area utilities to provide services for the Project. A Boston Water and Sewer Commission (BWSC) Site Plan and General Service Application will be submitted for the new water, sanitary sewer, and storm drain connections. In addition, a pollution prevention plan will be prepared for use during construction, including during demolition activity.

4.6.1 Wastewater

The following section describes the existing sanitary wastewater system and the proposed improvements to the system in association with the Project.

4.6.1.1 Existing Sanitary Sewer System

The sanitary wastewater system in the vicinity of the Project site is owned, operated, and maintained by BWSC (see Figure 4-6). A 42"x44.5" sanitary sewer main that is reduced to a 24-inch main exists on the northerly side of Columbus Avenue and an 18-inch sanitary sewer main on the south side of Columbus Avenue. The Massachusetts Water Resources Authority (MWRA) owns and maintains a 78-inch combined sewer main within Columbus Avenue.



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HOWARD STEIN HUDSON
Engineers + Planners

Figure 4-6
Sanitary Wastewater System

An 8-inch private sewer line exists within the Project site that serves the ISEC building.

The total sewer flow from the existing building on-site is estimated to be 19,463 gallons per day (gpd) based on the building uses and design sewer flows provided in 310 CMR 15.000, the State Environmental Code, Title 5: *Standard Requirements for the Siting, Construction, Inspection, Upgrade and Expansion of On-Site Sewage Treatment and Disposal Systems and for the Transport and Disposal of Septage* ("Title V"). The breakdown of these uses are summarized in Table 4-9.

Table 4-9 Project Site Existing Wastewater Generation

Use	Quantity	Sewer Generation Rate	Total GPD
Wet Lab	37,500 sf	200 gpd/1,000 sf	7,500
Other Lab/Office Space	159,500 sf	75 gpd/1,000 sf	11,963
Total Estimated Existing Sewage Generation			19,463[1]

1. Building uses, floor area and sewer generation rates are derived from *Table 6-1: Project Sewage Flows* of the *Northeastern University, Boston Campus, Interdisciplinary Science and Engineering Building Project Notification Form.*

4.6.1.2 Project Generated Sanitary Sewer Flow

The new building will generate an estimated 26,250 gpd based on Title V sewer design flows, as summarized in Table 4-10. The Proponent will continue to participate in BWSC's sewer inflow/infiltration program for the 45,713 gpd combined sanitary flow from the existing and proposed buildings.

Table 4-10 Project Site Proposed Wastewater Generation

Use	Number	Sewer Generation Rate	Total GPD
Research/Academic/Administrative Programs, Faculty Club and Building Support	350,000 sf	75 gpd/1,000 sf	26,250
Total Estimated Proposed Sewage Generation			26,250

4.6.1.3 Proposed Sanitary Sewer Service

Sanitary wastewater from the Project is expected to be directed to the 42"x44.5" sanitary sewer main in Columbus Avenue. The Project's proposed sewer flow accounts only for sanitary sewerage, any additional waste produced in laboratory spaces will be considered industrial wastewater and will discharge to a tight tank or be treated prior to discharging to the municipal sewer system. The municipal sewer system contained in Columbus Avenue is expected to be of adequate capacity to serve the needs of the Project.

4.6.2 Water System

The following sections describe the existing water system and the proposed improvements to the system in association with the Project.

4.6.2.1 Existing Water Service

BWSC owns and maintains the water distribution system in the vicinity of the Project site (see Figure 4-7). Within Columbus Avenue, BWSC record drawings indicate an 8-inch ductile iron cement lined (DICL) water main installed in 1972, a 12-inch DICL main installed in 2006 and a 30-inch pit cast iron (PCI) main installed in 1914 and cement lined in 1972. A 12-inch DICL main, installed in 1984, runs adjacent to the west side of the Project site. A 10-inch DICL main, installed in 2015, runs through the Project site. The 30-inch PCI main is a part of the Southern High service network, all other mains are part of the Northern Low service network.

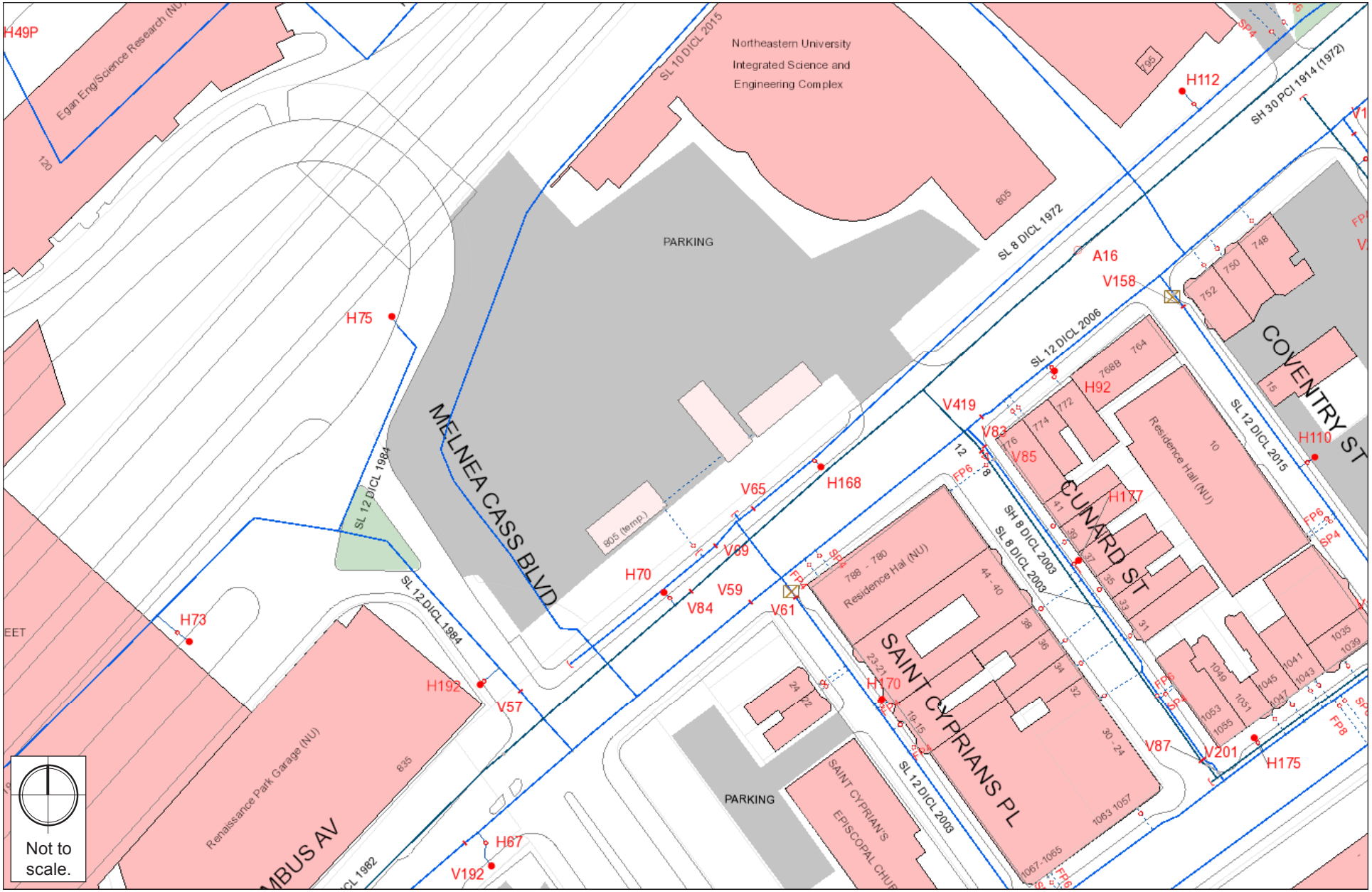
There are four hydrants located within the vicinity of the Project site. Hydrants H168 and H170 are located adjacent to the Project site within the Columbus Avenue right-of-way. Hydrant H192 is located in the northwest corner of the Columbus Avenue and Melnea Cass Boulevard intersection. Hydrant H75 is located within the Ruggles Upper busway. It is anticipated that these hydrants provide sufficient coverage for the Project. Northeastern will confirm the fire hydrant coverage for the Project in consultation with BWSC and the Boston Fire Department (BFD) during the detailed design phase of the Project.

4.6.2.2 Anticipated Water Consumption

The anticipated water demand for the Project is estimated at approximately 28,875 gpd. The estimated water consumption is based on the Project's estimated sewage generation, plus a factor of 10% to account for consumption, system losses, and other usages to estimate an average water demand. The water for the Project will be supplied by BWSC. More detailed water use and meter sizing calculations will be submitted to BWSC as part of the Site Plan Review process.

4.6.2.3 Proposed Water Service

It is anticipated that separate domestic and fire protection services for the Project will be directly tapped from the 30-inch (Southern Low) service main in Columbus Avenue. The water supply systems servicing the Project will be gated so as to minimize public hazard or inconvenience in the event of a water main break.



EXP **Boston, Massachusetts**

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Engineers + Planners

Figure 4-7
Water Supply System

Water service to the building will be metered in accordance with BWSC's requirements. Northeastern will provide a suitable location for the Meter Transmission Units (MTU's) as part of BWSC's Automatic Meter Reading System. Water meters over 3-inches will be provided with a bypass to allow BWSC testing without service interruptions. Backflow preventers will be installed on all fire protection services and will be coordinated with BWSC's Cross Connection Control Department.

4.6.3 Storm Drainage System

The following sections describe the existing and proposed stormwater management systems and detail the Project's proposed compliance with the BWSC stormwater management guidance.

4.6.3.1 Existing Storm Drainage Systems

Stormwater runoff from a majority of the site is captured by catch basins on-site before being discharged to the surrounding municipal storm drain system. The storm drainage system in the vicinity of the Project site is owned and maintained by BWSC (see Figure 4-6). There is an 18-inch storm drain line within Columbus Avenue and a 12-inch line that serves as a connection to the privately-owned drainage system associated with the existing building on site.

4.6.3.2 Proposed Storm Drainage System

A stormwater management system will be constructed to treat, detain and infiltrate stormwater runoff to maintain the existing hydrology of the site. It is expected that subsurface stormwater infiltration systems will be constructed that can infiltrate the first 1¼-inch of runoff from the site's impervious areas. Rooftop runoff will be piped directly to the stormwater infiltration systems. Stormwater runoff from paved areas, such as the proposed driveway, will be captured by deep sump, hooded catch basins and provide pretreatment prior to being directed to the stormwater infiltration systems. The infiltration systems are expected to be provided with a bypass structures that allow for overflow during larger storm events to be directed to the municipal storm drain system. A Stormwater Operation and Maintenance Plan and a Long-Term Pollution Prevention Plan will be developed to support the long-term functionality of the proposed stormwater management system. Rain gardens and bioswales will be implemented on site, to the greatest extent practicable, to provide increased opportunity for stormwater recharge through the use of green infrastructure.

4.6.4 Electrical Service

Eversource owns and maintains the electrical transmission system in the vicinity of the Project. The electrical power supply design and loads for the building will be coordinated with Eversource during the design phase. Northeastern is investigating energy conservation measures as described in Section 4.2

4.6.5 Telecommunication Systems

Verizon and Comcast provide cable and telephone services in the Project area. Services will be coordinated during the design phase.

4.6.6 Gas Systems

National Grid provides natural gas in the Project area. The actual size and location of the building services will be coordinated with National Grid.

4.6.7 Utility Protection During Construction

The Project construction contractor will notify utility companies and register with "Dig Safe" prior to excavation. During construction, infrastructure will be protected using sheeting and shoring, temporary relocations, and construction staging as required. The Project construction contractor will be required to coordinate all protection measures, temporary supports, and temporary shutdowns of all utilities with the appropriate utility owners and/or agencies.

The Project construction contractor will also be required to provide adequate notification to the utility owner prior to any work commencing on their utility. In addition, in the event a utility cannot be maintained in service during switch over to a temporary or permanent system, the Project construction contractor will be required to coordinate the shutdown with the utility owners and Project abutters to minimize impacts and inconveniences.

Chapter 5.0

Coordination with other Governmental Agencies

5.0 COORDINATION WITH OTHER GOVERNMENTAL AGENCIES

5.1 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. The Accessibility Checklist is included in Appendix F.

5.2 Massachusetts Environmental Policy Act (MEPA)

The Proponent does not expect that the Project will require review by the Massachusetts Environmental Policy Act (MEPA) Office of the Massachusetts Executive Office of Energy and Environmental Affairs.

5.3 Massachusetts Historical Commission State Register Review

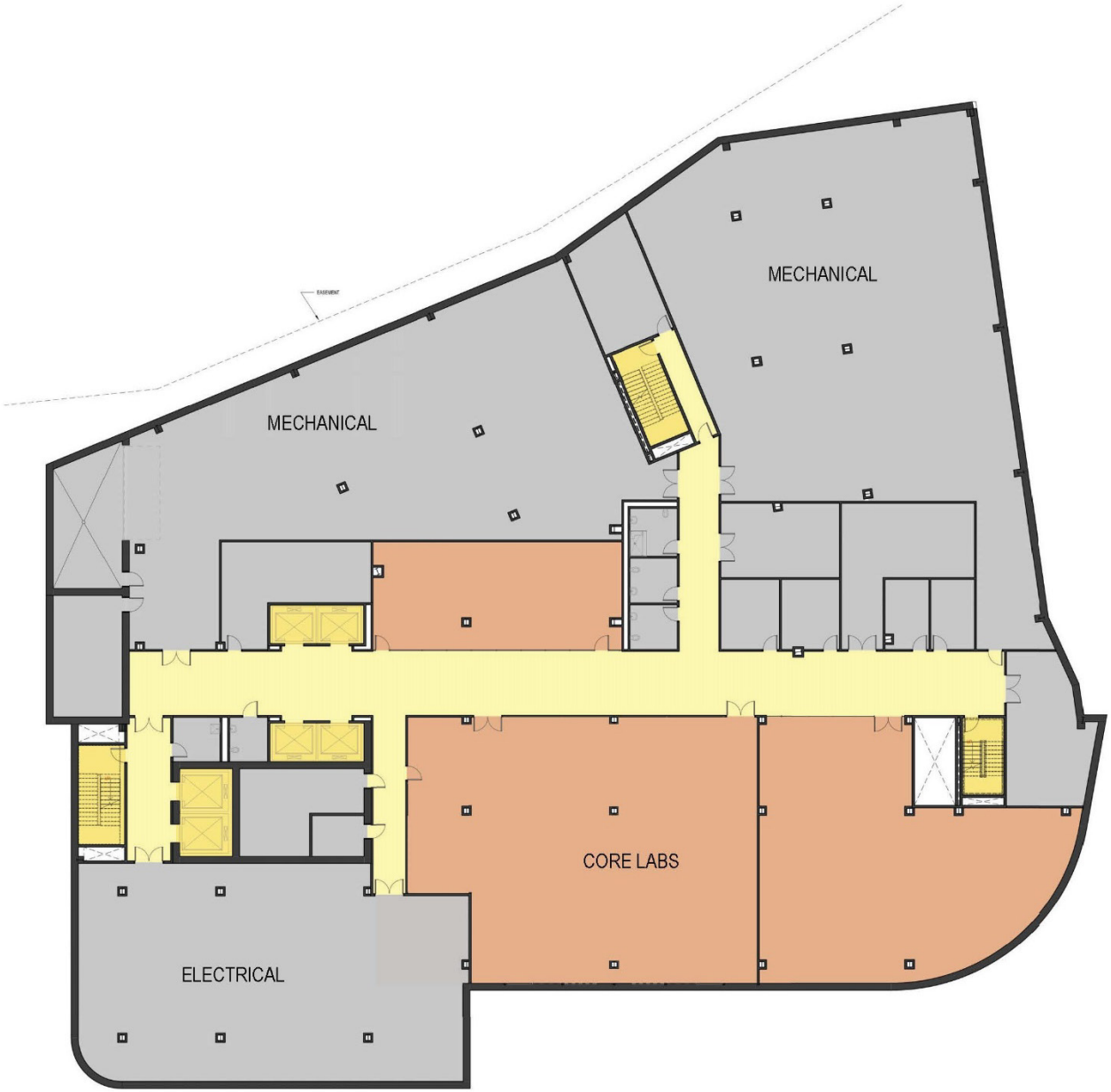
The MHC has review authority over projects requiring state funding, licensing, permitting and/or approvals that may have direct or indirect impacts to properties listed in the State Register of Historic Places. It is anticipated that a state permit will be required for the Project. The MHC review process will be initiated through the filing of an MHC Project Notification Form as prescribed in MHC's governing regulations.

5.4 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 BPDA as part of the Article 80 process.

Appendix A

Floor Plans and Section


MECHANICAL
MECHANICAL
CORE LABS
ELECTRICAL

EXP Boston, Massachusetts

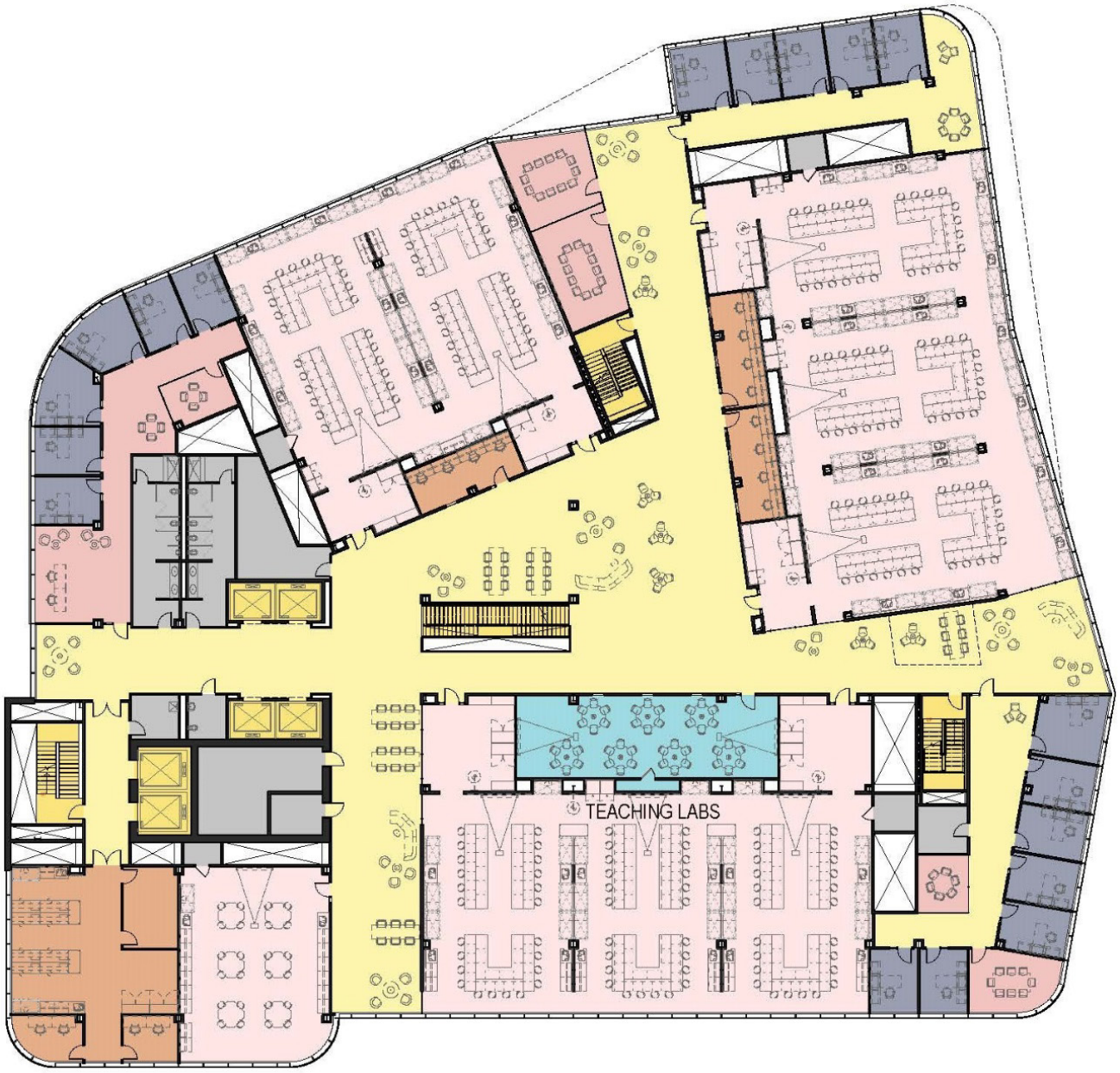
PAYETTE

Level 1 Plan

EXP Boston, Massachusetts

PAYETTE

Level 2 Plan



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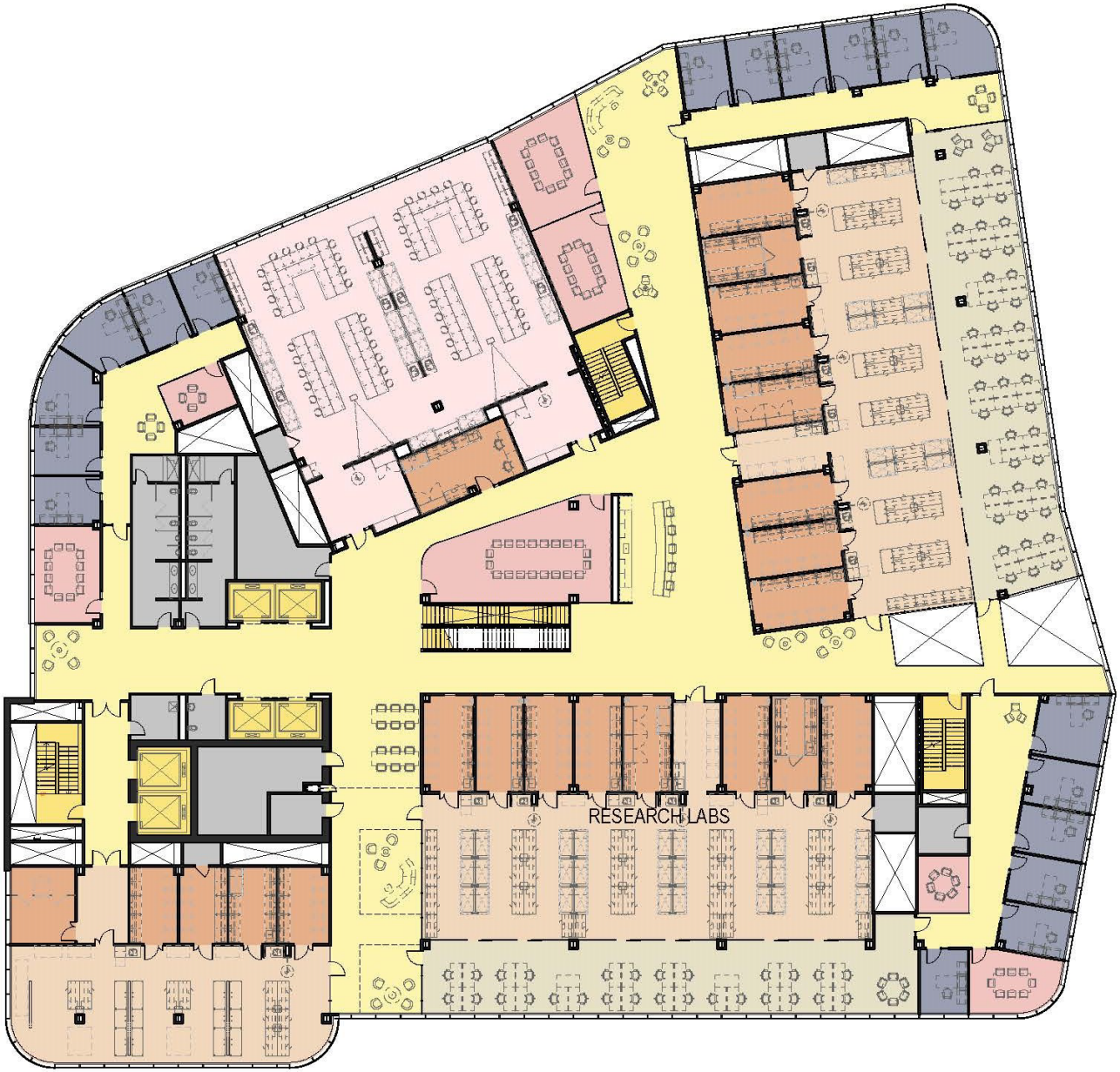
Level 3 Plan



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Level 4 Plan

EXP Boston, Massachusetts

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Level 5 Plan

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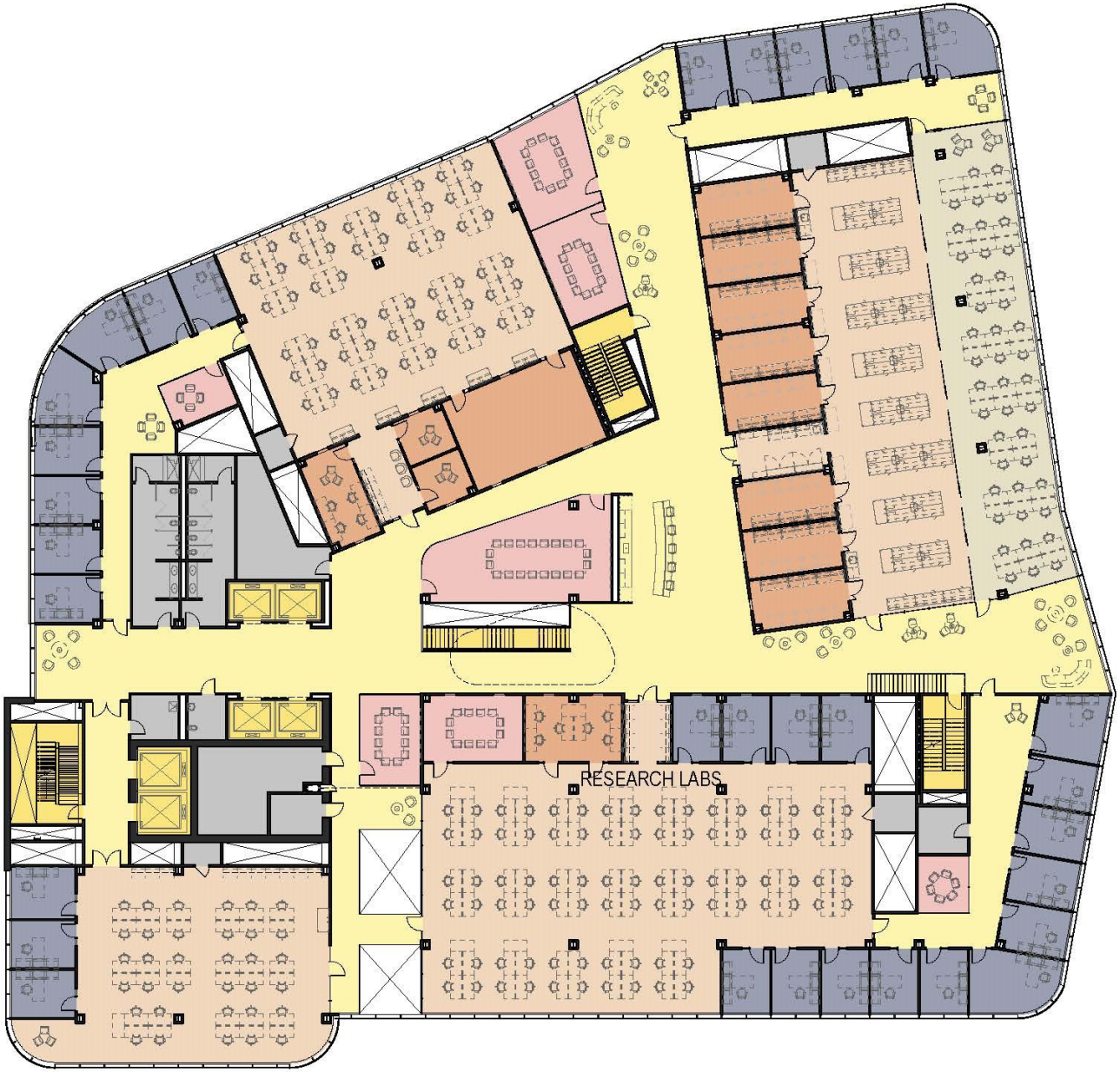
Level 6 Plan



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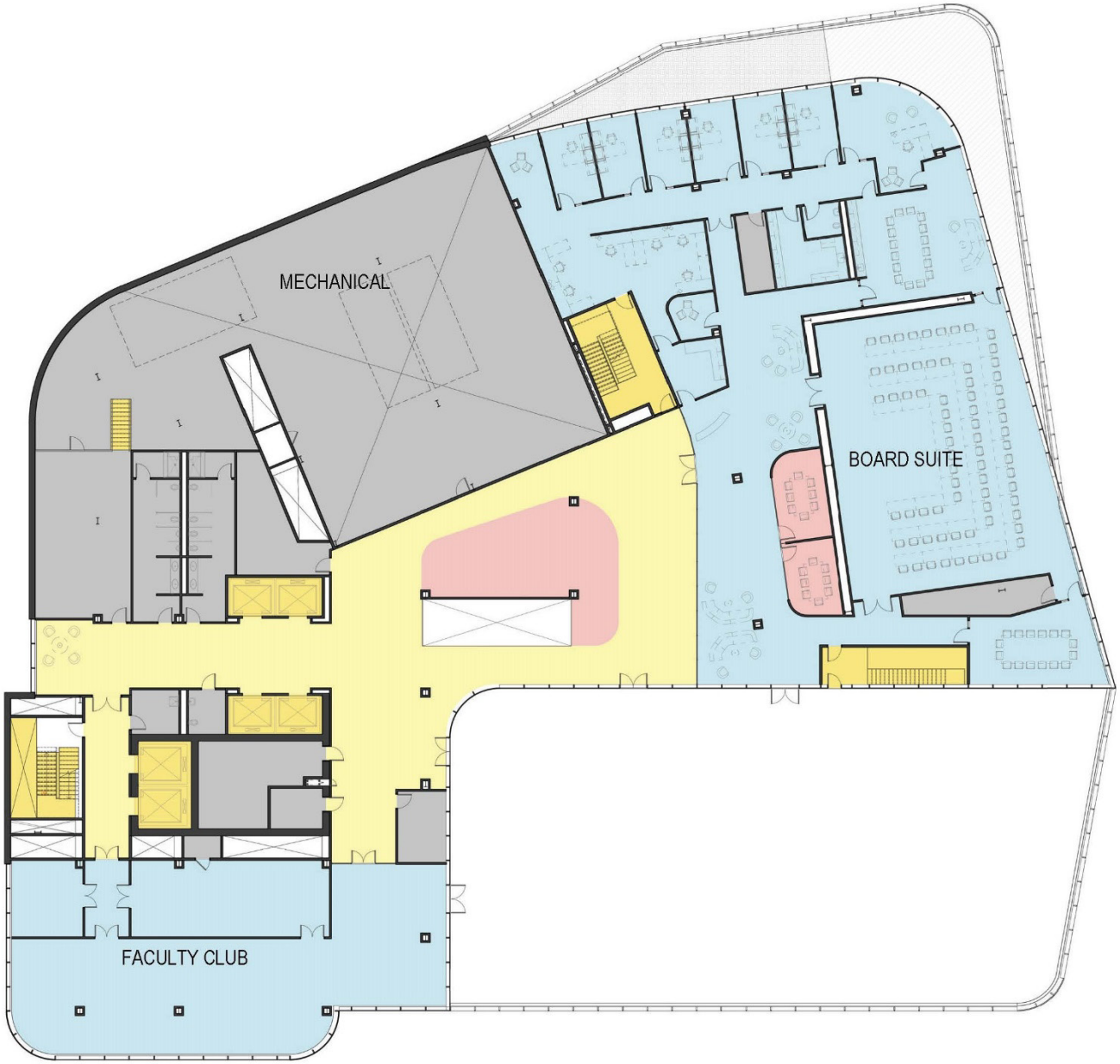
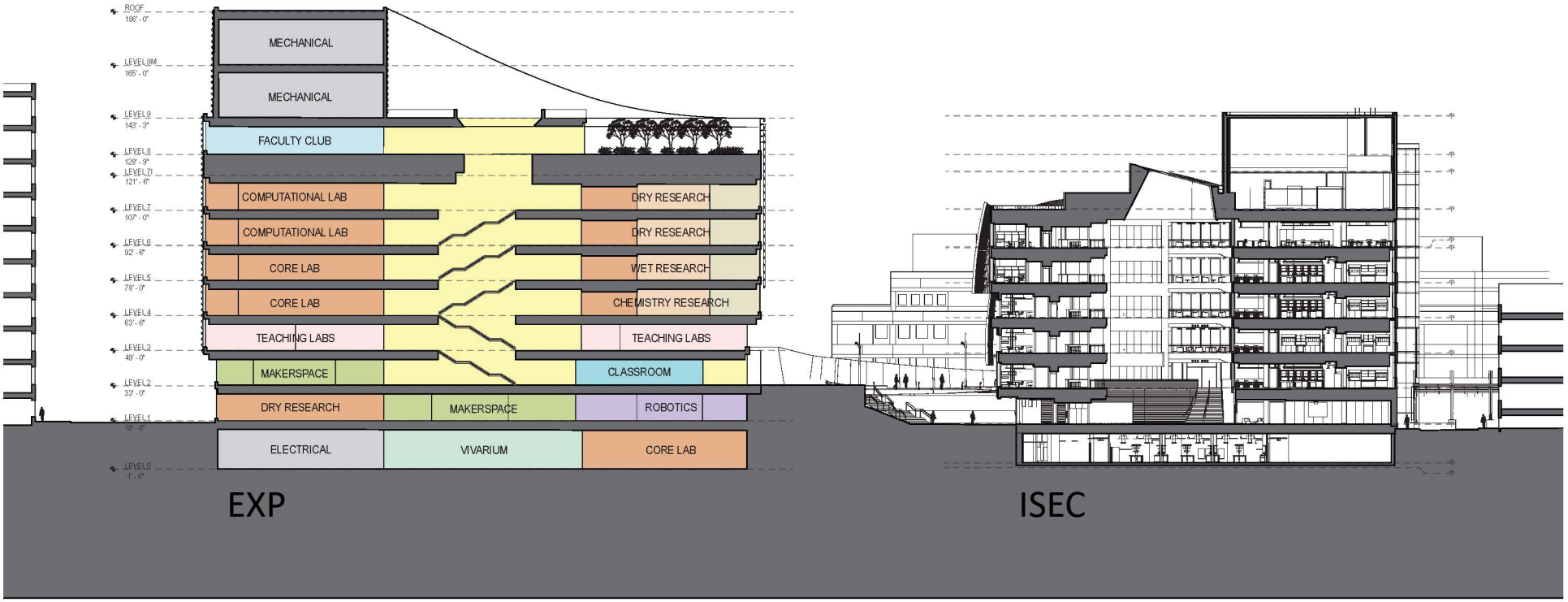
Level 7 Plan


MECHANICAL
BOARD SUITE
FACULTY CLUB



EXP Boston, Massachusetts

PAYETTE

Section

Appendix B

Site Survey

LEGEND

- CATCH BASIN
- DRAIN MANHOLE
- ELECTRIC MANHOLE
- MISCELLANEOUS MANHOLE
- SEWER MANHOLE
- WSO — WATER SHUT-OFF
- GG — GAS GATE
- WG — WATER GATE
- ICV — IRRIGATION CONTROL VALVE
- CLEANOUT — CLEANOUT
- FIRE HYDRANT
- DS — DOWN SPOUT
- UP — UTILITY POLE
- LIGHT POLE
- HH — HAND HOLE
- TC — TRASH CAN
- ECB — ELECTRIC CONTROL BOX
- P — POST
- B — BOLLARD
- S — SIGN POST
- TMA — TRAFFIC MAST ARM
- TRSG — TRAFFIC SIGNAL
- 12" — DECIDUOUS TREE WITH TRUNK DIAMETER
- 17x88 — SPOT ELEVATION
- CLF — CHAIN LINK FENCE
- JB — JERSEY BARRIER
- BB — BITUMINOUS CONCRETE BERM
- VGC — VERTICAL GRANITE CURB
- CC — CONCRETE CURB
- WCR — WHEELCHAIR RAMP
- M/L — MULCH AND/OR LANDSCAPE
- R= — RIM ELEVATION EQUALS
- I= — INVERT ELEVATION EQUALS
- TH= — TOP OF HOOD ELEVATION EQUALS
- NPV — NO PIPES VISIBLE
- TOW= — TOP OF WATER
- FOD — FULL OF DEBRIS
- ULD — UNDERGROUND LOOP DETECTOR
- DWP — DETECTABLE WARNING PANEL
- D — UNDERGROUND DRAIN LINE
- E — UNDERGROUND ELECTRIC LINE
- G — UNDERGROUND GAS LINE
- S — UNDERGROUND SEWER LINE
- TR — UNDERGROUND TRAFFIC LINE
- W — UNDERGROUND WATER LINE
- MONITORING WELL
- BENCH MARK

UTILITY INFORMATION STATEMENT

1. THE SUB-SURFACE UTILITY INFORMATION SHOWN HEREON IS COMPILED BASED ON FIELD SURVEY INFORMATION, RECORD INFORMATION AS SUPPLIED BY THE APPROPRIATE UTILITY COMPANIES, AND PLAN INFORMATION SUPPLIED BY THE CLIENT, IF ANY; THEREFORE WE CANNOT GUARANTEE THE ACCURACY OF SAID COMPILED SUB-SURFACE INFORMATION TO ANY CERTAIN DEGREE OF STATED TOLERANCE. ONLY PHYSICALLY LOCATED SUB-SURFACE UTILITY FEATURES FALL WITHIN NORMAL STANDARD OF CARE ACCURACIES.

2. THE LOCATIONS OF UNDERGROUND PIPES, CONDUITS, AND STRUCTURES HAVE BEEN DETERMINED FROM SAID INFORMATION, AND ARE APPROXIMATE ONLY. COMPILED LOCATIONS OF ANY UNDERGROUND STRUCTURES, NOT VISIBLY OBSERVED AND LOCATED, CAN VARY FROM THEIR ACTUAL LOCATIONS.

3. ADDITIONAL BURIED UTILITIES/STRUCTURES MAY BE ENCOUNTERED.

4. THE STATUS OF UTILITIES, WHETHER ACTIVE, ABANDONED, OR REMOVED, IS AN UNKNOWN CONDITION AS FAR AS OUR COMPILATION OF THIS INFORMATION.

5. IT IS INCUMBENT UPON INDIVIDUALS USING THIS INFORMATION TO UNDERSTAND THAT COMPILING UTILITY INFORMATION IS NOT EXACT, AND IS SUBJECT TO CHANGE BASED UPON VARYING PLAN INFORMATION RECEIVED AND ACTUAL LOCATIONS.

6. THE ACCURACY OF MEASURED UTILITY INVERTS AND PIPE SIZES IS SUBJECT TO FIELD CONDITIONS, THE ABILITY TO MAKE VISUAL OBSERVATIONS, DIRECT ACCESS TO THE VARIOUS ELEMENTS AND OTHER MATTERS.

7. THE PROPER UTILITY ENGINEERING/COMPANY SHOULD BE CONSULTED AND THE ACTUAL LOCATIONS OF SUBSURFACE STRUCTURES SHOULD BE VERIFIED IN THE FIELD (V.I.F.) BEFORE PLANNING FUTURE CONNECTIONS. CONTACT THE DIG SAFE CALL CENTER AT 1-888-344-7233, SEVENTY-TWO HOURS PRIOR TO EXCAVATION, BLASTING, GRADING, AND/OR PAVING.

8. AS OF THE DATE OF THIS PLAN RECORD INFORMATION HAS NOT BEEN RECEIVED BY NITSCH ENGINEERING FOR THE FOLLOWING UTILITIES: TRAFFIC (BOSTON TRAFFIC LIGHTING), CABLE (RCN, AT&T, CROWN CASTLE, EVERSOURCE FIBER, CENTURYLINK), FIRE ALARM (BOSTON FIRE ALARM), RAILROAD (PANAM, CSX TRANS, AMTRAK).

NOTES

1. THIS DOCUMENT IS AN INSTRUMENT OF SERVICE OF NITSCH ENGINEERING. IT IS ISSUED TO NORTHEASTERN UNIVERSITY FOR PURPOSES RELATED DIRECTLY AND SOLELY TO NITSCH ENGINEERING'S SCOPE OF SERVICES UNDER CONTRACT WITH NORTHEASTERN UNIVERSITY FOR 805 COLUMBUS AVENUE. ANY USE OR REUSE OF THIS DOCUMENT FOR ANY REASON BY ANY PARTY FOR PURPOSES UNRELATED DIRECTLY AND SOLELY TO SAID CONTRACT AND PROJECT SHALL BE AT THE USER'S SOLE AND EXCLUSIVE RISK AND LIABILITY, INCLUDING LIABILITY FOR VIOLATION OF COPYRIGHT LAWS, UNLESS WRITTEN AUTHORIZATION IS GIVEN THEREFOR BY NITSCH ENGINEERING.

2. THE PURPOSE OF THIS PLAN IS TO SHOW EXISTING CONDITIONS AS THE RESULT OF AN ON-THE-GROUND INSTRUMENT SURVEY WHICH OCCURRED JANUARY 16, 2019, JANUARY 18, 2019, JANUARY 23, 2019, JANUARY 25-26, 2019 AND JANUARY 30, 2019.

3. HORIZONTAL BEARINGS REFER TO MASSACHUSETTS STATE PLANE COORDINATE SYSTEM (NAD83) BASED ON GPS OBSERVATIONS.

4. ELEVATION REFERS TO BOSTON CITY BASE (BCB) VERTICAL BASED ON GPS OBSERVATIONS.

5. THE SITE FALLS WITHIN THE AREA DESIGNATED ZONE X DEFINED AS AREAS OF 0.2% ANNUAL CHANCE FLOOD, AS SHOWN ON FEMA FLOOD INSURANCE RATE MAP NUMBER 25025C0079J HAVING AN EFFECTIVE DATE OF MARCH 16, 2016.

6. THE INFORMATION CONTAINED ON THE DISK OR ELECTRONIC DRAWING FILE ACCOMPANYING THIS PLAN MUST BE COMPARED TO THE SEALED AND SIGNED HARD COPY OF THE PLAN TO ENSURE THE ACCURACY OF ALL INFORMATION AND TO ENSURE NO CHANGES, ALTERATIONS, OR MODIFICATIONS HAVE BEEN MADE. RELIANCE SHALL NOT BE MADE ON A DOCUMENT TRANSMITTED BY COMPUTER OR OTHER ELECTRONIC MEANS UNLESS FIRST COMPARED TO THE ORIGINAL SEALED DOCUMENT ISSUED AT THE TIME OF THE SURVEY. DUE TO THE CRITICAL NATURE OF SURVEYING, DATA ACQUISITION, AND AUTOCAD PLAN DEVELOPMENT, IF CRITICAL DIMENSIONAL INFORMATION IS NEEDED AND IS NOT SPECIFICALLY SHOWN ON THE ELECTRONIC DRAWING FILE, PLEASE CONTACT NITSCH ENGINEERING.

7. MBTA PLATFORM EASEMENT DRAFTED ACCORDINGLY TO DESCRIPTION PROVIDED, MAY BE ADDITIONAL DELINEATION NOT SHOWN.

8. MBTA EASTERN PATHWAY EASEMENT DRAFTED ACCORDINGLY TO DESCRIPTION PROVIDED, MAY BE ADDITIONAL DELINEATION NOT SHOWN.

COMMONWEALTH OF MASSACHUSETTS — DENIS R. SEGUIN — 37058 — REGISTERED LAND SURVEYOR

Denis Seguin 3/19/19

DENIS R. SEGUIN, PLS — DATE
MASSACHUSETTS REG. No. 37058
REGISTERED PROFESSIONAL LAND SURVEYOR

PROPERTY REFERENCES

SUFFOLK REGISTRY OF DEEDS

DEEDS:

BOOK 12045 PAGE 304
BOOK 12045 PAGE 314
BOOK 21899 PAGE 307

PLANS:

PLAN BOOK 12045 PAGE 304
PLAN BOOK 12045 PAGE 345
PLAN BOOK 13028 PAGE END
PLAN BOOK 17669 PAGE 234
PLAN BOOK 2018 PAGE 142

BOSTON L PLANS:

L-2681
L-2682
L-2683
L-10950
L-10960
L-11048
L-11596

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EXISTING CONDITIONS

805 COLUMBUS AVE
NORTHEASTERN UNIVERSITY
BOSTON, MASSACHUSETTS

PREPARED FOR:
NORTHEASTERN UNIVERSITY
360 HUNTINGTON AVENUE, BOSTON, MA 02115

REV.	COMMENTS	DATE
	REVISIONS	

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Appendix C

Transportation

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 1
Location:	Ruggles Station, MA
Street 1:	Ruggles Street
Street 2:	Leon Street
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

BOSTON TRAFFIC DATA
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TOTAL (CARS & TRUCKS)

	Leon Street Northbound				Leon Street Southbound				Ruggles Street Eastbound				Ruggles Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	0	0	0	7	0	3	0	3	116	0	0	0	147	1
7:15 AM	0	0	0	0	0	6	0	4	0	3	126	0	0	0	153	3
7:30 AM	0	0	0	0	0	9	0	4	0	4	131	0	0	0	167	2
7:45 AM	0	0	0	0	0	10	0	5	0	5	130	0	0	0	166	4
8:00 AM	0	0	0	0	0	11	0	6	0	3	121	0	0	0	179	3
8:15 AM	0	0	0	0	0	12	0	4	0	4	114	0	0	0	171	3
8:30 AM	0	0	0	0	0	10	0	5	0	3	115	0	0	0	160	2
8:45 AM	0	0	0	0	0	8	0	4	0	3	114	0	0	0	154	2

	Leon Street Northbound				Leon Street Southbound				Ruggles Street Eastbound				Ruggles Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
11:00 AM	0	0	0	0	0	8	0	8	0	2	104	0	0	0	119	3
11:15 AM	0	0	0	0	0	9	0	7	0	3	108	0	0	0	127	2
11:30 AM	0	0	0	0	0	11	0	8	0	3	116	0	0	0	108	4
11:45 AM	0	0	0	0	0	13	0	9	0	2	119	0	0	0	126	3
12:00 PM	0	0	0	0	0	15	0	10	0	3	120	0	0	0	129	3
12:15 PM	0	0	0	0	0	17	0	8	0	1	121	0	0	0	121	5
12:30 PM	0	0	0	0	0	16	0	9	0	2	119	0	0	0	122	3
12:45 PM	0	0	0	0	0	15	0	7	0	2	113	0	0	0	117	2

	Leon Street Northbound				Leon Street Southbound				Ruggles Street Eastbound				Ruggles Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	0	0	0	43	0	12	0	3	102	0	0	0	132	2
4:15 PM	0	0	0	0	0	47	0	14	0	2	107	0	0	0	130	2
4:30 PM	0	0	0	0	0	50	0	16	0	2	106	0	0	0	124	3
4:45 PM	0	0	0	0	0	51	0	19	0	3	112	0	0	0	131	2
5:00 PM	0	0	0	0	0	52	0	22	0	2	121	0	0	0	123	2
5:15 PM	0	0	0	0	0	54	0	24	0	3	112	0	0	0	112	1
5:30 PM	0	0	0	0	0	51	0	20	0	2	115	0	0	0	110	2
5:45 PM	0	0	0	0	0	50	0	21	0	2	106	0	0	0	109	1

AM PEAK HOUR 7:30 AM to 8:30 AM	Leon Street Northbound				Leon Street Southbound				Ruggles Street Eastbound				Ruggles Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**42**	**0**	**19**	**0**	**16**	**496**	**0**	**0**	**0**	**683**	**12**
PHF	**0.00**				**0.90**				**0.95**				**0.95**			
HV %	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**2.6%**	**0.0%**	**0.0%**	**0.0%**	**2.8%**	**0.0%**

MID PEAK HOUR 11:45 AM to 12:45 PM	Leon Street Northbound				Leon Street Southbound				Ruggles Street Eastbound				Ruggles Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**61**	**0**	**36**	**0**	**8**	**479**	**0**	**0**	**0**	**498**	**14**
PHF	**0.00**				**0.97**				**0.99**				**0.97**			
HV %	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**2.3%**	**0.0%**	**0.0%**	**0.0%**	**2.0%**	**0.0%**

PM PEAK HOUR 4:30 PM to 5:30 PM	Leon Street Northbound				Leon Street Southbound				Ruggles Street Eastbound				Ruggles Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**207**	**0**	**81**	**0**	**10**	**451**	**0**	**0**	**0**	**490**	**8**
PHF	**0.00**				**0.92**				**0.94**				**0.94**			
HV %	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**1.3%**	**0.0%**	**0.0%**	**0.0%**	**1.4%**	**0.0%**

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 1
Location:	Ruggles Station, MA
Street 1:	Ruggles Street
Street 2:	Leon Street
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

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TRUCKS

	Northbound				Leon Street Southbound				Ruggles Street Eastbound				Ruggles Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	5	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	4	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	5	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	5	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	5	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	4	0

	Northbound				Leon Street Southbound				Ruggles Street Eastbound				Ruggles Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
11:00 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0
11:15 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	3	0
11:30 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	4	0
11:45 AM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	2	0
12:00 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	3	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	2	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0

	Northbound				Leon Street Southbound				Ruggles Street Eastbound				Ruggles Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	2	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0

AM PEAK HOUR	Northbound				Leon Street Southbound				Ruggles Street Eastbound				Ruggles Street Westbound			
7:45 AM																
to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
8:45 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**14**	**0**	**0**	**0**	**19**	**0**
PHF	**0.00**				**0.00**				**0.88**				**0.95**			

MID PEAK HOUR	Northbound				Leon Street Southbound				Ruggles Street Eastbound				Ruggles Street Westbound			
11:45 AM																
to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
12:45 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**11**	**0**	**0**	**0**	**10**	**0**
PHF	**0.00**				**0.00**				**0.92**				**0.83**			

PM PEAK HOUR	Northbound				Leon Street Southbound				Ruggles Street Eastbound				Ruggles Street Westbound			
4:15 PM																
to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
5:15 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**8**	**0**	**0**	**0**	**7**	**0**
PHF	**0.00**				**0.00**				**0.67**				**0.88**			

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 1
Location:	Ruggles Station, MA
Street 1:	Ruggles Street
Street 2:	Leon Street
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

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PEDESTRIANS & BICYCLES

	Leon Street Northbound					Leon Street Southbound					Ruggles Street Eastbound					Ruggles Street Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
7:00 AM	0	0	0	0		0	0	0	43		0	0	0	6		0	3	0	3	
7:15 AM	0	0	0	0		1	0	0	47		0	1	0	9		0	2	0	3	
7:30 AM	0	0	0	0		0	0	0	45		0	0	0	7		0	3	0	4	
7:45 AM	0	0	0	0		0	0	0	46		0	0	0	8		0	3	0	5	
8:00 AM	0	0	0	0		0	0	0	49		0	1	0	7		0	2	0	3	
8:15 AM	0	0	0	0		0	0	0	45		0	0	0	8		0	5	0	4	
8:30 AM	0	0	0	0		0	0	0	42		0	0	0	6		0	4	0	5	
8:45 AM	0	0	0	0		0	0	0	40		0	0	0	7		0	2	0	3	

	Leon Street Northbound					Leon Street Southbound					Ruggles Street Eastbound					Ruggles Street Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
11:00 AM	0	0	0	0		0	0	0	17		0	0	0	6		0	2	0	4	
11:15 AM	0	0	0	0		0	0	0	19		0	0	0	5		0	1	1	3	
11:30 AM	0	0	0	0		0	0	0	20		0	1	0	7		0	2	0	4	
11:45 AM	0	0	0	0		0	0	0	22		0	0	0	9		0	2	0	3	
12:00 PM	0	0	0	0		0	0	0	21		0	0	0	12		0	2	0	5	
12:15 PM	0	0	0	0		0	0	0	23		0	0	0	15		0	1	0	3	
12:30 PM	0	0	0	0		0	0	0	20		0	1	0	14		0	2	0	7	
12:45 PM	0	0	0	0		0	0	0	22		0	0	0	16		0	1	0	6	

	Leon Street Northbound					Leon Street Southbound					Ruggles Street Eastbound					Ruggles Street Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
4:00 PM	0	0	0	0		0	0	0	63		0	1	0	22		0	1	0	5	
4:15 PM	0	0	0	0		0	0	0	68		0	0	0	13		0	2	0	4	
4:30 PM	0	0	0	0		0	0	0	65		0	1	0	16		0	1	0	6	
4:45 PM	0	0	0	0		0	0	0	70		0	0	0	15		0	2	0	7	
5:00 PM	0	0	0	0		0	0	0	68		0	1	0	17		0	1	0	9	
5:15 PM	0	0	0	0		0	0	0	67		0	0	0	14		0	2	0	8	
5:30 PM	0	0	0	0		0	0	0	64		0	0	0	16		0	1	0	10	
5:45 PM	0	0	0	0		0	0	0	61		0	0	0	15		0	1	0	8	

AM PEAK HOUR	Leon Street Northbound					Leon Street Southbound					Ruggles Street Eastbound					Ruggles Street Westbound				
7:30 AM																				
to	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
8:30 AM	0	0	0	0		0	0	0	185		0	1	0	30		0	13	0	16	

MID PEAK HOUR	Leon Street Northbound					Leon Street Southbound					Ruggles Street Eastbound					Ruggles Street Westbound				
11:45 AM																				
to	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
12:45 PM	0	0	0	0		0	0	0	86		0	1	0	50		0	7	0	18	

PM PEAK HOUR	Leon Street Northbound					Leon Street Southbound					Ruggles Street Eastbound					Ruggles Street Westbound				
4:30 PM																				
to	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
5:30 PM	0	0	0	0		0	0	0	270		0	2	0	62		0	6	0	30	

NOTE: Peak hour summaries here correspond to peak hours identified for passenger car and heavy vehicles combined.

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 2
Location:	Ruggles Station, MA
Street 1:	Ruggles Street
Street 2:	Ruggles Upper Busway
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

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TOTAL (CARS & TRUCKS)

	Ruggles Upper Busway Southbound								Ruggles Street Eastbound				Ruggles Street Westbound			
	Northbound															
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	0	0	0	0	0	0	0	4	119	0	0	0	148	10
7:15 AM	0	0	0	0	0	0	0	0	0	5	127	0	0	0	156	13
7:30 AM	0	0	0	0	0	0	0	0	0	5	135	0	0	0	169	12
7:45 AM	0	0	0	0	0	0	0	0	0	6	134	0	0	0	170	11
8:00 AM	0	0	0	0	0	0	0	0	0	4	128	0	0	0	182	9
8:15 AM	0	0	0	0	0	0	0	0	0	4	122	0	0	0	174	8
8:30 AM	0	0	0	0	0	0	0	0	0	5	120	0	0	0	162	9
8:45 AM	0	0	0	0	0	0	0	0	0	4	118	0	0	0	156	7

	Ruggles Upper Busway Southbound								Ruggles Street Eastbound				Ruggles Street Westbound			
	Northbound															
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
11:00 AM	0	0	0	0	0	0	0	0	0	3	109	0	0	0	122	8
11:15 AM	0	0	0	0	0	0	0	0	0	2	115	0	0	0	129	9
11:30 AM	0	0	0	0	0	0	0	0	0	4	123	0	0	0	112	7
11:45 AM	0	0	0	0	0	0	0	0	0	3	129	0	0	0	129	8
12:00 PM	0	0	0	0	0	0	0	0	0	3	132	0	0	0	132	7
12:15 PM	0	0	0	0	0	0	0	0	0	2	136	0	0	0	126	7
12:30 PM	0	0	0	0	0	0	0	0	0	3	132	0	0	0	125	8
12:45 PM	0	0	0	0	0	0	0	0	0	2	126	0	0	0	119	6

	Ruggles Upper Busway Southbound								Ruggles Street Eastbound				Ruggles Street Westbound			
	Northbound															
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	0	0	0	0	0	0	0	3	142	0	0	0	134	7
4:15 PM	0	0	0	0	0	0	0	0	0	3	151	0	0	0	132	9
4:30 PM	0	0	0	0	0	0	0	0	0	4	152	0	0	0	127	10
4:45 PM	0	0	0	0	0	0	0	0	0	3	160	0	0	0	133	11
5:00 PM	0	0	0	0	0	0	0	0	0	4	169	0	0	0	125	12
5:15 PM	0	0	0	0	0	0	0	0	0	4	162	0	0	0	113	14
5:30 PM	0	0	0	0	0	0	0	0	0	3	163	0	0	0	112	13
5:45 PM	0	0	0	0	0	0	0	0	0	3	153	0	0	0	110	11

AM PEAK HOUR	Ruggles Upper Busway Southbound								Ruggles Street Eastbound				Ruggles Street Westbound			
7:30 AM	Northbound															
to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
8:30 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**19**	**519**	**0**	**0**	**0**	**695**	**40**
PHF	**0.00**				**0.00**				**0.96**				**0.96**			
HV %	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**2.5%**	**0.0%**	**0.0%**	**0.0%**	**2.7%**	**0.0%**

MID PEAK HOUR	Ruggles Upper Busway Southbound								Ruggles Street Eastbound				Ruggles Street Westbound			
11:45 AM	Northbound															
to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
12:45 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**11**	**529**	**0**	**0**	**0**	**512**	**30**
PHF	**0.00**				**0.00**				**0.98**				**0.97**			
HV %	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**2.1%**	**0.0%**	**0.0%**	**0.0%**	**2.0%**	**0.0%**

PM PEAK HOUR	Ruggles Upper Busway Southbound								Ruggles Street Eastbound				Ruggles Street Westbound			
4:15 PM	Northbound															
to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
5:15 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**14**	**632**	**0**	**0**	**0**	**517**	**42**
PHF	**0.00**				**0.00**				**0.93**				**0.97**			
HV %	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**1.3%**	**0.0%**	**0.0%**	**0.0%**	**1.4%**	**0.0%**

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 2
Location:	Ruggles Station, MA
Street 1:	Ruggles Street
Street 2:	Ruggles Upper Busway
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

BOSTON TRAFFIC DATA
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TRUCKS

	Northbound				Ruggles Upper Busway Southbound				Ruggles Street Eastbound				Ruggles Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	5	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	4	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	5	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	5	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	5	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	4	0

	Northbound				Ruggles Upper Busway Southbound				Ruggles Street Eastbound				Ruggles Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
11:00 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0
11:15 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	3	0
11:30 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	4	0
11:45 AM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	2	0
12:00 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	3	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	2	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0

	Northbound				Ruggles Upper Busway Southbound				Ruggles Street Eastbound				Ruggles Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	2	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0

AM PEAK HOUR	Northbound				Ruggles Upper Busway Southbound				Ruggles Street Eastbound				Ruggles Street Westbound			
7:45 AM																
to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
8:45 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**14**	**0**	**0**	**0**	**19**	**0**
PHF	**0.00**				**0.00**				**0.88**				**0.95**			

MID PEAK HOUR	Northbound				Ruggles Upper Busway Southbound				Ruggles Street Eastbound				Ruggles Street Westbound			
11:45 AM																
to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
12:45 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**11**	**0**	**0**	**0**	**10**	**0**
PHF	**0.00**				**0.00**				**0.92**				**0.83**			

PM PEAK HOUR	Northbound				Ruggles Upper Busway Southbound				Ruggles Street Eastbound				Ruggles Street Westbound			
4:15 PM																
to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
5:15 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**8**	**0**	**0**	**0**	**7**	**0**
PHF	**0.00**				**0.00**				**0.67**				**0.88**			

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 2
Location:	Ruggles Station, MA
Street 1:	Ruggles Street
Street 2:	Ruggles Upper Busway
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

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PEDESTRIANS & BICYCLES

	Northbound				Ruggles Upper Busway Southbound				Ruggles Street Eastbound				Ruggles Street Westbound			
Start Time	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED
7:00 AM	0	0	0	0	0	0	0	7	0	0	0	9	0	2	0	2
7:15 AM	0	0	0	0	0	0	0	10	0	1	0	10	0	2	0	5
7:30 AM	0	0	0	0	0	0	0	9	0	0	0	12	0	3	0	1
7:45 AM	0	0	0	0	0	0	0	11	0	0	0	11	0	2	0	2
8:00 AM	0	0	0	0	0	0	0	8	0	1	0	10	0	3	0	2
8:15 AM	0	0	0	0	0	0	0	9	0	0	0	11	0	5	1	1
8:30 AM	0	0	0	0	0	0	0	10	0	0	0	9	0	4	0	1
8:45 AM	0	0	0	0	0	0	0	8	0	0	0	12	0	2	0	0

	Northbound				Ruggles Upper Busway Southbound				Ruggles Street Eastbound				Ruggles Street Westbound			
Start Time	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED
11:00 AM	0	0	0	0	0	0	0	6	0	0	0	11	0	2	0	1
11:15 AM	0	0	0	0	0	0	1	7	0	0	0	12	0	1	0	2
11:30 AM	0	0	0	0	0	0	0	8	0	1	0	10	0	2	0	0
11:45 AM	0	0	0	0	0	0	0	7	0	0	0	8	0	3	0	1
12:00 PM	0	0	0	0	0	0	0	8	0	0	0	6	0	1	0	1
12:15 PM	0	0	0	0	0	0	0	6	0	0	0	7	0	2	0	2
12:30 PM	0	0	0	0	0	0	0	9	0	1	0	8	0	2	0	1
12:45 PM	0	0	0	0	0	0	0	5	0	0	0	7	0	1	0	0

	Northbound				Ruggles Upper Busway Southbound				Ruggles Street Eastbound				Ruggles Street Westbound			
Start Time	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED
4:00 PM	0	0	0	0	0	0	0	12	0	0	0	17	0	1	0	1
4:15 PM	0	0	0	0	0	0	0	11	0	1	0	20	0	2	0	1
4:30 PM	0	0	0	0	0	0	0	10	0	1	0	15	0	1	0	2
4:45 PM	0	0	0	0	0	0	0	9	0	0	0	12	0	1	0	1
5:00 PM	0	0	0	0	0	0	0	12	0	1	0	10	0	2	0	0
5:15 PM	0	0	0	0	0	0	0	10	0	0	0	6	0	2	0	1
5:30 PM	0	0	0	0	0	0	0	11	0	0	0	7	0	1	0	1
5:45 PM	0	0	0	0	0	0	0	8	0	0	0	8	0	1	0	0

AM PEAK HOUR 7:30 AM to 8:30 AM	Northbound				Ruggles Upper Busway Southbound				Ruggles Street Eastbound				Ruggles Street Westbound			
	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED
	0	0	0	0	0	0	0	37	0	1	0	44	0	13	1	6

MID PEAK HOUR 11:45 AM to 12:45 PM	Northbound				Ruggles Upper Busway Southbound				Ruggles Street Eastbound				Ruggles Street Westbound			
	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED
	0	0	0	0	0	0	0	30	0	1	0	29	0	8	0	5

PM PEAK HOUR 4:15 PM to 5:15 PM	Northbound				Ruggles Upper Busway Southbound				Ruggles Street Eastbound				Ruggles Street Westbound			
	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED
	0	0	0	0	0	0	0	42	0	3	0	57	0	6	0	4

NOTE: Peak hour summaries here correspond to peak hours identified for passenger car and heavy vehicles combined.

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 3
Location:	Ruggles Station, MA
Street 1:	Ruggles Street
Street 2:	Ruggles Lower Busway
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

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TOTAL (CARS & TRUCKS)

	Ruggles Lower Busway Southbound				Ruggles Street Eastbound				Ruggles Street Westbound				Northbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	17	0	7	0	0	119	0	0	0	151	0	0	0	0	0
7:15 AM	0	16	0	6	0	0	127	0	0	0	163	0	0	0	0	0
7:30 AM	0	15	0	7	0	0	135	0	0	0	174	0	0	0	0	0
7:45 AM	0	17	0	6	0	0	134	0	0	0	175	0	0	0	0	0
8:00 AM	0	21	0	4	0	0	128	0	0	0	187	0	0	0	0	0
8:15 AM	0	19	0	5	0	0	122	0	0	0	177	0	0	0	0	0
8:30 AM	0	18	0	3	0	0	120	0	0	0	168	0	0	0	0	0
8:45 AM	0	16	0	4	0	0	118	0	0	0	159	0	0	0	0	0

	Ruggles Lower Busway Southbound				Ruggles Street Eastbound				Ruggles Street Westbound				Northbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
11:00 AM	0	13	0	5	0	0	109	0	0	0	125	0	0	0	0	0
11:15 AM	0	11	0	7	0	0	115	0	0	0	131	0	0	0	0	0
11:30 AM	0	12	0	6	0	0	123	0	0	0	113	0	0	0	0	0
11:45 AM	0	13	0	7	0	0	129	0	0	0	130	0	0	0	0	0
12:00 PM	0	12	0	8	0	0	132	0	0	0	131	0	0	0	0	0
12:15 PM	0	10	0	6	0	0	136	0	0	0	127	0	0	0	0	0
12:30 PM	0	11	0	7	0	0	132	0	0	0	126	0	0	0	0	0
12:45 PM	0	10	0	6	0	0	126	0	0	0	120	0	0	0	0	0

	Ruggles Lower Busway Southbound				Ruggles Street Eastbound				Ruggles Street Westbound				Northbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	12	0	8	0	0	142	0	0	0	133	0	0	0	0	0
4:15 PM	0	11	0	7	0	0	151	0	0	0	134	0	0	0	0	0
4:30 PM	0	10	0	7	0	0	152	0	0	0	130	0	0	0	0	0
4:45 PM	0	11	0	8	0	0	160	0	0	0	136	0	0	0	0	0
5:00 PM	0	8	0	6	0	0	169	0	0	0	131	0	0	0	0	0
5:15 PM	0	9	0	7	0	0	162	0	0	0	120	0	0	0	0	0
5:30 PM	0	7	0	5	0	0	163	0	0	0	121	0	0	0	0	0
5:45 PM	0	6	0	5	0	0	153	0	0	0	116	0	0	0	0	0

AM PEAK HOUR	Ruggles Lower Busway Southbound				Ruggles Street Eastbound				Ruggles Street Westbound				Northbound			
7:30 AM																
to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
8:30 AM	**0**	**72**	**0**	**22**	**0**	**0**	**519**	**0**	**0**	**0**	**713**	**0**	**0**	**0**	**0**	**0**
PHF	**0.94**				**0.96**				**0.95**				**0.00**			
HV %	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**2.5%**	**0.0%**	**0.0%**	**0.0%**	**2.7%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

MID PEAK HOUR	Ruggles Lower Busway Southbound				Ruggles Street Eastbound				Ruggles Street Westbound				Northbound			
11:45 AM																
to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
12:45 PM	**0**	**46**	**0**	**28**	**0**	**0**	**529**	**0**	**0**	**0**	**514**	**0**	**0**	**0**	**0**	**0**
PHF	**0.93**				**0.97**				**0.98**				**0.00**			
HV %	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**2.1%**	**0.0%**	**0.0%**	**0.0%**	**1.9%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

PM PEAK HOUR	Ruggles Lower Busway Southbound				Ruggles Street Eastbound				Ruggles Street Westbound				Northbound			
4:15 PM																
to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
5:15 PM	**0**	**40**	**0**	**28**	**0**	**0**	**632**	**0**	**0**	**0**	**531**	**0**	**0**	**0**	**0**	**0**
PHF	**0.89**				**0.93**				**0.98**				**0.00**			
HV %	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**1.3%**	**0.0%**	**0.0%**	**0.0%**	**1.3%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 3
Location:	Ruggles Station, MA
Street 1:	Ruggles Street
Street 2:	Ruggles Lower Busway
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

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TRUCKS

	Northbound				Ruggles Lower Busway Southbound				Ruggles Street Eastbound				Ruggles Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	5	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	4	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	5	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	5	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	5	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	4	0

	Northbound				Ruggles Lower Busway Southbound				Ruggles Street Eastbound				Ruggles Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
11:00 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0
11:15 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	3	0
11:30 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	4	0
11:45 AM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	2	0
12:00 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	3	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	2	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0

	Northbound				Ruggles Lower Busway Southbound				Ruggles Street Eastbound				Ruggles Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	2	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0

AM PEAK HOUR	Northbound				Ruggles Lower Busway Southbound				Ruggles Street Eastbound				Ruggles Street Westbound			
7:45 AM																
to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
8:45 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**14**	**0**	**0**	**0**	**19**	**0**
PHF	**0.00**				**0.00**				**0.88**				**0.95**			

MID PEAK HOUR	Northbound				Ruggles Lower Busway Southbound				Ruggles Street Eastbound				Ruggles Street Westbound			
11:45 AM																
to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
12:45 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**11**	**0**	**0**	**0**	**10**	**0**
PHF	**0.00**				**0.00**				**0.92**				**0.83**			

PM PEAK HOUR	Northbound				Ruggles Lower Busway Southbound				Ruggles Street Eastbound				Ruggles Street Westbound			
4:15 PM																
to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
5:15 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**8**	**0**	**0**	**0**	**7**	**0**
PHF	**0.00**				**0.00**				**0.67**				**0.88**			

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 3
Location:	Ruggles Station, MA
Street 1:	Ruggles Street
Street 2:	Ruggles Lower Busway
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

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PEDESTRIANS & BICYCLES

	Ruggles Lower Busway Northbound					Ruggles Lower Busway Southbound					Ruggles Street Eastbound					Ruggles Street Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
7:00 AM	0	0	0	0		0	0	0	6		0	2	0	6		0	2	0	17	
7:15 AM	0	0	0	0		0	0	0	8		0	0	0	10		0	0	0	20	
7:30 AM	0	0	0	0		0	0	0	12		0	0	0	13		0	0	0	24	
7:45 AM	0	0	0	0		0	0	0	7		0	1	0	11		0	1	0	27	
8:00 AM	0	0	0	0		0	0	0	4		0	1	0	9		0	0	0	30	
8:15 AM	0	0	0	0		0	0	0	5		0	0	0	7		0	0	0	26	
8:30 AM	0	0	0	0		0	0	0	3		0	0	0	8		0	1	0	23	
8:45 AM	0	0	0	0		0	0	0	4		0	0	0	7		0	0	0	24	

	Ruggles Lower Busway Northbound					Ruggles Lower Busway Southbound					Ruggles Street Eastbound					Ruggles Street Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
11:00 AM	0	0	0	0		0	0	0	10		0	0	0	3		0	0	0	16	
11:15 AM	0	0	0	0		0	0	0	8		0	0	0	4		0	1	0	15	
11:30 AM	0	0	0	0		0	0	0	9		0	1	0	5		0	0	0	12	
11:45 AM	0	0	0	0		0	0	0	8		0	0	0	6		0	0	0	14	
12:00 PM	0	0	0	0		0	0	0	7		0	0	0	5		0	1	0	12	
12:15 PM	0	0	0	0		0	0	0	6		0	0	0	4		0	0	0	11	
12:30 PM	0	0	0	0		0	0	0	8		0	1	0	6		0	0	0	13	
12:45 PM	0	0	0	0		0	0	0	7		0	0	0	5		0	1	0	12	

	Ruggles Lower Busway Northbound					Ruggles Lower Busway Southbound					Ruggles Street Eastbound					Ruggles Street Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
4:00 PM	0	0	0	0		0	0	0	11		0	0	0	8		0	1	0	19	
4:15 PM	0	0	0	0		0	0	0	10		0	1	0	7		0	0	0	21	
4:30 PM	0	0	0	0		0	0	0	8		0	1	0	5		0	1	0	23	
4:45 PM	0	0	0	0		0	0	0	9		0	0	0	6		0	0	0	24	
5:00 PM	0	0	0	0		0	0	0	10		0	1	0	3		0	0	0	26	
5:15 PM	0	0	0	0		0	0	0	7		0	0	0	4		0	1	0	23	
5:30 PM	0	0	0	0		0	0	0	8		0	0	0	5		0	0	0	24	
5:45 PM	0	0	0	0		0	0	0	6		0	0	0	3		0	0	0	20	

AM PEAK HOUR	Ruggles Lower Busway Northbound					Ruggles Lower Busway Southbound					Ruggles Street Eastbound					Ruggles Street Westbound				
7:30 AM																				
to	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
8:30 AM	0	0	0	0		0	0	0	28		0	2	0	40		0	1	0	107	

MID PEAK HOUR	Ruggles Lower Busway Northbound					Ruggles Lower Busway Southbound					Ruggles Street Eastbound					Ruggles Street Westbound				
11:45 AM																				
to	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
12:45 PM	0	0	0	0		0	0	0	29		0	1	0	21		0	1	0	50	

PM PEAK HOUR	Ruggles Lower Busway Northbound					Ruggles Lower Busway Southbound					Ruggles Street Eastbound					Ruggles Street Westbound				
4:15 PM																				
to	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
5:15 PM	0	0	0	0		0	0	0	37		0	3	0	21		0	1	0	94	

NOTE: Peak hour summaries here correspond to peak hours identified for passenger car and heavy vehicles combined.

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 4
Location:	Ruggles Station, MA
Street 1:	Tremont Street
Street 2:	Ruggles Street/ Whittier Street
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

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TOTAL (CARS & TRUCKS)

	Tremont Street Northbound				Tremont Street Southbound				Ruggles Street Eastbound				Whittier Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	4	39	213	0	3	0	93	112	0	102	0	17	0	1	0	1
7:15 AM	3	46	225	0	4	0	98	117	0	107	0	20	0	2	0	2
7:30 AM	3	53	231	0	4	0	101	121	0	113	0	22	0	4	0	2
7:45 AM	4	61	242	0	5	0	106	113	0	109	0	25	0	4	1	3
8:00 AM	2	68	255	1	3	0	111	119	0	101	0	27	0	5	0	4
8:15 AM	3	63	247	0	4	0	117	114	0	94	0	28	0	3	0	3
8:30 AM	3	58	243	0	4	0	109	108	0	96	0	24	0	2	2	4
8:45 AM	2	55	235	0	3	0	102	104	0	92	0	26	0	2	0	3

	Tremont Street Northbound				Tremont Street Southbound				Ruggles Street Eastbound				Whittier Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
11:00 AM	4	21	215	0	6	0	126	103	0	78	0	31	0	6	1	1
11:15 AM	5	23	211	0	4	0	123	108	0	81	0	34	0	5	0	2
11:30 AM	3	21	213	0	3	0	125	92	0	93	0	30	0	4	0	3
11:45 AM	4	24	214	0	5	0	128	105	0	102	0	27	0	3	1	4
12:00 PM	3	23	212	0	4	0	131	107	0	107	0	25	0	3	1	6
12:15 PM	4	25	218	0	3	0	126	102	0	114	0	22	0	4	0	5
12:30 PM	4	28	226	0	4	0	124	98	0	109	0	23	0	4	1	4
12:45 PM	3	26	221	0	4	0	122	94	0	102	0	24	0	3	0	4

	Tremont Street Northbound				Tremont Street Southbound				Ruggles Street Eastbound				Whittier Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	9	30	233	0	4	0	133	101	0	96	0	46	0	10	2	1
4:15 PM	8	29	231	0	6	0	137	104	0	102	0	49	0	7	1	1
4:30 PM	6	28	235	0	5	0	135	102	0	105	0	47	0	4	0	3
4:45 PM	7	30	237	0	4	0	139	106	0	112	0	48	0	3	0	4
5:00 PM	5	27	239	1	3	0	143	103	0	119	0	50	0	1	1	5
5:15 PM	6	25	235	0	4	0	141	95	0	115	0	47	0	2	0	3
5:30 PM	4	24	232	0	5	0	145	97	0	118	0	45	0	1	0	2
5:45 PM	3	23	227	0	3	0	138	93	0	109	0	44	0	1	0	1

AM PEAK HOUR 7:30 AM to 8:30 AM	Tremont Street Northbound				Tremont Street Southbound				Ruggles Street Eastbound				Whittier Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	12	**245**	**975**	**1**	**16**	**0**	**435**	**467**	**0**	**417**	**0**	**102**	**0**	**16**	**1**	**12**
PHF	**0.95**				**0.98**				**0.96**				**0.81**			
HV %	**0.0%**	**4.5%**	**1.3%**	**0.0%**	**0.0%**	**0.0%**	**3.0%**	**1.7%**	**0.0%**	**1.9%**	**0.0%**	**3.9%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

MID PEAK HOUR 11:45 AM to 12:45 PM	Tremont Street Northbound				Tremont Street Southbound				Ruggles Street Eastbound				Whittier Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	15	**100**	**870**	**0**	**16**	**0**	**509**	**412**	**0**	**432**	**0**	**97**	**0**	**14**	**3**	**19**
PHF	**0.95**				**0.97**				**0.97**				**0.90**			
HV %	**0.0%**	**4.0%**	**1.1%**	**0.0%**	**0.0%**	**0.0%**	**2.4%**	**1.5%**	**0.0%**	**1.4%**	**0.0%**	**5.2%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

PM PEAK HOUR 4:45 PM to 5:45 PM	Tremont Street Northbound				Tremont Street Southbound				Ruggles Street Eastbound				Whittier Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	22	**106**	**943**	**1**	**16**	**0**	**568**	**401**	**0**	**464**	**0**	**190**	**0**	**7**	**1**	**14**
PHF	**0.98**				**0.99**				**0.97**				**0.79**			
HV %	**0.0%**	**1.9%**	**0.3%**	**0.0%**	**0.0%**	**0.0%**	**0.5%**	**1.5%**	**0.0%**	**0.9%**	**0.0%**	**0.5%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 4
Location:	Ruggles Station, MA
Street 1:	Tremont Street
Street 2:	Ruggles Street/ Whittier Street
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

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TRUCKS

	Tremont Street Northbound				Tremont Street Southbound				Ruggles Street Eastbound				Whittier Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	3	0	0	0	4	1	0	1	0	0	0	0	0	0
7:15 AM	0	1	3	0	0	0	2	2	0	2	0	1	0	0	0	0
7:30 AM	0	3	2	0	0	0	3	2	0	2	0	0	0	0	0	0
7:45 AM	0	2	4	0	0	0	3	1	0	3	0	1	0	0	0	0
8:00 AM	0	3	3	0	0	0	4	3	0	1	0	2	0	0	0	0
8:15 AM	0	3	4	0	0	0	3	2	0	2	0	1	0	0	0	0
8:30 AM	0	2	3	0	0	0	3	3	0	2	0	2	0	0	0	0
8:45 AM	0	3	3	0	0	0	2	1	0	1	0	1	0	0	0	0

	Tremont Street Northbound				Tremont Street Southbound				Ruggles Street Eastbound				Whittier Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
11:00 AM	0	1	1	0	0	0	2	1	0	2	0	0	0	0	0	0
11:15 AM	0	0	1	0	0	0	1	2	0	1	0	1	0	0	0	0
11:30 AM	0	1	2	0	0	0	3	3	0	1	0	0	0	0	0	0
11:45 AM	0	1	1	0	0	0	2	1	0	2	0	1	0	0	0	0
12:00 PM	0	0	3	0	0	0	3	2	0	1	0	2	0	0	0	0
12:15 PM	0	1	2	0	0	0	2	1	0	1	0	1	0	0	0	0
12:30 PM	0	2	4	0	0	0	5	2	0	2	0	1	0	0	0	0
12:45 PM	0	0	1	0	0	0	3	2	0	1	0	0	0	0	0	0

	Tremont Street Northbound				Tremont Street Southbound				Ruggles Street Eastbound				Whittier Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	1	0	0	0	2	1	0	1	0	1	0	0	0	0
4:15 PM	0	1	1	0	0	0	1	0	0	2	0	1	0	0	0	0
4:30 PM	0	1	2	0	0	0	1	1	0	1	0	2	0	0	0	0
4:45 PM	0	0	1	0	0	0	0	2	0	1	0	0	0	0	0	0
5:00 PM	0	1	0	0	0	0	1	1	0	2	0	0	0	0	0	0
5:15 PM	0	0	1	0	0	0	2	1	0	0	0	1	0	0	0	0
5:30 PM	0	1	1	0	0	0	0	2	0	1	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0

AM PEAK HOUR	Tremont Street Northbound				Tremont Street Southbound				Ruggles Street Eastbound				Whittier Street Westbound			
7:45 AM																
to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
8:45 AM	**0**	**10**	**14**	**0**	**0**	**0**	**13**	**9**	**0**	**8**	**0**	**6**	**0**	**0**	**0**	**0**
PHF	**0.86**				**0.79**				**0.88**				**0.00**			

MID PEAK HOUR	Tremont Street Northbound				Tremont Street Southbound				Ruggles Street Eastbound				Whittier Street Westbound			
11:45 AM																
to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
12:45 PM	**0**	**4**	**10**	**0**	**0**	**0**	**12**	**6**	**0**	**6**	**0**	**5**	**0**	**0**	**0**	**0**
PHF	**0.58**				**0.64**				**0.92**				**0.00**			

PM PEAK HOUR	Tremont Street Northbound				Tremont Street Southbound				Ruggles Street Eastbound				Whittier Street Westbound			
4:00 PM																
to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
5:00 PM	**0**	**2**	**5**	**0**	**0**	**0**	**4**	**4**	**0**	**5**	**0**	**4**	**0**	**0**	**0**	**0**
PHF	**0.58**				**0.67**				**0.75**				**0.00**			

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 4
Location:	Ruggles Station, MA
Street 1:	Tremont Street
Street 2:	Ruggles Street/ Whittier Street
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

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PEDESTRIANS & BICYCLES

	Tremont Street Northbound					Tremont Street Southbound					Ruggles Street Eastbound					Whittier Street Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
7:00 AM	0	0	0	0		0	0	1	1		2	0	0	1		0	0	0	1	
7:15 AM	0	0	0	1		0	0	0	3		0	0	0	3		0	0	0	2	
7:30 AM	0	0	0	2		0	1	0	2		0	0	0	3		0	0	0	3	
7:45 AM	0	1	0	3		0	0	1	2		1	0	0	5		0	0	0	2	
8:00 AM	0	0	0	1		0	0	0	2		1	0	0	4		0	0	0	3	
8:15 AM	0	1	0	6		0	1	0	4		0	0	0	5		0	1	0	7	
8:30 AM	1	1	0	7		0	1	0	8		0	0	0	7		0	0	0	9	
8:45 AM	0	0	0	3		0	0	0	5		0	0	0	0		0	0	0	5	

	Tremont Street Northbound					Tremont Street Southbound					Ruggles Street Eastbound					Whittier Street Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
11:00 AM	0	0	0	12		0	0	0	3		0	0	0	6		0	0	0	10	
11:15 AM	0	1	0	7		0	1	0	5		0	0	0	2		0	0	0	5	
11:30 AM	0	0	0	4		0	1	0	4		1	0	0	4		0	0	0	4	
11:45 AM	0	1	0	5		0	0	0	3		0	0	0	5		0	0	0	6	
12:00 PM	0	0	0	4		0	0	0	3		0	0	0	6		0	1	0	5	
12:15 PM	0	0	0	8		0	1	0	2		0	0	0	3		0	0	0	7	
12:30 PM	0	1	0	3		0	0	0	1		1	0	0	7		0	0	0	3	
12:45 PM	0	0	0	4		0	0	1	3		0	0	0	4		0	0	0	2	

	Tremont Street Northbound					Tremont Street Southbound					Ruggles Street Eastbound					Whittier Street Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
4:00 PM	1	0	0	3		0	0	0	3		0	0	0	5		0	0	0	5	
4:15 PM	0	0	0	5		0	1	0	2		1	0	0	3		0	0	0	4	
4:30 PM	0	1	0	2		0	1	0	6		0	0	0	4		0	1	0	4	
4:45 PM	0	0	0	3		0	0	0	4		1	0	0	3		0	0	0	6	
5:00 PM	0	1	0	4		0	0	0	5		1	0	0	6		0	0	0	5	
5:15 PM	0	0	0	2		0	1	0	3		0	0	0	4		0	0	0	3	
5:30 PM	0	0	0	1		0	0	0	4		0	0	0	3		0	0	0	4	
5:45 PM	0	0	0	0		0	0	0	1		0	0	0	2		0	0	0	3	

AM PEAK HOUR 7:30 AM to 8:30 AM	Tremont Street Northbound					Tremont Street Southbound					Ruggles Street Eastbound					Whittier Street Westbound				
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	2	0	12		0	2	1	10		2	0	0	17		0	1	0	15	

MID PEAK HOUR 11:45 AM to 12:45 PM	Tremont Street Northbound					Tremont Street Southbound					Ruggles Street Eastbound					Whittier Street Westbound				
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	2	0	20		0	1	0	9		1	0	0	21		0	1	0	21	

PM PEAK HOUR 4:45 PM to 5:45 PM	Tremont Street Northbound					Tremont Street Southbound					Ruggles Street Eastbound					Whittier Street Westbound				
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	1	0	10		0	1	0	16		2	0	0	16		0	0	0	18	

NOTE: Peak hour summaries here correspond to peak hours identified for passenger car and heavy vehicles combined.

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 5
Location:	Ruggles Station, MA
Street 1:	Tremont Street/ Ruggles Street
Street 2:	Columbus Avenue (Driveways)
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

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TOTAL (CARS & TRUCKS)

	Tremont Street Northbound				Tremont Street Southbound				Columbus Avenue (Driveway) Eastbound				Ruggles Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	314	5	0	0	200	3	0	0	0	8	0	0	0	0
7:15 AM	0	0	331	7	0	0	210	4	0	0	0	9	0	0	0	0
7:30 AM	0	0	339	11	0	0	216	4	0	0	0	10	0	0	0	0
7:45 AM	0	0	346	13	0	0	213	5	0	0	0	11	0	0	0	0
8:00 AM	0	0	348	15	0	0	221	6	0	0	0	12	0	0	0	0
8:15 AM	0	0	334	14	0	0	225	4	0	0	0	10	0	0	0	0
8:30 AM	0	0	335	12	0	0	210	5	0	0	0	11	0	0	0	0
8:45 AM	0	0	320	13	0	0	199	4	0	0	0	9	0	0	0	0

	Tremont Street Northbound				Tremont Street Southbound				Columbus Avenue (Driveway) Eastbound				Ruggles Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
11:00 AM	0	0	284	16	0	0	223	3	0	0	0	12	0	0	0	0
11:15 AM	0	0	279	19	0	0	224	5	0	0	0	11	0	0	0	0
11:30 AM	0	0	288	24	0	0	209	6	0	0	0	11	0	0	0	0
11:45 AM	0	0	298	27	0	0	226	7	0	0	0	12	0	0	0	0
12:00 PM	0	0	299	30	0	0	233	8	0	0	0	9	0	0	0	0
12:15 PM	0	0	312	28	0	0	221	6	0	0	0	10	0	0	0	0
12:30 PM	0	0	317	26	0	0	217	5	0	0	0	9	0	0	0	0
12:45 PM	0	0	308	23	0	0	212	4	0	0	0	8	0	0	0	0

	Tremont Street Northbound				Tremont Street Southbound				Columbus Avenue (Driveway) Eastbound				Ruggles Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	315	19	0	0	224	2	0	0	0	14	0	0	0	0
4:15 PM	0	0	319	21	0	0	231	3	0	0	0	16	0	0	0	0
4:30 PM	0	0	325	23	0	0	227	3	0	0	0	15	0	0	0	0
4:45 PM	0	0	332	25	0	0	234	2	0	0	0	15	0	0	0	0
5:00 PM	0	0	338	28	0	0	233	2	0	0	0	16	0	0	0	0
5:15 PM	0	0	331	26	0	0	226	3	0	0	0	14	0	0	0	0
5:30 PM	0	0	332	25	0	0	234	2	0	0	0	13	0	0	0	0
5:45 PM	0	0	317	23	0	0	222	2	0	0	0	12	0	0	0	0

AM PEAK HOUR 7:30 AM to 8:30 AM	Tremont Street Northbound				Tremont Street Southbound				Columbus Avenue (Driveway) Eastbound				Ruggles Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**1367**	**53**	**0**	**0**	**875**	**19**	**0**	**0**	**0**	**43**	**0**	**0**	**0**	**0**
PHF	**0.98**				**0.98**				**0.90**				**0.00**			
HV %	**0.0%**	**0.0%**	**1.5%**	**0.0%**	**0.0%**	**0.0%**	**2.4%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

MID PEAK HOUR 11:45 AM to 12:45 PM	Tremont Street Northbound				Tremont Street Southbound				Columbus Avenue (Driveway) Eastbound				Ruggles Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**1226**	**111**	**0**	**0**	**897**	**26**	**0**	**0**	**0**	**40**	**0**	**0**	**0**	**0**
PHF	**0.97**				**0.96**				**0.83**				**0.00**			
HV %	**0.0%**	**0.0%**	**1.3%**	**0.0%**	**0.0%**	**0.0%**	**2.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

PM PEAK HOUR 4:45 PM to 5:45 PM	Tremont Street Northbound				Tremont Street Southbound				Columbus Avenue (Driveway) Eastbound				Ruggles Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**1333**	**104**	**0**	**0**	**927**	**9**	**0**	**0**	**0**	**58**	**0**	**0**	**0**	**0**
PHF	**0.98**				**0.99**				**0.91**				**0.00**			
HV %	**0.0%**	**0.0%**	**0.5%**	**0.0%**	**0.0%**	**0.0%**	**1.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 5
Location:	Ruggles Station, MA
Street 1:	Tremont Street/ Ruggles Street
Street 2:	Columbus Avenue (Driveways)
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

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TRUCKS

	Tremont Street Northbound				Tremont Street Southbound				Columbus Avenue (Driveway) Eastbound				Ruggles Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	4	0	0	0	5	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	5	0	0	0	4	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	4	0	0	0	5	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	7	0	0	0	4	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	4	0	0	0	7	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	6	0	0	0	5	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	5	0	0	0	6	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	4	0	0	0	3	0	0	0	0	0	0	0	0	0

	Tremont Street Northbound				Tremont Street Southbound				Columbus Avenue (Driveway) Eastbound				Ruggles Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
11:00 AM	0	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0
11:15 AM	0	0	2	0	0	0	3	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	3	0	0	0	6	0	0	0	0	0	0	0	0	0
11:45 AM	0	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0
12:00 PM	0	0	4	0	0	0	5	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	6	0	0	0	7	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	2	0	0	0	5	0	0	0	0	0	0	0	0	0

	Tremont Street Northbound				Tremont Street Southbound				Columbus Avenue (Driveway) Eastbound				Ruggles Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	2	0	0	0	3	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	3	0	0	0	1	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	3	0	0	0	2	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	1	0	0	0	3	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0

AM PEAK HOUR	Tremont Street Northbound				Tremont Street Southbound				Columbus Avenue (Driveway) Eastbound				Ruggles Street Westbound			
7:45 AM																
to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
8:45 AM	**0**	**0**	**22**	**0**	**0**	**0**	**22**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PHF	**0.79**				**0.79**				**0.00**				**0.00**			

MID PEAK HOUR	Tremont Street Northbound				Tremont Street Southbound				Columbus Avenue (Driveway) Eastbound				Ruggles Street Westbound			
12:00 PM																
to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
1:00 PM	**0**	**0**	**15**	**0**	**0**	**0**	**20**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PHF	**0.63**				**0.71**				**0.00**				**0.00**			

PM PEAK HOUR	Tremont Street Northbound				Tremont Street Southbound				Columbus Avenue (Driveway) Eastbound				Ruggles Street Westbound			
4:00 PM																
to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
5:00 PM	**0**	**0**	**10**	**0**	**0**	**0**	**8**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PHF	**0.83**				**0.67**				**0.00**				**0.00**			

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 5
Location:	Ruggles Station, MA
Street 1:	Tremont Street/ Ruggles Street
Street 2:	Columbus Avenue (Driveways)
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

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PEDESTRIANS & BICYCLES

	Tremont Street Northbound					Tremont Street Southbound					Columbus Avenue (Driveway) Eastbound					Ruggles Street Westbound				
Start Time	Left	Thru	Right	PED*		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
7:00 AM	0	2	0	38		0	0	0	3		0	0	0	4		0	0	0	5	
7:15 AM	0	0	0	31		0	0	0	2		0	0	0	5		0	0	0	4	
7:30 AM	0	0	0	27		0	1	0	1		0	0	0	3		0	0	0	6	
7:45 AM	0	2	0	25		0	0	0	2		0	0	0	4		0	0	0	4	
8:00 AM	0	1	0	22		0	0	0	4		0	0	0	3		0	0	0	5	
8:15 AM	0	1	0	24		0	1	0	1		0	0	0	5		0	0	0	6	
8:30 AM	0	1	0	26		0	1	0	0		0	0	0	4		0	0	0	5	
8:45 AM	0	0	0	23		0	0	0	1		0	0	0	3		0	0	0	4	

	Tremont Street Northbound					Tremont Street Southbound					Columbus Avenue (Driveway) Eastbound					Ruggles Street Westbound				
Start Time	Left	Thru	Right	PED*		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
11:00 AM	0	0	0	10		0	0	0	2		0	0	0	1		0	0	0	3	
11:15 AM	0	1	0	13		0	1	0	0		0	0	0	3		0	0	0	5	
11:30 AM	0	1	0	15		0	1	0	1		0	0	0	2		0	0	0	4	
11:45 AM	0	1	0	19		0	0	0	0		0	0	0	3		0	0	0	4	
12:00 PM	0	0	0	17		0	0	0	3		0	0	0	4		0	0	0	5	
12:15 PM	0	0	0	14		0	1	0	2		0	0	0	5		0	0	0	6	
12:30 PM	0	2	0	16		0	0	0	0		0	0	0	3		0	0	0	4	
12:45 PM	0	0	0	15		0	0	0	1		0	0	0	4		0	0	0	5	

	Tremont Street Northbound					Tremont Street Southbound					Columbus Avenue (Driveway) Eastbound					Ruggles Street Westbound				
Start Time	Left	Thru	Right	PED*		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
4:00 PM	0	0	0	28		0	0	0	1		0	0	0	9		0	0	0	7	
4:15 PM	0	1	0	24		0	1	0	0		0	0	0	7		0	0	0	6	
4:30 PM	0	1	0	21		0	1	0	2		0	0	0	6		0	0	0	8	
4:45 PM	0	1	0	19		0	0	0	1		0	0	0	7		0	0	0	7	
5:00 PM	0	2	0	17		0	0	0	0		0	0	0	4		0	0	0	6	
5:15 PM	0	0	0	20		0	1	0	1		0	0	0	5		0	0	0	5	
5:30 PM	0	0	0	18		0	0	0	0		0	0	0	4		0	0	0	4	
5:45 PM	0	0	0	16		0	0	0	0		0	0	0	3		0	0	0	5	

AM PEAK HOUR 7:30 AM to 8:30 AM	Tremont Street Northbound					Tremont Street Southbound					Columbus Avenue (Driveway) Eastbound					Ruggles Street Westbound				
	Left	Thru	Right	PED*		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	4	0	98		0	2	0	8		0	0	0	15		0	0	0	21	

MID PEAK HOUR 11:45 AM to 12:45 PM	Tremont Street Northbound					Tremont Street Southbound					Columbus Avenue (Driveway) Eastbound					Ruggles Street Westbound				
	Left	Thru	Right	PED*		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	3	0	66		0	1	0	5		0	0	0	15		0	0	0	19	

PM PEAK HOUR 4:45 PM to 5:45 PM	Tremont Street Northbound					Tremont Street Southbound					Columbus Avenue (Driveway) Eastbound					Ruggles Street Westbound				
	Left	Thru	Right	PED*		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	3	0	74		0	1	0	2		0	0	0	20		0	0	0	22	

NOTE: Peak hour summaries here correspond to peak hours identified for passenger car and heavy vehicles combined.

Note:

1. Tremont Street Southbound Pedestrians Movement shown are the Pedestrians crossing using crosswalk between the two Columbus Avenue Driveways.

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 6
Location:	Ruggles Station, MA
Street 1:	Tremont Street
Street 2:	Melnea Cass Boulevard
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

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TOTAL (CARS & TRUCKS)

	Tremont Street Northbound				Tremont Street Southbound				Melnea Cass Boulevard Eastbound				Melnea Cass Boulevard Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	65	63	186	0	2	71	4	0	0	20	17	0	115	41	8
7:15 AM	0	68	71	192	0	3	73	6	0	1	18	19	0	122	44	10
7:30 AM	0	66	78	195	0	4	70	5	0	2	19	18	0	132	43	9
7:45 AM	0	70	83	193	0	4	68	5	0	1	21	17	0	133	42	7
8:00 AM	0	68	92	188	0	5	67	4	0	1	18	16	0	144	43	6
8:15 AM	0	67	89	178	0	4	65	3	0	2	19	18	0	146	40	5
8:30 AM	0	64	87	184	0	4	66	4	0	1	16	15	0	134	41	6
8:45 AM	0	62	85	173	0	3	63	3	0	1	15	16	0	124	38	5

	Tremont Street Northbound				Tremont Street Southbound				Melnea Cass Boulevard Eastbound				Melnea Cass Boulevard Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
11:00 AM	0	48	60	176	0	4	55	4	0	1	14	32	0	139	23	9
11:15 AM	0	45	62	172	0	5	59	5	0	2	16	33	0	137	25	11
11:30 AM	0	41	64	183	0	5	63	4	0	2	15	31	0	121	22	12
11:45 AM	0	38	66	194	0	6	68	3	0	3	16	34	0	131	20	14
12:00 PM	0	35	69	195	0	7	72	3	0	4	15	32	0	137	18	16
12:15 PM	0	37	70	205	0	6	76	2	0	3	17	33	0	118	16	18
12:30 PM	0	33	67	217	0	5	74	3	0	2	14	31	0	117	17	17
12:45 PM	0	34	65	209	0	5	73	2	0	2	13	28	0	115	16	15

	Tremont Street Northbound				Tremont Street Southbound				Melnea Cass Boulevard Eastbound				Melnea Cass Boulevard Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	50	58	207	0	6	89	3	0	1	29	43	0	94	18	8
4:15 PM	0	52	64	203	0	7	92	4	0	2	34	45	0	97	20	9
4:30 PM	0	54	69	202	0	8	85	5	0	2	37	44	0	101	22	10
4:45 PM	0	58	74	200	0	7	81	3	0	3	42	47	0	108	24	9
5:00 PM	0	61	82	195	0	6	76	4	0	2	46	45	0	114	26	11
5:15 PM	0	59	78	194	0	6	73	4	0	2	43	46	0	110	28	10
5:30 PM	0	57	76	199	0	7	74	3	0	1	41	42	0	120	27	9
5:45 PM	0	55	73	189	0	5	71	3	0	1	37	40	0	113	25	8

AM PEAK HOUR 7:30 AM to 8:30 AM	Tremont Street Northbound				Tremont Street Southbound				Melnea Cass Boulevard Eastbound				Melnea Cass Boulevard Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**271**	**342**	**754**	**0**	**17**	**270**	**17**	**0**	**6**	**77**	**69**	**0**	**555**	**168**	**27**
PHF	**0.98**				**0.96**				**0.97**				**0.97**			
HV %	**0.0%**	**0.7%**	**4.1%**	**0.7%**	**0.0%**	**0.0%**	**4.1%**	**0.0%**	**0.0%**	**0.0%**	**1.3%**	**2.9%**	**0.0%**	**1.4%**	**0.6%**	**0.0%**

MID PEAK HOUR 11:45 AM to 12:45 PM	Tremont Street Northbound				Tremont Street Southbound				Melnea Cass Boulevard Eastbound				Melnea Cass Boulevard Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**143**	**272**	**811**	**0**	**24**	**290**	**11**	**0**	**12**	**62**	**130**	**0**	**503**	**71**	**65**
PHF	**0.97**				**0.97**				**0.96**				**0.93**			
HV %	**0.0%**	**0.7%**	**4.8%**	**0.2%**	**0.0%**	**0.0%**	**2.4%**	**0.0%**	**0.0%**	**0.0%**	**1.6%**	**0.8%**	**0.0%**	**2.0%**	**0.0%**	**0.0%**

PM PEAK HOUR 4:45 PM to 5:45 PM	Tremont Street Northbound				Tremont Street Southbound				Melnea Cass Boulevard Eastbound				Melnea Cass Boulevard Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**235**	**310**	**788**	**0**	**26**	**304**	**14**	**0**	**8**	**172**	**180**	**0**	**452**	**105**	**39**
PHF	**0.99**				**0.95**				**0.97**				**0.96**			
HV %	**0.0%**	**0.0%**	**1.9%**	**0.1%**	**0.0%**	**0.0%**	**1.3%**	**0.0%**	**0.0%**	**0.0%**	**0.6%**	**0.0%**	**0.0%**	**1.1%**	**1.0%**	**0.0%**

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 6
Location:	Ruggles Station, MA
Street 1:	Tremont Street
Street 2:	Melnea Cass Boulevard
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

BOSTON TRAFFIC DATA
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TRUCKS

	Tremont Street Northbound				Tremont Street Southbound				Melnea Cass Boulevard Eastbound				Melnea Cass Boulevard Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	3	1	0	0	2	0	0	0	0	0	0	3	0	0
7:15 AM	0	1	4	0	0	0	1	0	0	0	0	0	0	3	0	0
7:30 AM	0	0	3	1	0	0	2	0	0	0	0	1	0	2	1	0
7:45 AM	0	1	4	2	0	0	3	0	0	0	1	0	0	1	0	0
8:00 AM	0	1	3	0	0	0	4	0	0	0	0	0	0	3	0	0
8:15 AM	0	0	4	2	0	0	2	0	0	0	0	1	0	2	0	0
8:30 AM	0	1	3	1	0	0	3	0	0	0	1	0	0	3	1	0
8:45 AM	0	0	4	0	0	0	2	0	0	0	0	0	0	1	0	0

	Tremont Street Northbound				Tremont Street Southbound				Melnea Cass Boulevard Eastbound				Melnea Cass Boulevard Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
11:00 AM	0	0	2	1	0	0	1	0	0	0	0	0	0	2	0	0
11:15 AM	0	0	2	0	0	0	2	0	0	0	0	0	0	1	0	0
11:30 AM	0	1	2	0	0	0	3	0	0	0	1	1	0	2	1	0
11:45 AM	0	0	3	0	0	0	1	0	0	0	0	0	0	2	0	0
12:00 PM	0	0	3	1	0	0	2	0	0	0	0	0	0	3	0	0
12:15 PM	0	0	3	0	0	0	1	0	0	0	1	0	0	2	0	0
12:30 PM	0	1	4	1	0	0	3	0	0	0	0	1	0	3	0	0
12:45 PM	0	0	2	0	0	0	2	0	0	0	0	0	0	3	0	0

	Tremont Street Northbound				Tremont Street Southbound				Melnea Cass Boulevard Eastbound				Melnea Cass Boulevard Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	1	1	0	0	1	0	0	0	0	0	0	2	0	0
4:15 PM	0	0	2	1	0	0	0	0	0	0	1	0	0	1	0	0
4:30 PM	0	1	2	0	0	0	1	0	0	0	0	1	0	0	0	0
4:45 PM	0	0	1	1	0	0	0	0	0	0	0	0	0	2	1	0
5:00 PM	0	0	2	0	0	0	1	0	0	0	1	0	0	1	0	0
5:15 PM	0	0	1	0	0	0	2	0	0	0	0	0	0	1	0	0
5:30 PM	0	0	2	0	0	0	1	0	0	0	0	0	0	1	0	0
5:45 PM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0

AM PEAK HOUR	Tremont Street Northbound				Tremont Street Southbound				Melnea Cass Boulevard Eastbound				Melnea Cass Boulevard Westbound			
7:45 AM																
to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
8:45 AM	**0**	**3**	**14**	**5**	**0**	**0**	**12**	**0**	**0**	**0**	**2**	**1**	**0**	**9**	**1**	**0**
PHF	**0.79**				**0.75**				**0.75**				**0.63**			

MID PEAK HOUR	Tremont Street Northbound				Tremont Street Southbound				Melnea Cass Boulevard Eastbound				Melnea Cass Boulevard Westbound			
12:00 PM																
to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
1:00 PM	**0**	**1**	**12**	**2**	**0**	**0**	**8**	**0**	**0**	**0**	**1**	**1**	**0**	**11**	**0**	**0**
PHF	**0.63**				**0.67**				**0.50**				**0.92**			

PM PEAK HOUR	Tremont Street Northbound				Tremont Street Southbound				Melnea Cass Boulevard Eastbound				Melnea Cass Boulevard Westbound			
4:00 PM																
to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
5:00 PM	**0**	**1**	**6**	**3**	**0**	**0**	**2**	**0**	**0**	**0**	**1**	**1**	**0**	**5**	**1**	**0**
PHF	**0.83**				**0.50**				**0.50**				**0.50**			

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 6
Location:	Ruggles Station, MA
Street 1:	Tremont Street
Street 2:	Melnea Cass Boulevard
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

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PEDESTRIANS & BICYCLES

	Tremont Street Northbound					Tremont Street Southbound					Melnea Cass Boulevard Eastbound					Melnea Cass Boulevard Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
7:00 AM	0	2	0	0		0	0	0	4		0	0	0	2		0	0	0	0	
7:15 AM	0	0	0	0		0	0	0	6		0	0	0	3		0	0	0	1	
7:30 AM	0	0	0	1		0	1	0	5		0	0	0	3		0	0	0	0	
7:45 AM	0	2	0	0		0	0	0	7		0	0	0	4		0	0	0	2	
8:00 AM	0	1	0	2		0	0	1	5		0	0	0	3		0	0	0	1	
8:15 AM	0	0	1	0		0	1	0	6		0	0	0	5		0	0	0	1	
8:30 AM	0	1	0	1		0	1	0	3		0	0	0	4		0	0	0	2	
8:45 AM	0	0	0	1		0	0	0	4		0	0	0	3		0	0	0	2	

	Tremont Street Northbound					Tremont Street Southbound					Melnea Cass Boulevard Eastbound					Melnea Cass Boulevard Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
11:00 AM	0	0	0	4		0	0	0	3		0	0	0	4		0	0	0	3	
11:15 AM	0	1	0	2		0	1	1	5		0	0	0	6		0	0	0	2	
11:30 AM	1	0	0	3		0	1	0	4		0	0	0	7		0	0	0	4	
11:45 AM	0	1	0	1		0	0	0	3		0	0	0	4		0	0	0	3	
12:00 PM	0	0	0	0		0	0	0	2		0	0	0	5		0	0	0	5	
12:15 PM	0	0	0	2		0	1	1	5		0	0	0	6		0	0	0	3	
12:30 PM	0	2	0	1		0	0	0	6		0	0	0	8		0	0	0	4	
12:45 PM	0	0	0	0		0	0	0	4		0	0	0	5		0	0	0	3	

	Tremont Street Northbound					Tremont Street Southbound					Melnea Cass Boulevard Eastbound					Melnea Cass Boulevard Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
4:00 PM	0	0	0	1		0	0	0	2		0	0	0	2		0	0	0	2	
4:15 PM	0	1	0	0		0	1	1	4		0	0	0	4		0	0	0	4	
4:30 PM	0	0	1	2		0	1	0	3		0	0	0	5		0	0	0	5	
4:45 PM	0	1	0	0		0	0	0	2		0	0	0	3		0	0	0	3	
5:00 PM	0	2	0	1		0	0	0	3		0	0	0	4		0	0	0	4	
5:15 PM	0	0	0	1		0	1	0	2		0	0	0	6		0	0	0	4	
5:30 PM	0	0	0	0		0	0	0	1		0	0	0	5		0	0	0	3	
5:45 PM	0	0	0	0		0	0	0	2		0	0	0	4		0	0	0	2	

AM PEAK HOUR 7:30 AM to 8:30 AM	Tremont Street Northbound					Tremont Street Southbound					Melnea Cass Boulevard Eastbound					Melnea Cass Boulevard Westbound				
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	3	1	3		0	2	1	23		0	0	0	15		0	0	0	4	

MID PEAK HOUR 11:45 AM to 12:45 PM	Tremont Street Northbound					Tremont Street Southbound					Melnea Cass Boulevard Eastbound					Melnea Cass Boulevard Westbound				
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	3	0	4		0	1	1	16		0	0	0	23		0	0	0	15	

PM PEAK HOUR 4:45 PM to 5:45 PM	Tremont Street Northbound					Tremont Street Southbound					Melnea Cass Boulevard Eastbound					Melnea Cass Boulevard Westbound				
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	3	0	2		0	1	0	8		0	0	0	18		0	0	0	14	

NOTE: Peak hour summaries here correspond to peak hours identified for passenger car and heavy vehicles combined.

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 7
Location:	Ruggles Station, MA
Street 1:	Columbus Avenue
Street 2:	Melnea Cass Boulevard
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

BOSTON TRAFFIC DATA
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TOTAL (CARS & TRUCKS)

	Columbus Avenue Northbound				Columbus Avenue Southbound				Melnea Cass Boulevard Eastbound				Melnea Cass Boulevard Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	3	7	0	30	4	0	0	1	0	0	0	34	4	72
7:15 AM	0	1	5	9	0	27	5	1	0	3	2	0	0	39	5	74
7:30 AM	0	0	4	8	0	31	7	0	0	2	0	0	0	36	6	72
7:45 AM	0	0	3	9	0	29	10	0	0	3	1	0	0	33	4	80
8:00 AM	0	0	4	10	0	23	13	1	0	2	2	0	0	31	5	79
8:15 AM	0	1	2	9	0	29	16	0	0	2	1	0	0	28	4	78
8:30 AM	0	0	3	8	0	23	14	0	0	3	1	0	0	27	5	77
8:45 AM	0	0	2	7	0	24	13	0	0	2	1	0	0	26	3	74

	Columbus Avenue Northbound				Columbus Avenue Southbound				Melnea Cass Boulevard Eastbound				Melnea Cass Boulevard Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
11:00 AM	0	0	11	2	0	44	5	0	0	1	1	0	0	13	5	57
11:15 AM	0	0	8	3	0	48	6	0	0	1	0	0	0	12	5	58
11:30 AM	0	1	6	3	0	45	7	1	0	2	0	0	0	11	6	50
11:45 AM	0	0	5	4	0	48	5	0	0	2	1	0	0	9	7	45
12:00 PM	0	0	3	3	0	47	6	0	0	1	1	0	0	8	6	42
12:15 PM	0	0	4	5	0	48	4	1	0	2	0	0	0	7	7	41
12:30 PM	0	0	3	4	0	42	5	0	0	1	1	0	0	6	5	42
12:45 PM	0	0	4	3	0	40	5	0	0	1	0	0	0	7	6	39

	Columbus Avenue Northbound				Columbus Avenue Southbound				Melnea Cass Boulevard Eastbound				Melnea Cass Boulevard Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	14	13	0	59	8	0	0	0	1	0	0	12	10	49
4:15 PM	0	0	11	17	0	64	7	0	0	1	0	0	0	13	7	56
4:30 PM	0	0	12	24	0	59	9	1	0	0	0	0	0	14	8	59
4:45 PM	0	1	10	26	0	65	12	0	0	1	1	0	0	15	9	61
5:00 PM	0	0	9	31	0	62	13	0	0	1	0	0	0	13	6	72
5:15 PM	0	0	7	34	0	57	15	1	0	0	0	0	0	14	4	73
5:30 PM	0	0	8	31	0	53	19	0	0	0	0	0	0	13	5	69
5:45 PM	0	0	6	28	0	50	24	0	0	0	0	0	0	12	4	67

AM PEAK HOUR 7:15 AM to 8:15 AM	Columbus Avenue Northbound				Columbus Avenue Southbound				Melnea Cass Boulevard Eastbound				Melnea Cass Boulevard Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**1**	**16**	**36**	**0**	**110**	**35**	**2**	**0**	**10**	**5**	**0**	**0**	**139**	**20**	**305**
PHF	**0.88**				**0.94**				**0.75**				**0.98**			
HV %	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**1.8%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.7%**	**0.0%**	**1.0%**

MID PEAK HOUR 11:00 AM to 12:00 PM	Columbus Avenue Northbound				Columbus Avenue Southbound				Melnea Cass Boulevard Eastbound				Melnea Cass Boulevard Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**1**	**30**	**12**	**0**	**185**	**23**	**1**	**0**	**6**	**2**	**0**	**0**	**45**	**23**	**210**
PHF	**0.83**				**0.97**				**0.67**				**0.93**			
HV %	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**1.1%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**1.0%**

PM PEAK HOUR 4:45 PM to 5:45 PM	Columbus Avenue Northbound				Columbus Avenue Southbound				Melnea Cass Boulevard Eastbound				Melnea Cass Boulevard Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**1**	**34**	**122**	**0**	**237**	**59**	**1**	**0**	**2**	**1**	**0**	**0**	**55**	**24**	**275**
PHF	**0.96**				**0.96**				**0.38**				**0.97**			
HV %	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.4%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.4%**

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 7
Location:	Ruggles Station, MA
Street 1:	Columbus Avenue
Street 2:	Melnea Cass Boulevard
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

BOSTON TRAFFIC DATA
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TRUCKS

	Columbus Avenue Northbound				Columbus Avenue Southbound				Melnea Cass Boulevard Eastbound				Melnea Cass Boulevard Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7:30 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0
7:45 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:15 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Columbus Avenue Northbound				Columbus Avenue Southbound				Melnea Cass Boulevard Eastbound				Melnea Cass Boulevard Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
11:00 AM	0	0	0	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	0	0	0
11:30 AM	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Columbus Avenue Northbound				Columbus Avenue Southbound				Melnea Cass Boulevard Eastbound				Melnea Cass Boulevard Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:00 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AM PEAK HOUR 7:45 AM to 8:45 AM	Columbus Avenue Northbound				Columbus Avenue Southbound				Melnea Cass Boulevard Eastbound				Melnea Cass Boulevard Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**
PHF	**0.00**				**0.75**				**0.00**				**0.50**			

MID PEAK HOUR 11:30 AM to 12:30 PM	Columbus Avenue Northbound				Columbus Avenue Southbound				Melnea Cass Boulevard Eastbound				Melnea Cass Boulevard Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**
PHF	**0.00**				**0.38**				**0.00**				**0.50**			

PM PEAK HOUR 4:15 PM to 5:15 PM	Columbus Avenue Northbound				Columbus Avenue Southbound				Melnea Cass Boulevard Eastbound				Melnea Cass Boulevard Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**
PHF	**0.00**				**0.75**				**0.00**				**0.50**			

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 7
Location:	Ruggles Station, MA
Street 1:	Columbus Avenue
Street 2:	Melnea Cass Boulevard
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

BOSTON TRAFFIC DATA
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PEDESTRIANS & BICYCLES

	Columbus Avenue Northbound					Columbus Avenue Southbound					Melnea Cass Boulevard Eastbound					Melnea Cass Boulevard Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
7:00 AM	0	7	0	1		0	1	0	5		0	0	0	22		0	0	0	1	
7:15 AM	0	8	0	3		0	2	0	6		0	0	0	39		1	0	0	3	
7:30 AM	0	9	0	4		0	1	0	7		0	0	0	56		0	0	0	2	
7:45 AM	0	11	0	2		0	2	0	6		0	0	0	60		0	0	0	4	
8:00 AM	0	10	0	3		0	3	0	5		0	0	0	32		1	0	0	5	
8:15 AM	0	12	0	5		0	3	0	3		0	0	0	30		0	0	0	3	
8:30 AM	0	9	0	3		0	4	0	4		0	0	0	33		0	0	0	4	
8:45 AM	0	10	0	4		0	2	0	5		0	0	0	28		1	0	0	3	

	Columbus Avenue Northbound					Columbus Avenue Southbound					Melnea Cass Boulevard Eastbound					Melnea Cass Boulevard Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
11:00 AM	0	6	0	2		0	1	0	9		0	0	0	58		0	0	0	6	
11:15 AM	0	7	0	4		0	2	0	7		0	0	0	53		1	0	0	8	
11:30 AM	0	5	0	6		0	1	0	8		0	0	0	50		0	0	0	9	
11:45 AM	0	7	0	3		0	3	0	7		0	0	0	55		0	0	0	7	
12:00 PM	0	6	0	4		0	1	0	6		0	0	0	51		2	0	0	10	
12:15 PM	0	4	0	2		0	1	0	5		0	0	0	49		0	0	0	8	
12:30 PM	0	5	0	1		0	2	0	7		0	0	0	53		1	0	0	7	
12:45 PM	0	4	0	3		0	1	0	8		0	0	0	52		0	0	0	9	

	Columbus Avenue Northbound					Columbus Avenue Southbound					Melnea Cass Boulevard Eastbound					Melnea Cass Boulevard Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
4:00 PM	0	2	0	4		0	4	0	7		0	0	0	55		2	0	0	5	
4:15 PM	0	3	0	7		0	6	0	6		0	0	0	57		1	0	0	7	
4:30 PM	0	2	0	9		0	5	0	8		0	0	0	50		3	0	0	6	
4:45 PM	0	4	0	7		0	7	0	10		0	0	0	53		0	0	0	9	
5:00 PM	0	3	0	8		0	8	0	7		0	0	0	58		1	0	0	10	
5:15 PM	0	2	0	5		0	5	0	9		0	0	0	60		1	0	0	8	
5:30 PM	0	1	0	6		0	6	0	8		0	0	0	54		2	0	0	7	
5:45 PM	0	1	0	3		0	4	0	6		0	0	0	55		0	0	0	6	

AM PEAK HOUR 7:15 AM to 8:15 AM	Columbus Avenue Northbound					Columbus Avenue Southbound					Melnea Cass Boulevard Eastbound					Melnea Cass Boulevard Westbound				
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	38	0	12		0	8	0	24		0	0	0	187		2	0	0	14	

MID PEAK HOUR 11:00 AM to 12:00 PM	Columbus Avenue Northbound					Columbus Avenue Southbound					Melnea Cass Boulevard Eastbound					Melnea Cass Boulevard Westbound				
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	25	0	15		0	7	0	31		0	0	0	216		1	0	0	30	

PM PEAK HOUR 4:45 PM to 5:45 PM	Columbus Avenue Northbound					Columbus Avenue Southbound					Melnea Cass Boulevard Eastbound					Melnea Cass Boulevard Westbound				
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	10	0	26		0	26	0	34		0	0	0	225		4	0	0	34	

NOTE: Peak hour summaries here correspond to peak hours identified for passenger car and heavy vehicles combined.

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 8
Location:	Ruggles Station, MA
Street 1:	Columbus Avenue
Street 2:	St. Cyprians Place
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

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TOTAL (CARS & TRUCKS)

	Columbus Avenue Northbound				Columbus Avenue Southbound				Driveway Eastbound				St. Cyprians Place Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	76	0	0	0	32	1	0	0	0	0	0	2	0	5
7:15 AM	0	0	82	0	0	0	31	0	0	0	0	0	0	2	0	3
7:30 AM	0	0	78	0	1	0	37	0	0	0	0	0	0	1	0	4
7:45 AM	0	0	86	0	0	0	38	0	0	0	0	0	0	1	0	3
8:00 AM	0	0	85	0	1	0	37	0	0	2	0	0	0	0	0	4
8:15 AM	0	0	82	0	0	0	44	0	0	0	0	0	0	1	0	3
8:30 AM	0	0	83	0	0	0	36	0	0	0	0	0	0	1	0	3
8:45 AM	0	0	78	0	0	0	37	0	0	0	0	0	0	0	0	2

	Columbus Avenue Northbound				Columbus Avenue Southbound				Driveway Eastbound				St. Cyprians Place Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
11:00 AM	0	0	69	0	0	0	46	0	0	0	0	2	0	1	0	1
11:15 AM	0	0	67	0	0	0	53	0	0	0	0	0	0	1	0	2
11:30 AM	0	0	58	0	0	0	50	0	0	0	0	0	0	3	0	2
11:45 AM	0	0	52	0	0	0	51	1	0	1	0	0	0	2	0	3
12:00 PM	0	0	46	0	0	0	50	0	0	0	0	0	0	3	0	4
12:15 PM	0	0	47	0	0	0	51	0	0	0	0	0	0	2	0	3
12:30 PM	0	0	46	0	0	0	45	0	0	0	0	0	0	2	0	2
12:45 PM	0	0	44	0	0	0	44	0	0	0	0	0	0	1	0	2

	Columbus Avenue Northbound				Columbus Avenue Southbound				Driveway Eastbound				St. Cyprians Place Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	63	0	0	0	67	0	0	0	0	0	0	0	0	3
4:15 PM	0	0	68	0	0	0	70	0	0	0	0	0	0	1	0	2
4:30 PM	0	0	71	0	0	0	68	0	0	0	0	0	0	1	0	2
4:45 PM	0	0	72	0	0	0	75	0	0	0	0	0	0	2	0	1
5:00 PM	0	0	82	0	0	0	71	0	0	0	0	0	0	4	0	1
5:15 PM	0	0	80	0	0	0	70	0	0	0	0	0	0	3	0	0
5:30 PM	0	0	77	0	0	0	71	0	0	0	0	0	0	1	0	1
5:45 PM	0	0	73	0	0	0	73	0	0	0	0	0	0	1	0	0

AM PEAK HOUR 7:45 AM to 8:45 AM	Columbus Avenue Northbound				Columbus Avenue Southbound				Driveway Eastbound				St. Cyprians Place Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**336**	**0**	**1**	**0**	**155**	**0**	**0**	**2**	**0**	**0**	**0**	**3**	**0**	**13**
PHF			**0.98**				**0.89**				**0.25**				**1.00**	
HV %	**0.0%**	**0.0%**	**1.2%**	**0.0%**	**0.0%**	**0.0%**	**1.9%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

MID PEAK HOUR 11:00 AM to 12:00 PM	Columbus Avenue Northbound				Columbus Avenue Southbound				Driveway Eastbound				St. Cyprians Place Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**246**	**0**	**0**	**0**	**200**	**1**	**0**	**1**	**0**	**2**	**0**	**7**	**0**	**8**
PHF			**0.89**				**0.95**				**0.38**				**0.75**	
HV %	**0.0%**	**0.0%**	**0.8%**	**0.0%**	**0.0%**	**0.0%**	**1.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

PM PEAK HOUR 4:45 PM to 5:45 PM	Columbus Avenue Northbound				Columbus Avenue Southbound				Driveway Eastbound				St. Cyprians Place Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**311**	**0**	**0**	**0**	**287**	**0**	**0**	**0**	**0**	**0**	**0**	**10**	**0**	**3**
PHF			**0.95**				**0.96**				**0.00**				**0.65**	
HV %	**0.0%**	**0.0%**	**0.3%**	**0.0%**	**0.0%**	**0.0%**	**0.3%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 8
Location:	Ruggles Station, MA
Street 1:	Columbus Avenue
Street 2:	St. Cyprians Place
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

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TRUCKS

	Columbus Avenue Northbound				Columbus Avenue Southbound				Driveway Eastbound				St. Cyprians Place Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Columbus Avenue Northbound				Columbus Avenue Southbound				Driveway Eastbound				St. Cyprians Place Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
11:00 AM	0	0	0	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	0	0	0
11:30 AM	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0
11:45 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Columbus Avenue Northbound				Columbus Avenue Southbound				Driveway Eastbound				St. Cyprians Place Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AM PEAK HOUR	Columbus Avenue Northbound				Columbus Avenue Southbound				Driveway Eastbound				St. Cyprians Place Westbound			
7:45 AM																
to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
8:45 AM	**0**	**0**	**4**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PHF	**0.50**				**0.75**				**0.00**				**0.00**			

MID PEAK HOUR	Columbus Avenue Northbound				Columbus Avenue Southbound				Driveway Eastbound				St. Cyprians Place Westbound			
11:15 AM																
to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
12:15 PM	**0**	**0**	**2**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PHF	**0.50**				**0.38**				**0.00**				**0.00**			

PM PEAK HOUR	Columbus Avenue Northbound				Columbus Avenue Southbound				Driveway Eastbound				St. Cyprians Place Westbound			
4:15 PM																
to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
5:15 PM	**0**	**0**	**2**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PHF	**0.50**				**0.50**				**0.00**				**0.00**			

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 8
Location:	Ruggles Station, MA
Street 1:	Columbus Avenue
Street 2:	St. Cyprians Place
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

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PEDESTRIANS & BICYCLES

	Columbus Avenue Northbound					Columbus Avenue Southbound					Driveway Eastbound					St. Cyprians Place Westbound			
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED
7:00 AM	0	7	0	11		0	1	0	0		0	0	0	21		0	0	0	13
7:15 AM	0	9	0	12		0	2	0	0		0	0	0	45		0	0	0	17
7:30 AM	0	8	0	10		0	2	0	1		0	0	0	68		0	0	0	23
7:45 AM	0	12	0	11		0	1	0	0		0	0	0	57		0	0	0	19
8:00 AM	0	9	0	9		0	2	0	0		0	0	0	61		0	0	0	15
8:15 AM	0	12	0	8		0	3	0	1		0	0	0	57		0	0	0	12
8:30 AM	0	10	0	7		0	4	0	0		0	0	0	54		0	0	0	13
8:45 AM	0	9	0	8		0	3	0	0		0	0	0	50		0	0	0	14

	Columbus Avenue Northbound					Columbus Avenue Southbound					Driveway Eastbound					St. Cyprians Place Westbound			
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED
11:00 AM	0	6	0	8		0	1	0	0		0	0	0	61		0	0	0	17
11:15 AM	0	7	0	9		0	2	0	1		0	0	0	56		0	0	0	20
11:30 AM	0	6	0	6		0	2	0	0		0	0	0	58		0	0	0	22
11:45 AM	0	6	0	10		0	1	0	0		0	0	0	60		0	0	0	24
12:00 PM	0	7	0	7		0	2	0	2		0	0	0	63		0	0	0	26
12:15 PM	0	5	0	8		0	2	0	0		0	0	0	65		0	0	0	23
12:30 PM	0	4	0	6		0	1	0	1		0	0	0	62		0	0	0	21
12:45 PM	0	5	0	9		0	1	0	0		0	0	0	67		0	0	0	25

	Columbus Avenue Northbound					Columbus Avenue Southbound					Driveway Eastbound					St. Cyprians Place Westbound			
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED
4:00 PM	0	3	0	7		0	4	0	0		0	0	0	65		0	0	0	19
4:15 PM	0	3	0	8		0	5	0	1		0	0	0	63		0	0	0	22
4:30 PM	0	4	0	10		0	6	0	3		0	0	0	68		0	0	0	20
4:45 PM	0	3	0	9		0	7	0	0		0	0	0	70		0	0	0	18
5:00 PM	0	2	0	11		0	8	0	1		0	0	0	71		0	0	0	16
5:15 PM	0	2	0	8		0	6	0	0		0	0	0	65		0	0	0	14
5:30 PM	0	1	0	9		0	5	0	0		0	0	0	68		0	0	0	15
5:45 PM	0	2	0	7		0	4	0	0		0	0	0	62		0	0	0	17

AM PEAK HOUR 7:45 AM to 8:45 AM	Columbus Avenue Northbound					Columbus Avenue Southbound					Driveway Eastbound					St. Cyprians Place Westbound			
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED
	0	43	0	35		0	10	0	1		0	0	0	229		0	0	0	59

MID PEAK HOUR 11:00 AM to 12:00 PM	Columbus Avenue Northbound					Columbus Avenue Southbound					Driveway Eastbound					St. Cyprians Place Westbound			
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED
	0	25	0	33		0	6	0	1		0	0	0	235		0	0	0	83

PM PEAK HOUR 4:45 PM to 5:45 PM	Columbus Avenue Northbound					Columbus Avenue Southbound					Driveway Eastbound					St. Cyprians Place Westbound			
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED
	0	8	0	37		0	26	0	1		0	0	0	274		0	0	0	63

NOTE: Peak hour summaries here correspond to peak hours identified for passenger car and heavy vehicles combined.

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 9
Location:	Ruggles Station, MA
Street 1:	Columbus Avenue
Street 2:	Cunard Street
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

BOSTON TRAFFIC DATA
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TOTAL (CARS & TRUCKS)

	Columbus Avenue Northbound				Columbus Avenue Southbound				Eastbound				Cunard Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	72	9	0	8	33	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	78	7	0	5	31	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	76	6	0	4	37	0	0	0	0	0	0	0	0	0
7:45 AM	1	0	85	4	0	2	38	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	86	5	0	3	37	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	79	6	0	4	44	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	78	7	0	5	36	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	75	5	1	6	37	0	0	0	0	0	0	0	0	0

	Columbus Avenue Northbound				Columbus Avenue Southbound				Eastbound				Cunard Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
11:00 AM	0	0	67	3	0	4	46	0	0	0	0	0	0	0	0	0
11:15 AM	0	0	65	4	1	4	53	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	54	6	0	5	50	0	0	0	0	0	0	0	0	0
11:45 AM	0	0	50	5	0	3	52	0	0	0	0	0	0	0	0	0
12:00 PM	0	0	46	4	0	4	50	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	45	5	0	4	51	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	43	5	0	5	45	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	42	4	0	3	44	0	0	0	0	0	0	0	0	0

	Columbus Avenue Northbound				Columbus Avenue Southbound				Eastbound				Cunard Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	61	5	0	4	67	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	64	6	0	5	70	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	68	5	0	5	68	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	67	6	0	6	75	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	76	7	0	4	71	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	75	5	0	5	70	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	72	6	0	5	71	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	68	5	0	4	73	0	0	0	0	0	0	0	0	0

AM PEAK HOUR 7:45 AM to 8:45 AM	Columbus Avenue Northbound				Columbus Avenue Southbound				Eastbound				Cunard Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	1	**0**	**328**	**22**	**0**	**14**	**155**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PHF	**0.96**				**0.88**				**0.00**				**0.00**			
HV %	**0.0%**	**0.0%**	**1.2%**	**0.0%**	**0.0%**	**0.0%**	**1.9%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

MID PEAK HOUR 11:00 AM to 12:00 PM	Columbus Avenue Northbound				Columbus Avenue Southbound				Eastbound				Cunard Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**236**	**18**	**1**	**16**	**201**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PHF	**0.91**				**0.94**				**0.00**				**0.00**			
HV %	**0.0%**	**0.0%**	**0.8%**	**0.0%**	**0.0%**	**0.0%**	**1.5%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

PM PEAK HOUR 4:45 PM to 5:45 PM	Columbus Avenue Northbound				Columbus Avenue Southbound				Eastbound				Cunard Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**290**	**24**	**0**	**20**	**287**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PHF	**0.95**				**0.95**				**0.00**				**0.00**			
HV %	**0.0%**	**0.0%**	**0.3%**	**0.0%**	**0.0%**	**0.0%**	**0.3%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 9
Location:	Ruggles Station, MA
Street 1:	Columbus Avenue
Street 2:	Cunard Street
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

BOSTON TRAFFIC DATA
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TRUCKS

	Columbus Avenue Northbound				Columbus Avenue Southbound				Eastbound				Cunard Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Columbus Avenue Northbound				Columbus Avenue Southbound				Eastbound				Cunard Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
11:00 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
11:15 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	1	0	0	0	2	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	0	0	0
12:00 PM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Columbus Avenue Northbound				Columbus Avenue Southbound				Eastbound				Cunard Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AM PEAK HOUR	Columbus Avenue Northbound				Columbus Avenue Southbound				Eastbound				Cunard Street Westbound			
7:45 AM																
to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
8:45 AM	**0**	**0**	**4**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PHF	**0.50**				**0.75**				**0.00**				**0.00**			

MID PEAK HOUR	Columbus Avenue Northbound				Columbus Avenue Southbound				Eastbound				Cunard Street Westbound			
11:15 AM																
to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
12:15 PM	**0**	**0**	**3**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PHF	**0.75**				**0.38**				**0.00**				**0.00**			

PM PEAK HOUR	Columbus Avenue Northbound				Columbus Avenue Southbound				Eastbound				Cunard Street Westbound			
4:30 PM																
to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
5:30 PM	**0**	**0**	**2**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PHF	**0.50**				**0.50**				**0.00**				**0.00**			

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 9
Location:	Ruggles Station, MA
Street 1:	Columbus Avenue
Street 2:	Cunard Street
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

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PEDESTRIANS & BICYCLES

	Columbus Avenue Northbound					Columbus Avenue Southbound					Eastbound					Cunard Street Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
7:00 AM	0	8	0	5		0	1	0	2		0	0	0	0		0	0	0	12	
7:15 AM	0	9	0	7		0	3	0	0		0	0	0	0		0	0	0	15	
7:30 AM	0	10	0	10		0	1	0	0		0	0	0	0		0	0	0	19	
7:45 AM	0	11	0	11		0	2	0	1		0	0	0	0		0	0	0	14	
8:00 AM	0	10	0	8		0	2	0	0		0	0	0	0		0	0	0	16	
8:15 AM	0	11	0	9		0	4	0	0		0	0	0	0		0	0	0	14	
8:30 AM	0	9	0	12		0	4	0	1		0	0	0	0		0	0	0	15	
8:45 AM	0	10	0	10		0	3	0	0		0	0	0	0		0	0	0	16	

	Columbus Avenue Northbound					Columbus Avenue Southbound					Eastbound					Cunard Street Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
11:00 AM	0	7	0	11		0	1	0	0		0	0	0	0		0	0	0	13	
11:15 AM	0	6	0	10		0	2	0	1		0	0	0	0		0	0	0	11	
11:30 AM	0	8	0	13		0	1	0	0		0	0	0	0		0	0	0	16	
11:45 AM	0	6	0	15		0	2	0	0		0	0	0	0		0	0	0	19	
12:00 PM	0	6	0	14		0	3	0	1		0	0	0	0		0	0	0	23	
12:15 PM	0	4	0	16		0	1	0	0		0	0	0	0		0	0	0	26	
12:30 PM	0	5	0	13		0	2	0	0		0	0	0	0		0	0	0	22	
12:45 PM	0	6	0	11		0	1	0	0		0	0	0	0		0	0	0	20	

	Columbus Avenue Northbound					Columbus Avenue Southbound					Eastbound					Cunard Street Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
4:00 PM	0	4	0	12		0	5	0	0		0	0	0	0		0	0	0	17	
4:15 PM	0	3	0	11		0	4	0	0		0	0	0	0		0	0	0	19	
4:30 PM	0	3	0	10		0	5	0	1		0	0	0	0		0	0	0	21	
4:45 PM	0	4	0	12		0	4	0	0		0	0	0	0		0	0	0	17	
5:00 PM	0	2	0	8		0	7	0	0		0	0	0	0		0	0	0	15	
5:15 PM	0	3	0	9		0	7	0	0		0	0	0	0		0	0	0	12	
5:30 PM	0	2	0	10		0	6	0	0		0	0	0	0		0	0	0	14	
5:45 PM	0	1	0	8		0	5	0	0		0	0	0	0		0	0	0	13	

AM PEAK HOUR 7:45 AM to 8:45 AM	Columbus Avenue Northbound					Columbus Avenue Southbound					Eastbound					Cunard Street Westbound				
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	41	0	40		0	12	0	2		0	0	0	0		0	0	0	59	

MID PEAK HOUR 11:00 AM to 12:00 PM	Columbus Avenue Northbound					Columbus Avenue Southbound					Eastbound					Cunard Street Westbound				
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	27	0	49		0	6	0	1		0	0	0	0		0	0	0	59	

PM PEAK HOUR 4:45 PM to 5:45 PM	Columbus Avenue Northbound					Columbus Avenue Southbound					Eastbound					Cunard Street Westbound				
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	11	0	39		0	24	0	0		0	0	0	0		0	0	0	58	

NOTE: Peak hour summaries here correspond to peak hours identified for passenger car and heavy vehicles combined.

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 10
Location:	Ruggles Station, MA
Street 1:	Columbus Avenue
Street 2:	Coventry Street
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

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TOTAL (CARS & TRUCKS)

	Columbus Avenue Northbound				Columbus Avenue Southbound				Driveway Eastbound				Coventry Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	1	2	70	0	0	0	41	0	0	0	0	0	0	0	0	4
7:15 AM	0	0	78	0	0	0	36	0	0	0	0	0	0	1	0	2
7:30 AM	0	0	76	0	0	0	39	3	0	0	0	2	0	0	0	1
7:45 AM	0	1	84	0	1	0	40	0	0	0	0	0	0	2	0	3
8:00 AM	1	0	86	0	0	0	37	0	0	0	0	1	0	2	0	7
8:15 AM	0	1	78	0	0	0	48	1	0	1	0	0	0	0	0	5
8:30 AM	0	0	78	0	0	0	40	0	0	0	0	0	0	1	0	4
8:45 AM	0	0	75	0	0	0	42	0	0	0	0	0	0	1	0	3

	Columbus Avenue Northbound				Columbus Avenue Southbound				Driveway Eastbound				Coventry Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
11:00 AM	0	1	66	0	0	0	46	1	0	2	0	1	0	3	0	3
11:15 AM	0	0	65	0	1	0	56	0	0	0	0	0	0	1	0	5
11:30 AM	0	0	54	0	0	0	53	0	0	0	0	0	0	2	0	4
11:45 AM	0	1	49	0	0	0	51	0	0	1	0	1	0	3	0	5
12:00 PM	1	0	46	0	1	0	52	0	0	2	0	0	0	2	0	5
12:15 PM	0	0	45	0	0	0	54	1	0	0	0	0	0	1	0	3
12:30 PM	0	0	43	0	0	0	49	0	0	0	0	0	0	1	0	2
12:45 PM	0	0	42	0	0	0	45	0	0	0	0	0	0	2	0	3

	Columbus Avenue Northbound				Columbus Avenue Southbound				Driveway Eastbound				Coventry Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	61	0	3	0	67	0	0	1	0	1	0	3	0	8
4:15 PM	1	1	63	0	0	0	73	0	0	0	0	0	0	2	0	5
4:30 PM	0	0	68	0	1	0	71	0	0	0	0	0	0	2	0	4
4:45 PM	0	0	67	0	0	0	79	0	0	0	0	1	0	1	0	3
5:00 PM	1	0	76	0	0	0	73	0	0	0	0	0	0	2	0	4
5:15 PM	0	0	75	0	1	0	74	0	0	0	0	0	0	1	0	3
5:30 PM	0	0	72	0	1	0	76	0	0	0	0	0	0	0	0	2
5:45 PM	0	0	68	0	0	0	76	0	0	0	0	0	0	1	0	2

AM PEAK HOUR 7:45 AM to 8:45 AM	Columbus Avenue Northbound				Columbus Avenue Southbound				Driveway Eastbound				Coventry Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	1	**2**	**326**	**0**	**1**	**0**	**165**	**1**	**0**	**1**	**0**	**1**	**0**	**5**	**0**	**19**
PHF		**0.95**				**0.85**				**0.50**				**0.67**		
HV %	**0.0%**	**0.0%**	**0.6%**	**0.0%**	**0.0%**	**0.0%**	**1.8%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**20.0%**	**0.0%**	**0.0%**

MID PEAK HOUR 11:00 AM to 12:00 PM	Columbus Avenue Northbound				Columbus Avenue Southbound				Driveway Eastbound				Coventry Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**2**	**234**	**0**	**1**	**0**	**206**	**1**	**0**	**3**	**0**	**2**	**0**	**9**	**0**	**17**
PHF		**0.88**				**0.91**				**0.42**				**0.81**		
HV %	**0.0%**	**0.0%**	**0.9%**	**0.0%**	**0.0%**	**0.0%**	**1.9%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

PM PEAK HOUR 4:45 PM to 5:45 PM	Columbus Avenue Northbound				Columbus Avenue Southbound				Driveway Eastbound				Coventry Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	1	**0**	**290**	**0**	**2**	**0**	**302**	**0**	**0**	**0**	**0**	**1**	**0**	**4**	**0**	**12**
PHF		**0.94**				**0.96**				**0.25**				**0.67**		
HV %	**0.0%**	**0.0%**	**0.3%**	**0.0%**	**0.0%**	**0.0%**	**0.3%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 10
Location:	Ruggles Station, MA
Street 1:	Columbus Avenue
Street 2:	Coventry Street
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

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TRUCKS

	Columbus Avenue Northbound				Columbus Avenue Southbound				Driveway Eastbound				Coventry Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
7:45 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0
8:00 AM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0

	Columbus Avenue Northbound				Columbus Avenue Southbound				Driveway Eastbound				Coventry Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
11:00 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
11:15 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Columbus Avenue Northbound				Columbus Avenue Southbound				Driveway Eastbound				Coventry Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AM PEAK HOUR 7:15 AM to 8:15 AM	Columbus Avenue Northbound				Columbus Avenue Southbound				Driveway Eastbound				Coventry Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**2**	**0**	**0**	**0**	**3**	**1**	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**0**
PHF	**0.50**				**1.00**				**0.25**				**0.25**			

MID PEAK HOUR 11:00 AM to 12:00 PM	Columbus Avenue Northbound				Columbus Avenue Southbound				Driveway Eastbound				Coventry Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**2**	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PHF	**0.50**				**0.50**				**0.00**				**0.00**			

PM PEAK HOUR 4:00 PM to 5:00 PM	Columbus Avenue Northbound				Columbus Avenue Southbound				Driveway Eastbound				Coventry Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**1**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PHF	**0.25**				**0.50**				**0.00**				**0.00**			

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 10
Location:	Ruggles Station, MA
Street 1:	Columbus Avenue
Street 2:	Coventry Street
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

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PEDESTRIANS & BICYCLES

	Columbus Avenue Northbound					Columbus Avenue Southbound					Driveway Eastbound					Coventry Street Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
7:00 AM	0	8	0	0		0	1	0	0		0	0	0	23		0	0	0	14	
7:15 AM	0	10	0	0		0	3	0	0		0	0	0	48		0	0	0	16	
7:30 AM	0	8	0	1		0	2	0	0		0	0	0	62		0	0	0	17	
7:45 AM	0	11	0	0		0	3	0	1		0	0	0	52		0	0	0	16	
8:00 AM	0	10	0	1		0	2	0	2		0	0	0	57		0	0	0	18	
8:15 AM	0	11	0	0		0	2	0	0		0	0	0	53		0	0	0	13	
8:30 AM	0	12	0	2		0	4	0	1		0	0	0	57		0	0	0	16	
8:45 AM	0	10	0	0		0	3	0	0		0	0	0	52		0	0	0	17	

	Columbus Avenue Northbound					Columbus Avenue Southbound					Driveway Eastbound					Coventry Street Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
11:00 AM	0	7	0	0		0	1	0	1		0	0	0	57		0	0	0	12	
11:15 AM	0	6	0	1		0	2	0	0		0	0	0	54		0	0	0	13	
11:30 AM	0	8	0	0		0	1	0	1		0	0	0	56		0	0	0	17	
11:45 AM	0	5	0	0		0	3	0	0		0	0	0	54		0	0	0	20	
12:00 PM	0	8	0	1		0	2	0	0		0	0	0	58		0	0	0	22	
12:15 PM	0	6	0	1		0	2	0	1		0	0	0	61		0	0	0	25	
12:30 PM	0	5	0	0		0	1	0	0		0	0	0	60		0	0	0	27	
12:45 PM	0	6	0	0		0	2	0	0		0	0	0	63		0	0	0	22	

	Columbus Avenue Northbound					Columbus Avenue Southbound					Driveway Eastbound					Coventry Street Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
4:00 PM	0	4	0	1		0	4	0	0		0	0	0	62		0	0	0	19	
4:15 PM	0	3	0	0		0	5	0	1		0	0	0	58		0	0	0	22	
4:30 PM	0	3	0	0		0	7	0	0		0	0	0	63		0	0	0	20	
4:45 PM	0	4	0	1		0	8	0	2		0	0	0	66		0	0	0	18	
5:00 PM	0	2	0	1		0	8	0	0		0	0	0	64		0	0	0	14	
5:15 PM	0	1	0	0		0	7	0	1		0	0	0	60		0	0	0	15	
5:30 PM	0	2	0	0		0	5	0	0		0	0	0	62		0	0	0	16	
5:45 PM	0	2	0	0		0	5	0	0		0	0	0	57		0	0	0	12	

AM PEAK HOUR	Columbus Avenue Northbound					Columbus Avenue Southbound					Driveway Eastbound					Coventry Street Westbound				
7:45 AM																				
to	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
8:45 AM	0	44	0	3		0	11	0	4		0	0	0	219		0	0	0	63	

MID PEAK HOUR	Columbus Avenue Northbound					Columbus Avenue Southbound					Driveway Eastbound					Coventry Street Westbound				
11:00 AM																				
to	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
12:00 PM	0	26	0	1		0	7	0	2		0	0	0	221		0	0	0	62	

PM PEAK HOUR	Columbus Avenue Northbound					Columbus Avenue Southbound					Driveway Eastbound					Coventry Street Westbound				
4:45 PM																				
to	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
5:45 PM	0	9	0	2		0	28	0	3		0	0	0	252		0	0	0	63	

NOTE: Peak hour summaries here correspond to peak hours identified for passenger car and heavy vehicles combined.

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 11
Location:	Ruggles Station, MA
Street 1:	Columbus Avenue
Street 2:	Burke Street
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

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TOTAL (CARS & TRUCKS)

	Columbus Avenue Northbound				Columbus Avenue Southbound				Parking Garage Driveway Eastbound				Burke Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	14	59	1	0	2	39	11	0	5	0	2	0	0	0	0
7:15 AM	0	12	66	2	0	2	30	13	0	4	0	6	0	0	0	0
7:30 AM	0	13	62	2	0	4	38	15	0	4	0	4	0	0	0	0
7:45 AM	0	14	70	4	0	3	37	17	0	5	0	3	0	0	0	0
8:00 AM	1	12	77	3	0	4	30	19	0	3	0	6	0	0	0	0
8:15 AM	0	13	68	3	1	3	48	21	0	2	0	1	0	0	0	0
8:30 AM	0	11	69	2	0	2	38	19	0	3	0	2	0	0	0	0
8:45 AM	0	10	66	2	0	2	41	18	0	2	0	1	0	0	0	0

	Columbus Avenue Northbound				Columbus Avenue Southbound				Parking Garage Driveway Eastbound				Burke Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
11:00 AM	1	10	59	1	0	2	44	4	0	8	1	2	0	0	0	0
11:15 AM	0	12	58	1	1	1	54	5	0	2	0	3	0	0	0	0
11:30 AM	0	11	45	2	0	2	49	5	0	3	0	4	0	0	0	0
11:45 AM	0	10	42	3	0	3	48	6	0	4	1	3	0	0	0	0
12:00 PM	0	12	41	1	1	5	49	5	0	2	0	4	0	0	0	0
12:15 PM	1	11	34	2	0	6	48	6	0	3	0	5	0	0	0	0
12:30 PM	0	10	35	1	0	4	45	7	0	2	0	4	0	0	0	0
12:45 PM	0	9	34	2	1	2	42	5	0	4	0	3	0	0	0	0

	Columbus Avenue Northbound				Columbus Avenue Southbound				Parking Garage Driveway Eastbound				Burke Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	1	3	65	4	0	1	56	10	0	16	2	13	0	0	0	0
4:15 PM	0	5	60	3	1	0	62	12	0	13	6	11	0	0	0	0
4:30 PM	0	4	66	3	0	2	59	11	0	14	4	13	0	0	0	0
4:45 PM	1	4	61	4	0	1	61	9	0	15	3	17	0	0	0	0
5:00 PM	0	5	73	2	1	2	53	8	0	18	3	20	0	0	0	0
5:15 PM	1	3	72	3	0	1	58	7	0	21	2	16	0	0	0	0
5:30 PM	0	2	71	2	0	1	60	5	0	19	1	17	0	0	0	0
5:45 PM	0	2	66	2	0	0	61	4	0	17	2	15	0	0	0	0

AM PEAK HOUR 7:45 AM to 8:45 AM	Columbus Avenue Northbound				Columbus Avenue Southbound				Parking Garage Driveway Eastbound				Burke Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	1	**50**	**284**	**12**	**1**	**12**	**153**	**76**	**0**	**13**	**0**	**12**	**0**	**0**	**0**	**0**
PHF	**0.93**				**0.83**				**0.69**				**0.00**			
HV %	**0.0%**	**0.0%**	**0.7%**	**0.0%**	**0.0%**	**0.0%**	**1.3%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

MID PEAK HOUR 11:00 AM to 12:00 PM	Columbus Avenue Northbound				Columbus Avenue Southbound				Parking Garage Driveway Eastbound				Burke Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	1	**43**	**204**	**7**	**1**	**8**	**195**	**20**	**0**	**17**	**2**	**12**	**0**	**0**	**0**	**0**
PHF	**0.90**				**0.92**				**0.70**				**0.00**			
HV %	**0.0%**	**0.0%**	**1.0%**	**0.0%**	**0.0%**	**0.0%**	**2.1%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

PM PEAK HOUR 4:45 PM to 5:45 PM	Columbus Avenue Northbound				Columbus Avenue Southbound				Parking Garage Driveway Eastbound				Burke Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	2	**14**	**277**	**11**	**1**	**5**	**232**	**29**	**0**	**73**	**9**	**70**	**0**	**0**	**0**	**0**
PHF	**0.95**				**0.94**				**0.93**				**0.00**			
HV %	**0.0%**	**0.0%**	**0.4%**	**0.0%**	**0.0%**	**0.0%**	**0.4%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 11
Location:	Ruggles Station, MA
Street 1:	Columbus Avenue
Street 2:	Burke Street
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

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TRUCKS

	Columbus Avenue Northbound				Columbus Avenue Southbound				Parking Garage Driveway Eastbound				Burke Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0

	Columbus Avenue Northbound				Columbus Avenue Southbound				Parking Garage Driveway Eastbound				Burke Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
11:00 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
11:15 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
11:45 AM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Columbus Avenue Northbound				Columbus Avenue Southbound				Parking Garage Driveway Eastbound				Burke Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AM PEAK HOUR 7:15 AM to 8:15 AM	Columbus Avenue Northbound				Columbus Avenue Southbound				Parking Garage Driveway Eastbound				Burke Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**2**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PHF	**0.50**				**0.75**				**0.00**				**0.00**			

MID PEAK HOUR 11:00 AM to 12:00 PM	Columbus Avenue Northbound				Columbus Avenue Southbound				Parking Garage Driveway Eastbound				Burke Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**2**	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PHF	**0.50**				**0.50**				**0.00**				**0.00**			

PM PEAK HOUR 4:00 PM to 5:00 PM	Columbus Avenue Northbound				Columbus Avenue Southbound				Parking Garage Driveway Eastbound				Burke Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**2**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PHF	**0.50**				**0.50**				**0.00**				**0.00**			

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 11
Location:	Ruggles Station, MA
Street 1:	Columbus Avenue
Street 2:	Burke Street
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

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PEDESTRIANS & BICYCLES

	Columbus Avenue Northbound					Columbus Avenue Southbound					Parking Garage Driveway Eastbound					Burke Street Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
7:00 AM	0	9	0	7		0	2	0	0		0	0	0	27		0	0	0	16	
7:15 AM	0	10	0	10		0	4	0	0		0	0	0	50		0	0	0	19	
7:30 AM	0	9	0	13		0	3	0	1		0	0	0	56		0	0	0	18	
7:45 AM	0	12	0	17		0	3	0	0		0	0	0	47		0	0	0	17	
8:00 AM	0	11	0	15		0	4	0	0		0	0	0	53		0	0	0	18	
8:15 AM	0	10	0	16		0	3	0	1		0	0	0	55		0	0	0	15	
8:30 AM	0	11	0	14		0	4	0	0		0	0	0	52		0	0	0	19	
8:45 AM	0	12	0	17		0	3	0	1		0	0	0	50		0	0	0	16	

	Columbus Avenue Northbound					Columbus Avenue Southbound					Parking Garage Driveway Eastbound					Burke Street Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
11:00 AM	0	7	0	9		0	2	0	0		0	0	0	54		0	0	0	14	
11:15 AM	0	8	0	7		0	2	0	1		0	0	0	51		0	0	0	15	
11:30 AM	0	7	0	10		0	1	0	0		0	0	0	55		0	0	0	18	
11:45 AM	0	6	0	8		0	3	0	0		0	0	0	57		0	0	0	19	
12:00 PM	0	7	0	11		0	2	0	1		0	0	0	53		0	0	0	20	
12:15 PM	0	8	0	10		0	3	0	0		0	0	0	57		0	0	0	23	
12:30 PM	0	5	0	9		0	2	0	1		0	0	0	54		0	0	0	26	
12:45 PM	0	7	0	12		0	2	0	0		0	0	0	55		0	0	0	23	

	Columbus Avenue Northbound					Columbus Avenue Southbound					Parking Garage Driveway Eastbound					Burke Street Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
4:00 PM	0	4	0	13		0	4	0	1		0	0	0	56		0	0	0	21	
4:15 PM	0	4	0	15		0	6	0	0		0	0	0	54		0	0	0	25	
4:30 PM	0	5	0	17		0	6	0	1		0	0	0	60		0	0	0	21	
4:45 PM	0	3	0	19		0	7	0	1		0	0	0	62		0	0	0	17	
5:00 PM	0	2	0	16		0	8	0	0		0	0	0	59		0	0	0	15	
5:15 PM	0	2	0	20		0	6	0	1		0	0	0	63		0	0	0	14	
5:30 PM	0	3	0	18		0	5	0	0		0	0	0	58		0	0	0	13	
5:45 PM	0	2	0	16		0	6	0	0		0	0	0	60		0	0	0	15	

AM PEAK HOUR 7:45 AM to 8:45 AM	Columbus Avenue Northbound					Columbus Avenue Southbound					Parking Garage Driveway Eastbound					Burke Street Westbound				
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	44	0	62		0	14	0	1		0	0	0	207		0	0	0	69	

MID PEAK HOUR 11:00 AM to 12:00 PM	Columbus Avenue Northbound					Columbus Avenue Southbound					Parking Garage Driveway Eastbound					Burke Street Westbound				
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	28	0	34		0	8	0	1		0	0	0	217		0	0	0	66	

PM PEAK HOUR 4:45 PM to 5:45 PM	Columbus Avenue Northbound					Columbus Avenue Southbound					Parking Garage Driveway Eastbound					Burke Street Westbound				
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	10	0	73		0	26	0	2		0	0	0	242		0	0	0	59	

NOTE: Peak hour summaries here correspond to peak hours identified for passenger car and heavy vehicles combined.

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 12
Location:	Ruggles Station, MA
Street 1:	Columbus Avenue
Street 2:	Massachusetts Avenue
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

BOSTON TRAFFIC DATA
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TOTAL (CARS & TRUCKS)

	Columbus Avenue Northbound				Columbus Avenue Southbound				Massachusetts Avenue Eastbound				Massachusetts Avenue Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	37	35	10	0	23	27	6	0	8	93	28	0	3	84	22
7:15 AM	0	44	37	9	0	25	30	7	0	7	101	27	1	5	89	24
7:30 AM	0	49	40	9	0	26	29	8	0	7	108	29	0	4	90	25
7:45 AM	0	54	42	10	0	23	28	9	0	8	116	28	0	5	92	27
8:00 AM	0	61	45	9	0	24	29	11	0	6	124	27	1	6	94	29
8:15 AM	0	56	43	8	0	21	27	10	0	7	118	25	0	6	96	28
8:30 AM	0	53	41	8	0	18	26	8	0	6	113	26	0	5	95	26
8:45 AM	0	48	37	7	0	19	25	9	0	6	109	24	0	5	93	25

	Columbus Avenue Northbound				Columbus Avenue Southbound				Massachusetts Avenue Eastbound				Massachusetts Avenue Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
11:00 AM	0	37	34	9	0	18	37	14	0	6	102	29	0	5	125	17
11:15 AM	0	36	36	10	0	17	39	15	0	7	99	30	0	4	128	15
11:30 AM	0	35	38	8	0	20	38	16	0	8	98	32	1	4	126	18
11:45 AM	0	37	39	9	0	25	36	13	0	11	95	34	0	5	129	16
12:00 PM	0	34	41	8	0	27	33	14	0	13	93	36	0	5	127	17
12:15 PM	0	35	39	9	0	31	34	12	0	12	94	35	3	6	131	15
12:30 PM	0	33	37	7	0	29	35	13	0	11	91	33	0	4	128	16
12:45 PM	0	31	35	7	0	28	32	11	0	9	92	31	0	5	126	17

	Columbus Avenue Northbound				Columbus Avenue Southbound				Massachusetts Avenue Eastbound				Massachusetts Avenue Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	59	50	12	0	38	49	14	0	14	153	42	0	4	126	18
4:15 PM	0	55	51	11	0	40	52	16	0	12	148	40	0	5	130	21
4:30 PM	0	51	52	10	0	39	49	15	0	13	145	38	0	5	128	19
4:45 PM	0	49	49	9	0	37	45	17	0	14	137	37	1	6	124	20
5:00 PM	0	46	51	7	0	35	43	16	0	13	134	35	0	5	122	21
5:15 PM	0	45	53	8	0	34	41	17	0	15	136	33	0	5	119	19
5:30 PM	0	44	47	7	0	32	42	18	0	12	128	31	0	4	116	20
5:45 PM	0	42	45	7	0	31	39	16	0	11	125	29	0	4	114	18

AM PEAK HOUR 7:45 AM	Columbus Avenue Northbound				Columbus Avenue Southbound				Massachusetts Avenue Eastbound				Massachusetts Avenue Westbound			
to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
8:45 AM	**0**	**224**	**171**	**35**	**0**	**86**	**110**	**38**	**0**	**27**	**471**	**106**	**1**	**22**	**377**	**110**
PHF		**0.93**				**0.91**				**0.96**				**0.98**		
HV %	**0.0%**	**0.4%**	**1.8%**	**0.0%**	**0.0%**	**0.0%**	**1.8%**	**2.6%**	**0.0%**	**7.4%**	**1.7%**	**1.9%**	**0.0%**	**9.1%**	**2.7%**	**0.9%**

MID PEAK HOUR 11:30 AM	Columbus Avenue Northbound				Columbus Avenue Southbound				Massachusetts Avenue Eastbound				Massachusetts Avenue Westbound			
to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
12:30 PM	**0**	**141**	**157**	**34**	**0**	**103**	**141**	**55**	**0**	**44**	**380**	**137**	**4**	**20**	**513**	**66**
PHF		**0.98**				**0.97**				**0.99**				**0.97**		
HV %	**0.0%**	**0.7%**	**1.3%**	**0.0%**	**0.0%**	**1.0%**	**2.1%**	**1.8%**	**0.0%**	**4.5%**	**1.1%**	**0.7%**	**0.0%**	**5.0%**	**1.4%**	**1.5%**

PM PEAK HOUR 4:00 PM	Columbus Avenue Northbound				Columbus Avenue Southbound				Massachusetts Avenue Eastbound				Massachusetts Avenue Westbound			
to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
5:00 PM	**0**	**214**	**202**	**42**	**0**	**154**	**195**	**62**	**0**	**53**	**583**	**157**	**1**	**20**	**508**	**78**
PHF		**0.95**				**0.95**				**0.95**				**0.97**		
HV %	**0.0%**	**0.5%**	**1.0%**	**0.0%**	**0.0%**	**0.0%**	**1.0%**	**1.6%**	**0.0%**	**1.9%**	**0.9%**	**0.6%**	**0.0%**	**5.0%**	**0.4%**	**1.3%**

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 12
Location:	Ruggles Station, MA
Street 1:	Columbus Avenue
Street 2:	Massachusetts Avenue
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

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TRUCKS

	Columbus Avenue Northbound				Columbus Avenue Southbound				Massachusetts Avenue Eastbound				Massachusetts Avenue Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	0
7:30 AM	0	0	1	1	0	1	1	2	0	0	2	1	0	0	4	0
7:45 AM	0	0	1	0	0	0	0	0	0	1	2	0	0	1	3	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0
8:15 AM	0	0	1	0	0	0	1	0	0	1	2	1	0	0	2	0
8:30 AM	0	1	1	0	0	0	1	1	0	0	3	1	0	1	3	1
8:45 AM	0	0	1	0	0	0	0	0	0	0	1	0	0	0	2	0

	Columbus Avenue Northbound				Columbus Avenue Southbound				Massachusetts Avenue Eastbound				Massachusetts Avenue Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
11:00 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	1	2	0
11:15 AM	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0
11:30 AM	0	1	0	0	0	1	2	0	0	1	2	1	0	0	4	0
11:45 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1
12:00 PM	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0
12:15 PM	0	0	1	0	0	0	1	0	0	1	1	0	0	0	2	0
12:30 PM	0	0	1	0	0	0	1	0	0	0	3	1	0	0	1	1
12:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0

	Columbus Avenue Northbound				Columbus Avenue Southbound				Massachusetts Avenue Eastbound				Massachusetts Avenue Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	1	0	0	1	1	1	0	0	1	0
4:30 PM	0	0	1	0	0	0	0	1	0	0	2	0	0	1	0	1
4:45 PM	0	1	0	0	0	0	0	0	0	0	1	0	0	0	1	0
5:00 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	2	0
5:15 PM	0	0	1	0	0	0	0	0	0	0	2	1	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AM PEAK HOUR 7:30 AM to 8:30 AM	Columbus Avenue Northbound				Columbus Avenue Southbound				Massachusetts Avenue Eastbound				Massachusetts Avenue Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**3**	**1**	**0**	**1**	**2**	**2**	**0**	**2**	**7**	**2**	**0**	**1**	**11**	**0**
PHF	**0.50**				**0.31**				**0.69**				**0.75**			

MID PEAK HOUR 11:30 AM to 12:30 PM	Columbus Avenue Northbound				Columbus Avenue Southbound				Massachusetts Avenue Eastbound				Massachusetts Avenue Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**1**	**2**	**0**	**0**	**1**	**3**	**1**	**0**	**2**	**4**	**1**	**0**	**1**	**7**	**1**
PHF	**0.75**				**0.42**				**0.44**				**0.56**			

PM PEAK HOUR 4:15 PM to 5:15 PM	Columbus Avenue Northbound				Columbus Avenue Southbound				Massachusetts Avenue Eastbound				Massachusetts Avenue Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**1**	**1**	**0**	**0**	**0**	**2**	**1**	**0**	**2**	**4**	**1**	**0**	**1**	**4**	**1**
PHF	**0.50**				**0.75**				**0.58**				**0.75**			

Client:	Michael White
Project #:	268_090_HSH
BTD #:	Location 12
Location:	Ruggles Station, MA
Street 1:	Columbus Avenue
Street 2:	Massachusetts Avenue
Count Date:	12/13/2018
Day of Week:	Thursday
Weather:	Partly Sunny, 30°F

BOSTON TRAFFIC DATA
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PEDESTRIANS & BICYCLES

	Columbus Avenue Northbound					Columbus Avenue Southbound					Massachusetts Avenue Eastbound					Massachusetts Avenue Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
7:00 AM	2	7	0	23		0	3	0	12		0	1	0	10		0	0	0	5	
7:15 AM	2	10	0	27		0	4	0	14		0	3	0	13		0	1	0	4	
7:30 AM	3	6	0	30		0	3	0	15		0	3	0	12		0	1	0	6	
7:45 AM	3	8	1	33		1	3	0	17		0	2	0	14		0	2	0	7	
8:00 AM	4	6	0	31		0	3	0	13		0	3	0	17		0	0	0	8	
8:15 AM	4	7	0	29		0	4	0	15		0	2	0	18		0	1	0	12	
8:30 AM	6	6	0	32		0	4	0	12		0	3	0	20		0	2	0	9	
8:45 AM	5	7	0	28		0	3	0	14		0	2	0	17		0	1	0	10	

	Columbus Avenue Northbound					Columbus Avenue Southbound					Massachusetts Avenue Eastbound					Massachusetts Avenue Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
11:00 AM	3	4	0	15		0	2	0	14		0	1	0	12		0	0	0	8	
11:15 AM	4	5	0	18		0	1	0	18		0	2	0	11		0	1	0	11	
11:30 AM	3	4	0	17		0	3	0	16		0	2	0	13		0	2	0	7	
11:45 AM	3	3	0	19		0	2	0	14		0	1	0	15		0	0	0	9	
12:00 PM	4	3	0	20		0	2	0	15		0	3	0	14		0	1	0	8	
12:15 PM	3	5	0	18		0	2	0	13		0	2	0	15		0	0	0	7	
12:30 PM	2	3	0	22		0	3	0	11		0	1	0	16		0	2	0	6	
12:45 PM	3	4	0	20		0	2	0	12		0	2	0	14		0	0	0	7	

	Columbus Avenue Northbound					Columbus Avenue Southbound					Massachusetts Avenue Eastbound					Massachusetts Avenue Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
4:00 PM	1	3	0	27		0	4	0	11		0	2	0	10		0	1	0	12	
4:15 PM	0	4	0	29		0	5	0	12		0	1	0	12		0	1	0	15	
4:30 PM	2	3	0	32		1	4	0	14		0	1	0	9		0	0	0	14	
4:45 PM	0	3	0	34		0	5	1	13		0	3	0	10		0	2	0	17	
5:00 PM	0	2	0	37		0	7	0	15		0	1	0	15		0	0	0	15	
5:15 PM	1	1	0	32		0	6	0	17		0	0	0	18		0	1	0	16	
5:30 PM	1	2	0	35		0	6	0	12		0	2	0	22		0	1	0	12	
5:45 PM	0	2	0	31		0	7	0	14		0	0	0	17		0	0	0	11	

AM PEAK HOUR	Columbus Avenue Northbound					Columbus Avenue Southbound					Massachusetts Avenue Eastbound					Massachusetts Avenue Westbound				
7:45 AM																				
to	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
8:45 AM	17	27	1	125		1	14	0	57		0	10	0	69		0	5	0	36	

MID PEAK HOUR	Columbus Avenue Northbound					Columbus Avenue Southbound					Massachusetts Avenue Eastbound					Massachusetts Avenue Westbound				
11:30 AM																				
to	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
12:30 PM	13	15	0	74		0	9	0	58		0	8	0	57		0	3	0	31	

PM PEAK HOUR	Columbus Avenue Northbound					Columbus Avenue Southbound					Massachusetts Avenue Eastbound					Massachusetts Avenue Westbound				
4:00 PM																				
to	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
5:00 PM	3	13	0	122		1	18	1	50		0	7	0	41		0	4	0	58	

NOTE: Peak hour summaries here correspond to peak hours identified for passenger car and heavy vehicles combined.

Massachusetts Highway Department
Statewide Traffic Data Collection
2017 Weekday Seasonal Factors

Factor Group	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Axle Factor
R1	1.30	1.23	1.21	1.04	0.98	0.92	0.86	0.81	0.95	0.99	1.03	1.10	0.80
R2	0.95	0.96	0.98	0.97	0.97	0.93	0.97	0.94	0.96	0.90	0.92	0.93	0.96
R3	1.05	1.01	1.04	0.99	0.94	0.93	0.91	0.92	0.96	0.94	1.01	1.03	0.97
R4-R7	1.10	1.07	1.09	1.00	0.95	0.89	0.88	0.87	0.92	0.95	1.04	1.09	0.93
U1-Boston	1.01	1.04	0.99	0.94	0.93	0.92	0.96	0.93	0.94	0.93	0.95	0.98	0.95
U1-Essex	1.04	1.05	1.00	0.96	0.93	0.89	0.90	0.90	0.93	0.93	0.98	1.03	0.90
U1-Southeast	1.07	1.05	1.02	0.97	0.95	0.90	0.89	0.88	0.92	0.94	0.98	1.01	0.97
U1-West	1.00	0.96	0.94	0.92	0.93	0.92	0.95	0.93	0.92	0.92	0.97	0.97	0.89
U1-Worcester	1.10	1.10	1.04	0.97	0.95	0.94	0.93	0.91	0.95	0.96	0.98	1.04	0.89
U2	1.01	1.03	0.98	0.95	0.93	0.91	0.94	0.92	0.95	0.95	0.95	0.97	0.98
U3	1.03	1.05	1.01	0.95	0.92	0.90	0.94	0.93	0.93	0.92	0.96	0.99	0.96
U4-U7	1.06	1.05	1.02	0.96	0.92	0.89	0.95	0.95	0.92	0.92	0.98	1.03	0.98
Rec - East	1.18	1.17	1.08	1.03	0.95	0.87	0.83	0.83	0.97	0.98	1.19	1.19	0.98
Rec - West	1.30	1.23	1.32	1.18	0.95	0.82	0.70	0.69	0.97	0.96	1.16	1.15	0.95

Round off:
0-999 = 10
>1000 = 100

U = Urban
R = Rural

1 - Interstate
2 - Freeway and Expressway
3 - Other Principal Arterial
4 - Minor Arterial
5 - Major Collector
6 - Minor Collector
7 - Local Road and Street

Recreational - East Group - Cape Cod (all towns) including the town of Plymouth south of Route 3A (stations 7014,7079,7080,7090,7091,7092,7093,7094,7095,7096,7097,7108 and 7178), Martha's Vineyard and Nantucket.

Recreational - West Group - Continuous Stations 2 and 189 including stations 1066,1067,1083,1084,1085,1086,1087,1088,1089,1090,1091,1092,1093,1094,1095,1096,1097,1098,1099,1100,1101,1102,1103,1104,1105,1106,1107,1108,1113,1114,1116,2196,2197 and 2198.

Northeastern EXP Building (EPNF)
Trip Generation Assessment

HOWARD STEIN HUDSON
8-Apr-2019

Land Use	Size	Category	Directional Split	Average Trip Rate	Unadjusted Person-Trips	Transit Share[3]	Transit Person-Trips	Walk/Bike/ Other Share[3]	Walk/ Bike/ Other Trips	Auto Share[3]	Auto Person-Trips	Ride Hail Share	Ride Hail Person-Trips	Assumed Local Auto Occupancy Rate[4]	Assumed Local Auto Occupancy Rate for Ride Hail[5]	Total Adjusted Private Auto Trips	Total Adjusted Ride HailTrips	Total Adjusted Auto (Private + Taxi) Trips
Daily Peak Hour																		
EXP Students[6]	593	Total		3.280	1,946	32%	**622**	61%	**1,188**	5%	**98**	2%	**38**	1.25	1.13	**78**	**68**	**146**
	Students	In	50%	1.640	973	32%	**311**	61%	**594**	5%	**49**	2%	**19**	1.25	1.13	**39**	**34**	**73**
		Out	50%	1.640	973	32%	**311**	61%	**594**	5%	**49**	2%	**19**	1.25	1.13	**39**	**34**	**73**
EXP Faculty/Staff[7]	166	Total		3.137	520	56%	**290**	11%	**58**	32%	**166**	1%	**6**	1.18	1.13	**140**	**12**	**152**
	Faculty/Staff	In	50%	1.569	260	56%	**145**	11%	**29**	32%	**83**	1%	**3**	1.18	1.13	**70**	**6**	**76**
		Out	50%	1.569	260	56%	**145**	11%	**29**	32%	**83**	1%	**3**	1.18	1.13	**70**	**6**	**76**
Total		Total			**2,466**		**912**		**1,246**		**264**					**218**	**80**	**298**
		In			**1,233**		**456**		**623**		**132**					**109**	**40**	**149**
		Out			**1,233**		**456**		**623**		**132**					**109**	**40**	**149**
AM Peak Hour																		
EXP Students[6]	593	Total		1.640	1,187		**379**		**725**		**60**		**23**	1.25	1.13	**48**	**42**	**90**
	Students	In	78%	1.640	973	32%	**311**	61%	**594**	5%	**49**	2%	**19**	1.25	1.13	**39**	**34**	**73**
		Out	22%	0.361	214	32%	**68**	61%	**131**	5%	**11**	2%	**4**	1.25	1.13	**9**	**8**	**17**
EXP Faculty/Staff[7]	166	Total		0.360	60		**35**		**6**		**19**		**0**	1.18	1.13	**16**	**0**	**16**
	Faculty/Staff	In	78%	0.281	47	56%	**27**	11%	**5**	32%	**15**	1%	**0**	1.18	1.13	**13**	**0**	**13**
		Out	22%	0.079	13	56%	**8**	11%	**1**	32%	**4**	1%	**0**	1.18	1.13	**3**	**0**	**3**
Total		Total			**1,247**		**414**		**731**		**79**					**64**	**42**	**106**
		In			**1,020**		**338**		**599**		**64**					**52**	**34**	**86**
		Out			**227**		**76**		**132**		**15**					**12**	**8**	**20**
PM Peak Hour																		
EXP Students[6]	593	Total		0.560	332		**106**		**203**		**17**		**6**	1.25	1.13	**14**	**12**	**26**
	units	In	35%	0.196	116	32%	**37**	61%	**71**	5%	**6**	2%	**2**	1.25	1.13	**5**	**4**	**9**
		Out	65%	0.364	216	32%	**69**	61%	**132**	5%	**11**	2%	**4**	1.25	1.13	**9**	**8**	**17**
EXP Faculty/Staff[7]	166	Total		0.440	73		**42**		**8**		**23**		**0**	1.18	1.13	**20**	**0**	**20**
	units	In	35%	0.154	26	56%	**15**	11%	**3**	32%	**8**	1%	**0**	1.18	1.13	**7**	**0**	**7**
		Out	65%	0.286	47	56%	**27**	11%	**5**	32%	**15**	1%	**0**	1.18	1.13	**13**	**0**	**13**
Total		Total			**405**		**148**		**211**		**40**					**34**	**12**	**46**
		In			**142**		**52**		**74**		**14**					**12**	**4**	**16**
		Out			**263**		**96**		**137**		**26**					**22**	**8**	**30**

1. 2017 National vehicle occupancy rates - 1.18: home to work; 1.82: family/personal business; 1.82: shopping; 2.1: social/recreational
2. Based on ITE Trip Generation Handbook, 3rd Edition method
3. Mode shares based on Mode Share and Zip Code Data supplied by Northeastern
4. Local Auto Occupancy Rate based on Mode Share and Zip Code Data supplied by Northeastern
5. Local Auto Occupancy Rate for Ride Hail Services based on data collection completed by HSH for Seaport Square
6. Northeastern University EXP Schematic Design Occupancy List
7. Northeastern University EXP Schematic Design Occupancy List

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	16	496	683	12	42	19
Future Volume (vph)	16	496	683	12	42	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	11	12	12	10	10
Storage Length (ft)	100			0	0	140
Storage Lanes	0			0	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	1.00
Ped Bike Factor		1.00	0.99		0.98	
Frt			0.997			0.850
Flt Protected		0.998			0.950	
Satd. Flow (prot)	0	1603	3217	0	1516	1245
Flt Permitted		0.976			0.950	
Satd. Flow (perm)	0	1563	3217	0	1485	1245
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			6			21
Link Speed (mph)		25	25		35	
Link Distance (ft)		511	102		700	
Travel Time (s)		13.9	2.8		13.6	
Confl. Peds. (#/hr)	159			185	16	30
Confl. Bikes (#/hr)				1		13
Peak Hour Factor	0.95	0.95	0.95	0.95	0.90	0.90
Heavy Vehicles (%)	0%	3%	0%	3%	0%	9%
Adj. Flow (vph)	17	522	719	13	47	21
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	539	732	0	47	21
Turn Type	Perm	NA	NA		Prot	Prot
Protected Phases		1	1		5	5
Permitted Phases	1					
Detector Phase	1	1	1		5	5
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0		8.0	8.0
Minimum Split (s)	28.0	28.0	28.0		18.0	18.0
Total Split (s)	42.0	42.0	42.0		18.0	18.0
Total Split (%)	70.0%	70.0%	70.0%		30.0%	30.0%
Maximum Green (s)	38.0	38.0	38.0		14.0	14.0
Yellow Time (s)	3.0	3.0	3.0		3.0	3.0
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0
Total Lost Time (s)		4.0	4.0		4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0
Recall Mode	C-Max	C-Max	C-Max		None	None
Walk Time (s)	8.0	8.0	8.0		6.0	6.0
Flash Dont Walk (s)	8.0	8.0	8.0		8.0	8.0
Pedestrian Calls (#/hr)	80	80	80		8	8
Act Effct Green (s)		49.2	49.2		9.2	9.2
Actuated g/C Ratio		0.82	0.82		0.15	0.15
v/c Ratio		0.42	0.28		0.20	0.10
Control Delay		4.8	5.3		23.4	10.8
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		4.8	5.3		23.4	10.8
LOS		A	A		C	B
Approach Delay		4.8	5.3		19.5	
Approach LOS		A	A		B	
90th %ile Green (s)	38.0	38.0	38.0		14.0	14.0
90th %ile Term Code	Coord	Coord	Coord		Ped	Ped
70th %ile Green (s)	44.0	44.0	44.0		8.0	8.0
70th %ile Term Code	Coord	Coord	Coord		Min	Min
50th %ile Green (s)	44.0	44.0	44.0		8.0	8.0
50th %ile Term Code	Coord	Coord	Coord		Min	Min
30th %ile Green (s)	56.0	56.0	56.0		0.0	0.0
30th %ile Term Code	Coord	Coord	Coord		Skip	Skip
10th %ile Green (s)	56.0	56.0	56.0		0.0	0.0
10th %ile Term Code	Coord	Coord	Coord		Skip	Skip
Queue Length 50th (ft)		58	67		16	0
Queue Length 95th (ft)		161	98		37	14
Internal Link Dist (ft)		431	22		620	
Turn Bay Length (ft)						140
Base Capacity (vph)		1281	2639		353	306
Starvation Cap Reductn		0	0		0	0
Spillback Cap Reductn		0	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.42	0.28		0.13	0.07

Intersection Summary

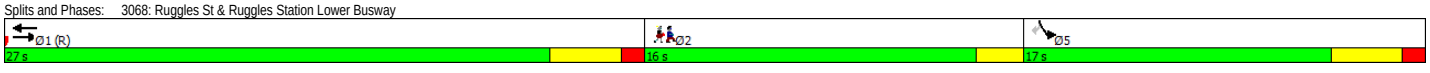
Area Type: CBD
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 47 (78%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.42
Intersection Signal Delay: 5.8 — Intersection LOS: A
Intersection Capacity Utilization 59.8% — ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 1526: Ruggles St & Leon St

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø2
Lane Configurations							
Traffic Volume (vph)	0	519	713	0	72	22	
Future Volume (vph)	0	519	713	0	72	22	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	16	16	12	16	12	
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	
Ped Bike Factor					0.85	0.93	
Frt						0.850	
Flt Protected					0.950		
Satd. Flow (prot)	0	3575	1882	0	1841	1454	
Flt Permitted					0.950		
Satd. Flow (perm)	0	3575	1882	0	1568	1356	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)						23	
Link Speed (mph)		25	25		35		
Link Distance (ft)		170	404		298		
Travel Time (s)		4.6	11.0		5.8		
Confl. Peds. (#/hr)	28			28	107	40	
Confl. Bikes (#/hr)				2		1	
Peak Hour Factor	0.96	0.96	0.95	0.95	0.94	0.94	
Heavy Vehicles (%)	0%	3%	3%	0%	0%	0%	
Adj. Flow (vph)	0	541	751	0	77	23	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	541	751	0	77	23	
Turn Type		NA	NA		Prot	Perm	
Protected Phases		1	1		5		2
Permitted Phases						5	
Detector Phase		1	1		5	5	
Switch Phase							
Minimum Initial (s)		10.0	10.0		10.0	10.0	7.0
Minimum Split (s)		23.0	23.0		17.0	17.0	16.0
Total Split (s)		27.0	27.0		17.0	17.0	16.0
Total Split (%)		45.0%	45.0%		28.3%	28.3%	27%
Maximum Green (s)		23.0	23.0		13.0	13.0	14.0
Yellow Time (s)		3.0	3.0		3.0	3.0	2.0
All-Red Time (s)		1.0	1.0		1.0	1.0	0.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.0	4.0		4.0	4.0	
Lead/Lag		Lead	Lead				Lag
Lead-Lag Optimize?							
Vehicle Extension (s)		2.0	2.0		2.0	2.0	2.0
Recall Mode		C-Max	C-Max		None	None	None
Walk Time (s)							7.0
Flash Dont Walk (s)							7.0
Pedestrian Calls (#/hr)							86
Act Effct Green (s)		35.6	35.6		10.0	10.0	
Actuated g/C Ratio		0.59	0.59		0.17	0.17	
v/c Ratio		0.26	0.67		0.25	0.09	
Control Delay		7.1	18.7		24.2	11.2	
Queue Delay		0.0	0.2		0.0	0.0	
Total Delay		7.1	19.0		24.2	11.2	
LOS		A	B		C	B	
Approach Delay		7.1	19.0		21.2		
Approach LOS		A	B		C		
90th %ile Green (s)		26.0	26.0		10.0	10.0	14.0
90th %ile Term Code		Coord	Coord		Min	Min	Ped
70th %ile Green (s)		26.0	26.0		10.0	10.0	14.0
70th %ile Term Code		Coord	Coord		Min	Min	Ped
50th %ile Green (s)		26.0	26.0		10.0	10.0	14.0
50th %ile Term Code		Coord	Coord		Min	Min	Ped
30th %ile Green (s)		40.0	40.0		0.0	0.0	14.0
30th %ile Term Code		Coord	Coord		Skip	Skip	Ped
10th %ile Green (s)		56.0	56.0		0.0	0.0	0.0
10th %ile Term Code		Coord	Coord		Skip	Skip	Skip
Queue Length 50th (ft)		70	243		25	0	
Queue Length 95th (ft)		38	#453		57	17	
Internal Link Dist (ft)		90	324		218		
Turn Bay Length (ft)							
Base Capacity (vph)		2121	1116		398	311	
Starvation Cap Reductn		0	52		0	0	
Spillback Cap Reductn		0	0		0	0	
Storage Cap Reductn		0	0		0	0	
Reduced v/c Ratio		0.26	0.71		0.19	0.07	

Intersection Summary			
Area Type:	CBD		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 4 (7%), Referenced to phase 1:EBWB, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.67			
Intersection Signal Delay: 14.5		Intersection LOS: B	
Intersection Capacity Utilization 56.7%		ICU Level of Service B	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 3068: Ruggles St & Ruggles Station Lower Busway



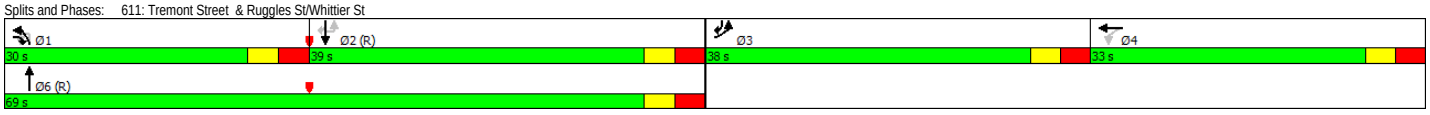
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations														
Traffic Volume (vph)	475	0	116	16	1	12	12	245	975	0	16	0	435	467
Future Volume (vph)	475	0	116	16	1	12	12	245	975	0	16	0	435	467
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	11	11	12	16	12	12	11	11	12	12	12	11	11
Storage Length (ft)	0		260	0		0		200		0		0		0
Storage Lanes	2		1	0		0		1		0		0		1
Taper Length (ft)	25			25				25				25		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	0.91	1.00	0.91	1.00	0.95	1.00	0.95	1.00
Ped Bike Factor	0.98				0.98									0.92
Frt			0.850		0.944									0.850
Flt Protected	0.950				0.973			0.950					0.998	
Satd. Flow (prot)	3090	0	1351	0	1759	0	0	1513	4468	0	0	0	3046	1378
Flt Permitted	0.950				0.973			0.167					0.891	
Satd. Flow (perm)	3042	0	1351	0	1740	0	0	266	4468	0	0	0	2720	1268
Right Turn on Red			Yes			Yes				Yes				No
Satd. Flow (RTOR)			121		15									
Link Speed (mph)		25			25				30				30	
Link Distance (ft)		404			351				578				318	
Travel Time (s)		11.0			9.6				13.1				7.2	
Confl. Peds. (#/hr)	10		12	12		10		17		15		15		17
Confl. Bikes (#/hr)						1				2				2
Peak Hour Factor	0.96	0.96	0.96	0.81	0.81	0.81	0.95	0.95	0.95	0.95	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	2%	0%	4%	0%	0%	0%	0%	4%	1%	0%	0%	0%	3%	2%
Parking (#/hr)				15										
Adj. Flow (vph)	495	0	121	20	1	15	13	258	1026	0	16	0	444	477
Shared Lane Traffic (%)														
Lane Group Flow (vph)	495	0	121	0	36	0	0	271	1026	0	0	0	460	477
Turn Type	Prot		Over	Perm	NA		custom	Prot	NA		Perm		NA	pm+ov
Protected Phases	3		1!		4			1	6				2	3
Permitted Phases				4			1!				2			2
Detector Phase	3		1	4	4		1	1	6		2		2	3
Switch Phase														
Minimum Initial (s)	9.0		8.0	8.0	8.0		8.0	8.0	16.0		16.0		16.0	9.0
Minimum Split (s)	15.0		14.0	32.0	32.0		14.0	14.0	26.0		26.0		26.0	15.0
Total Split (s)	38.0		30.0	33.0	33.0		30.0	30.0	69.0		39.0		39.0	38.0
Total Split (%)	27.1%		21.4%	23.6%	23.6%		21.4%	21.4%	49.3%		27.9%		27.9%	27.1%
Maximum Green (s)	32.0		24.0	27.0	27.0		24.0	24.0	63.0		33.0		33.0	32.0
Yellow Time (s)	3.0		3.0	3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0
All-Red Time (s)	3.0		3.0	3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0
Lost Time Adjust (s)	0.0		0.0		0.0			0.0	0.0				0.0	0.0
Total Lost Time (s)	6.0		6.0		6.0			6.0	6.0				6.0	6.0
Lead/Lag	Lead		Lead	Lag	Lag		Lead	Lead			Lag		Lag	Lead
Lead-Lag Optimize?	Yes		Yes	Yes	Yes		Yes	Yes			Yes		Yes	Yes
Vehicle Extension (s)	2.0		2.0	2.0	2.0		2.0	2.0	2.0		2.0		2.0	2.0
Recall Mode	None		None	None	None		None	None	C-Max		C-Max		C-Max	None
Walk Time (s)				7.0	7.0				8.0		8.0		8.0	
Flash Dont Walk (s)				19.0	19.0				12.0		12.0		12.0	
Pedestrian Calls (#/hr)				4	4				10		10		10	
Act Effct Green (s)	27.2		24.0		11.6			24.0	86.0				56.0	83.2
Actuated g/C Ratio	0.19		0.17		0.08			0.17	0.61				0.40	0.59
v/c Ratio	0.83		0.37		0.23			6.02	0.37				0.42	0.62
Control Delay	66.1		11.5		40.9			2316.9	16.1				34.9	21.9
Queue Delay	0.3		0.0		0.0			0.0	0.0				0.8	0.4
Total Delay	66.4		11.5		40.9			2316.9	16.1				35.7	22.3
LOS	E		B		D			F	B				D	C
Approach Delay		55.6			40.9				496.9				28.9	
Approach LOS		E			D				F				C	
90th %ile Green (s)	32.0		24.0	26.0	26.0		24.0	24.0	64.0		34.0		34.0	32.0
90th %ile Term Code	Max		Max	Ped	Ped		Max	Max	Coord		Coord		Coord	Max
70th %ile Green (s)	30.9		24.0	8.0	8.0		24.0	24.0	83.1		53.1		53.1	30.9
70th %ile Term Code	Gap		Max	Min	Min		Max	Max	Coord		Coord		Coord	Gap
50th %ile Green (s)	27.6		24.0	8.0	8.0		24.0	24.0	86.4		56.4		56.4	27.6
50th %ile Term Code	Gap		Max	Min	Min		Max	Max	Coord		Coord		Coord	Gap
30th %ile Green (s)	25.0		24.0	8.0	8.0		24.0	24.0	89.0		59.0		59.0	25.0
30th %ile Term Code	Gap		Max	Min	Min		Max	Max	Coord		Coord		Coord	Gap
10th %ile Green (s)	20.3		24.0	0.0	0.0		24.0	24.0	107.7		77.7		77.7	20.3
10th %ile Term Code	Gap		Max	Skip	Skip		Max	Max	Coord		Coord		Coord	Gap
Queue Length 50th (ft)	224		0		19			~438	161				157	223
Queue Length 95th (ft)	279		57		43			#622	280				266	449
Internal Link Dist (ft)		324			271				498				238	
Turn Bay Length (ft)			260					200						
Base Capacity (vph)	706		331		347			45	2746				1088	822
Starvation Cap Reductn	23		0		0			0	0				342	79
Spillback Cap Reductn	0		0		0			0	32				10	0
Storage Cap Reductn	0		0		0			0	0				0	0
Reduced v/c Ratio	0.72		0.37		0.10			6.02	0.38				0.62	0.64

Intersection Summary

Area Type: CBD
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 48 (34%), Referenced to phase 2:SBTU and 6:NBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 6.02
Intersection Signal Delay: 245.0 Intersection LOS: F
Intersection Capacity Utilization 80.7% ICU Level of Service D
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
! Phase conflict between lane groups.

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



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	43	0	0	0	0	1423	55	0	875	0
Future Volume (vph)	0	0	43	0	0	0	0	1423	55	0	875	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	16	12	11	12	12	11	12
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	1.00
Ped Bike Factor								1.00				
Frt			0.865					0.994				
Flt Protected												
Satd. Flow (prot)	0	0	1479	0	0	0	0	4381	0	0	4424	0
Flt Permitted												
Satd. Flow (perm)	0	0	1479	0	0	0	0	4381	0	0	4424	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			220					11				
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		195			565			318			141	
Travel Time (s)		5.3			15.4			7.2			3.2	
Confl. Peds. (#/hr)						98			21			
Confl. Bikes (#/hr)									3			
Peak Hour Factor	0.90	0.90	0.90	0.25	0.25	0.25	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	2%	0%
Adj. Flow (vph)	0	0	48	0	0	0	0	1452	56	0	893	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	48	0	0	0	0	1508	0	0	893	0
Turn Type			Prot					NA			NA	
Protected Phases			5					1			1	
Permitted Phases												
Detector Phase			5					1			1	
Switch Phase												
Minimum Initial (s)			4.0					10.0			10.0	
Minimum Split (s)			33.0					24.0			24.0	
Total Split (s)			33.0					107.0			107.0	
Total Split (%)			23.6%					76.4%			76.4%	
Maximum Green (s)			28.0					102.0			102.0	
Yellow Time (s)			3.0					3.0			3.0	
All-Red Time (s)			2.0					2.0			2.0	
Lost Time Adjust (s)			0.0					0.0			0.0	
Total Lost Time (s)			5.0					5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)			3.0					3.0			3.0	
Recall Mode			None					C-Max			C-Max	
Walk Time (s)			8.0					8.0			8.0	
Flash Dont Walk (s)			17.0					6.0			6.0	
Pedestrian Calls (#/hr)			0					6			6	
Act Effct Green (s)			5.5					127.6			127.6	
Actuated g/C Ratio			0.04					0.91			0.91	
v/c Ratio			0.18					0.38			0.22	
Control Delay			1.4					2.0			1.0	
Queue Delay			0.0					0.3			0.2	
Total Delay			1.5					2.3			1.3	
LOS			A					A			A	
Approach Delay		1.5						2.3			1.3	
Approach LOS		A						A			A	
90th %ile Green (s)			5.5					124.5			124.5	
90th %ile Term Code			Gap					Coord			Coord	
70th %ile Green (s)			5.5					124.5			124.5	
70th %ile Term Code			Gap					Coord			Coord	
50th %ile Green (s)			5.5					124.5			124.5	
50th %ile Term Code			Gap					Coord			Coord	
30th %ile Green (s)			5.5					124.5			124.5	
30th %ile Term Code			Gap					Coord			Coord	
10th %ile Green (s)			0.0					135.0			135.0	
10th %ile Term Code			Skip					Coord			Coord	
Queue Length 50th (ft)			0					35			27	
Queue Length 95th (ft)			0					214			32	
Internal Link Dist (ft)		115			485			238			61	
Turn Bay Length (ft)												
Base Capacity (vph)			471					3994			4032	
Starvation Cap Reductn			0					1565			2176	
Spillback Cap Reductn			30					0			88	
Storage Cap Reductn			0					0			0	
Reduced v/c Ratio			0.11					0.62			0.48	

Intersection Summary

Area Type: CBD
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 73 (52%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.38
Intersection Signal Delay: 1.9 Intersection LOS: A
Intersection Capacity Utilization 36.1% ICU Level of Service A
Analysis Period (min) 15

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

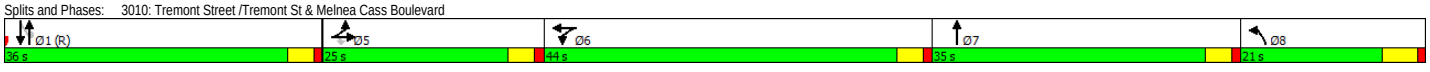
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø7
Lane Configurations													
Traffic Volume (vph)	6	77	69	555	168	27	282	356	0	17	270	17	
Future Volume (vph)	6	77	69	555	168	27	282	356	0	17	270	17	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	13	12	13	13	12	12	11	16	12	14	12	
Storage Length (ft)	0		0	350		0	0		0	0		0	
Storage Lanes	0		1	1		0	0		0	0		0	
Taper Length (ft)	25			25			25			25			
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.95	0.95	1.00	0.95	0.95	0.95	
Ped Bike Factor		1.00	0.98	0.99	0.99			0.99			1.00		
Frt			0.850		0.979						0.991		
Flt Protected		0.996		0.950				0.978			0.997		
Satd. Flow (prot)	0	1744	1411	3224	1706	0	0	2992	0	0	3298	0	
Flt Permitted		0.996		0.950				0.685			0.661		
Satd. Flow (perm)	0	1739	1384	3204	1706	0	0	2080	0	0	2186	0	
Right Turn on Red			Yes			No			No			Yes	
Satd. Flow (RTOR)			95								3		
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		312			560			205			296		
Travel Time (s)		7.1			12.7			4.7			6.7		
Confl. Peds. (#/hr)	23		3	3		23	15		4	4		15	
Confl. Bikes (#/hr)									3			2	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.98	0.98	0.98	0.96	0.96	0.96	
Heavy Vehicles (%)	0%	1%	3%	1%	1%	0%	1%	4%	1%	0%	4%	0%	
Adj. Flow (vph)	6	79	71	572	173	28	288	363	0	18	281	18	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	85	71	572	201	0	0	651	0	0	317	0	
Turn Type	Split	NA	Perm	Split	NA		Prot	NA		Perm	NA		
Protected Phases	5	5		6	6		8	1 7			1		7
Permitted Phases			5							1			
Detector Phase	5	5	5	6	6		8	1 7		1	1		
Switch Phase													
Minimum Initial (s)	8.0	8.0	8.0	10.0	10.0		4.0			10.0	10.0		4.0
Minimum Split (s)	24.0	24.0	24.0	22.0	22.0		21.0			26.0	26.0		9.0
Total Split (s)	25.0	25.0	25.0	44.0	44.0		21.0			36.0	36.0		35.0
Total Split (%)	15.5%	15.5%	15.5%	27.3%	27.3%		13.0%			22.4%	22.4%		22%
Maximum Green (s)	21.0	21.0	21.0	40.0	40.0		16.0			32.0	32.0		31.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		4.0			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		
Total Lost Time (s)		4.0	4.0	4.0	4.0						4.0		
Lead/Lag	Lead	Lead	Lead	Lag	Lag		Lag						Lead
Lead-Lag Optimize?													Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		3.0			2.0	2.0		2.0
Recall Mode	None	None	None	None	None		None			C-Max	C-Max		Max
Walk Time (s)	7.0	7.0	7.0				5.0			7.0	7.0		
Flash Dont Walk (s)	13.0	13.0	13.0				11.0			15.0	15.0		
Pedestrian Calls (#/hr)	5	5	5				0			0	0		
Act Effct Green (s)		12.9	12.9	33.1	33.1			103.0			68.0		
Actuated g/C Ratio		0.08	0.08	0.21	0.21			0.64			0.42		
v/c Ratio		0.61	0.36	0.86	0.57			3.64			0.34		
Control Delay		88.8	9.8	75.3	63.6			1218.1			34.4		
Queue Delay		0.0	0.0	0.0	0.0			0.0			0.0		
Total Delay		88.8	9.8	75.3	63.6			1218.1			34.4		
LOS		F	A	E	E			F			C		
Approach Delay		52.9			72.3			1218.1			34.4		
Approach LOS		D			E			F			C		
90th %ile Green (s)	20.0	20.0	20.0	40.0	40.0		0.0			54.0	54.0		31.0
90th %ile Term Code	Ped	Ped	Ped	Max	Max		Skip			Coord	Coord		MaxR
70th %ile Green (s)	14.3	14.3	14.3	36.6	36.6		0.0			63.1	63.1		31.0
70th %ile Term Code	Gap	Gap	Gap	Gap	Gap		Skip			Coord	Coord		MaxR
50th %ile Green (s)	12.2	12.2	12.2	33.0	33.0		0.0			68.8	68.8		31.0
50th %ile Term Code	Gap	Gap	Gap	Gap	Gap		Skip			Coord	Coord		MaxR
30th %ile Green (s)	10.1	10.1	10.1	30.1	30.1		0.0			73.8	73.8		31.0
30th %ile Term Code	Gap	Gap	Gap	Gap	Gap		Skip			Coord	Coord		MaxR
10th %ile Green (s)	8.0	8.0	8.0	25.9	25.9		0.0			80.1	80.1		31.0
10th %ile Term Code	Min	Min	Min	Gap	Gap		Skip			Coord	Coord		MaxR
Queue Length 50th (ft)		89	0	303	193			~548			115		
Queue Length 95th (ft)		144	27	356	267			#710			184		
Internal Link Dist (ft)		232			480			125			216		
Turn Bay Length (ft)				350									
Base Capacity (vph)		227	263	800	423			179			924		
Starvation Cap Reductn		0	0	0	0			0			0		
Spillback Cap Reductn		0	0	0	0			0			0		
Storage Cap Reductn		0	0	0	0			0			0		
Reduced v/c Ratio		0.37	0.27	0.71	0.48			3.64			0.34		

Intersection Summary

Area Type: CBD
Cycle Length: 161
Actuated Cycle Length: 161
Offset: 0 (0%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 105
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 3.64
Intersection Signal Delay: 457.6 — Intersection LOS: F
Intersection Capacity Utilization 72.6% — ICU Level of Service C
Analysis Period (min) 15

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

Splits and Phases: 3010: Tremont Street /Tremont St & Melnea Cass Boulevard

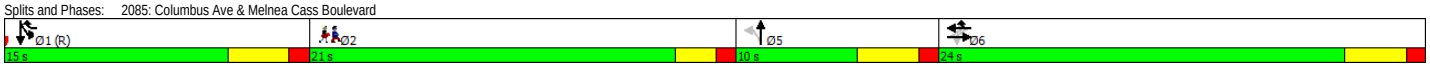


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø2
Lane Configurations													
Traffic Volume (vph)	10	5	0	139	20	308	1	16	36	111	44	3	
Future Volume (vph)	10	5	0	139	20	308	1	16	36	111	44	3	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor		0.98			0.98			0.89			0.97		
Frt						0.850		0.908			0.998		
Flt Protected		0.969			0.958			0.999			0.966		
Satd. Flow (prot)	0	1657	0	0	1624	1439	0	1392	0	0	1610	0	
Flt Permitted		0.826			0.738			0.989			0.966		
Satd. Flow (perm)	0	1382	0	0	1229	1439	0	1366	0	0	1582	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)						314		41			1		
Link Speed (mph)		35			35			25			35		
Link Distance (ft)		247			312			212			194		
Travel Time (s)		4.8			6.1			5.8			3.8		
Confl. Peds. (#/hr)	24		12	12		24	187		14	14		187	
Confl. Bikes (#/hr)									38			8	
Peak Hour Factor	0.75	0.75	0.75	0.98	0.98	0.98	0.88	0.88	0.88	0.94	0.94	0.94	
Heavy Vehicles (%)	0%	0%	0%	1%	0%	1%	0%	0%	0%	2%	0%	0%	
Parking (#/hr)												0	
Adj. Flow (vph)	13	7	0	142	20	314	1	18	41	118	47	3	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	20	0	0	162	314	0	60	0	0	168	0	
Turn Type	Perm	NA		Perm	NA	pt+ov	Perm	NA		Split	NA		
Protected Phases		6			6	1 6		5		1	1		2
Permitted Phases	6			6			5						
Detector Phase	6	6		6	6	1 6	5	5		1	1		
Switch Phase													
Minimum Initial (s)	8.0	8.0		8.0	8.0		5.0	5.0		10.0	10.0		8.0
Minimum Split (s)	14.0	14.0		14.0	14.0		10.0	10.0		15.0	15.0		21.0
Total Split (s)	24.0	24.0		24.0	24.0		10.0	10.0		15.0	15.0		21.0
Total Split (%)	34.3%	34.3%		34.3%	34.3%		14.3%	14.3%		21.4%	21.4%		30%
Maximum Green (s)	20.0	20.0		20.0	20.0		6.0	6.0		11.0	11.0		18.0
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		2.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0		1.0
Lost Time Adjust (s)		0.0			0.0			0.0			0.0		
Total Lost Time (s)		4.0			4.0			4.0			4.0		
Lead/Lag	Lag	Lag		Lag	Lag		Lead	Lead		Lead	Lead		Lag
Lead-Lag Optimize?													
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0		2.0
Recall Mode	None	None		None	None		None	None		C-Max	C-Max		None
Walk Time (s)													7.0
Flash Dont Walk (s)													11.0
Pedestrian Calls (#/hr)													0
Act Effct Green (s)		13.7			13.7	60.9		6.3			41.6		
Actuated g/C Ratio		0.20			0.20	0.87		0.09			0.59		
v/c Ratio		0.07			0.68	0.24		0.38			0.18		
Control Delay		20.9			39.2	0.8		21.3			10.0		
Queue Delay		0.0			0.0	0.3		0.0			0.0		
Total Delay		20.9			39.2	1.1		21.3			10.0		
LOS		C			D	A		C			A		
Approach Delay		20.9			14.1			21.3			10.0		
Approach LOS		C			B			C			A		
90th %ile Green (s)	19.9	19.9		19.9	19.9		9.0	9.0		29.1	29.1		0.0
90th %ile Term Code	Gap	Gap		Gap	Gap		Gap	Gap		Coord	Coord		Skip
70th %ile Green (s)	16.2	16.2		16.2	16.2		6.9	6.9		34.9	34.9		0.0
70th %ile Term Code	Gap	Gap		Gap	Gap		Gap	Gap		Coord	Coord		Skip
50th %ile Green (s)	13.6	13.6		13.6	13.6		5.4	5.4		39.0	39.0		0.0
50th %ile Term Code	Gap	Gap		Gap	Gap		Gap	Gap		Coord	Coord		Skip
30th %ile Green (s)	10.9	10.9		10.9	10.9		0.0	0.0		51.1	51.1		0.0
30th %ile Term Code	Gap	Gap		Gap	Gap		Skip	Skip		Coord	Coord		Skip
10th %ile Green (s)	8.0	8.0		8.0	8.0		0.0	0.0		54.0	54.0		0.0
10th %ile Term Code	Min	Min		Min	Min		Skip	Skip		Coord	Coord		Skip
Queue Length 50th (ft)		7			65	0		8			32		
Queue Length 95th (ft)		18			112	13		38			85		
Internal Link Dist (ft)		167			232			132			114		
Turn Bay Length (ft)													
Base Capacity (vph)		394			351	1280		169			957		
Starvation Cap Reductn		0			0	505		0			0		
Spillback Cap Reductn		0			0	0		0			0		
Storage Cap Reductn		0			0	0		0			0		
Reduced v/c Ratio		0.05			0.46	0.41		0.36			0.18		

Intersection Summary

Area Type: CBD
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 24 (34%), Referenced to phase 1:SBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.68
Intersection Signal Delay: 13.9 — Intersection LOS: B
Intersection Capacity Utilization 44.5% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2085: Columbus Ave & Melnea Cass Boulevard

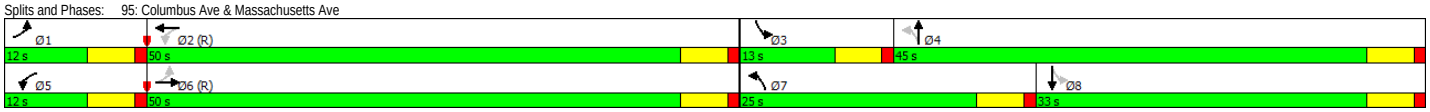


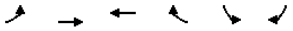
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	471	109	22	377	110	224	171	35	86	110	38
Future Volume (vph)	27	471	109	22	377	110	224	171	35	86	110	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	120		0	120		0	0		225	0		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.94	0.94		0.90	0.96		0.93	0.99		0.96	0.97	
Frt		0.972			0.966			0.974			0.961	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1687	3232	0	1656	3279	0	1805	1795	0	1805	1728	0
Flt Permitted	0.419			0.357			0.427			0.620		
Satd. Flow (perm)	701	3232	0	560	3279	0	757	1795	0	1131	1728	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		27			36			9			14	
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		328			280			940			267	
Travel Time (s)		6.4			5.5			18.3			5.2	
Confl. Peds. (#/hr)	57		125	125		57	69		36	36		69
Confl. Bikes (#/hr)			10			5			27			14
Peak Hour Factor	0.96	0.96	0.96	0.98	0.98	0.98	0.93	0.93	0.93	0.91	0.91	0.91
Heavy Vehicles (%)	7%	2%	2%	9%	3%	1%	0%	2%	0%	0%	2%	3%
Parking (#/hr)												0
Adj. Flow (vph)	28	491	114	22	385	112	241	184	38	95	121	42
Shared Lane Traffic (%)												
Lane Group Flow (vph)	28	605	0	22	497	0	241	222	0	95	163	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases	6			2			4			8		
Detector Phase	1	6		5	2		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	6.0		5.0	6.0		6.0	6.0		6.0	8.0	
Minimum Split (s)	10.0	30.0		10.0	30.0		11.0	29.0		11.0	29.0	
Total Split (s)	12.0	50.0		12.0	50.0		25.0	45.0		13.0	33.0	
Total Split (%)	10.0%	41.7%		10.0%	41.7%		20.8%	37.5%		10.8%	27.5%	
Maximum Green (s)	7.0	45.0		7.0	45.0		20.0	40.0		8.0	28.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		10.0			10.0			7.0			7.0	
Flash Dont Walk (s)		15.0			15.0			17.0			17.0	
Pedestrian Calls (#/hr)		57			36			125			58	
Act Effct Green (s)	62.1	57.8		61.7	57.7		45.1	32.4		30.7	22.9	
Actuated g/C Ratio	0.52	0.48		0.51	0.48		0.38	0.27		0.26	0.19	
v/c Ratio	0.07	0.39		0.06	0.31		0.56	0.45		0.29	0.48	
Control Delay	15.0	21.6		15.0	20.1		31.5	37.3		26.9	44.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	15.0	21.6		15.0	20.1		31.5	37.3		26.9	44.2	
LOS	B	C		B	C		C	D		C	D	
Approach Delay		21.3			19.9			34.3			37.8	
Approach LOS		C			B			C			D	
90th %ile Green (s)	7.8	48.5		7.5	48.2		20.0	36.0		8.0	24.0	
90th %ile Term Code	Gap	Coord		Gap	Coord		Max	Hold		Max	Ped	
70th %ile Green (s)	7.0	49.3		6.7	49.0		20.0	36.0		8.0	24.0	
70th %ile Term Code	Gap	Coord		Gap	Coord		Max	Hold		Max	Ped	
50th %ile Green (s)	6.4	51.6		6.2	51.4		18.2	34.2		8.0	24.0	
50th %ile Term Code	Gap	Coord		Gap	Coord		Gap	Hold		Max	Ped	
30th %ile Green (s)	0.0	65.4		0.0	65.4		15.6	31.6		8.0	24.0	
30th %ile Term Code	Skip	Coord		Skip	Coord		Gap	Hold		Max	Ped	
10th %ile Green (s)	0.0	74.3		0.0	74.3		12.1	24.0		6.7	18.6	
10th %ile Term Code	Skip	Coord		Skip	Coord		Gap	Ped		Gap	Hold	
Queue Length 50th (ft)	10	161		8	123		129	134		47	102	
Queue Length 95th (ft)	26	222		22	175		191	205		82	172	
Internal Link Dist (ft)		248			200			860			187	
Turn Bay Length (ft)	120			120								
Base Capacity (vph)	421	1571		354	1594		459	604		336	413	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
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	0.07	0.39		0.06	0.31		0.53	0.37		0.28	0.39	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.56
Intersection Signal Delay: 26.4 — Intersection LOS: C
Intersection Capacity Utilization 66.3% — ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 95: Columbus Ave & Massachusetts Ave





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	19	519	695	40	0	0
Future Volume (Veh/h)	19	519	695	40	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.98	0.98	0.97	0.97	0.25	0.25
Hourly flow rate (vph)	19	530	716	41	0	0
Pedestrians		44	6		37	
Lane Width (ft)		12.0	12.0		0.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		4	1		0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		211	170			
pX, platoon unblocked						
vC, conflicting volume	794				1082	460
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	794				1082	460
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				100	100
cM capacity (veh/h)	836				209	534

Direction, Lane #	EB 1	EB 2	WB 1	WB 2
Volume Total	196	353	477	280
Volume Left	19	0	0	0
Volume Right	0	0	0	41
cSH	836	1700	1700	1700
Volume to Capacity	0.02	0.21	0.28	0.16
Queue Length 95th (ft)	2	0	0	0
Control Delay (s)	1.1	0.0	0.0	0.0
Lane LOS	A			
Approach Delay (s)	0.4		0.0	
Approach LOS				

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	45.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	3	13	334	0	0	155
Future Volume (Veh/h)	3	13	334	0	0	155
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	0.98	0.98	0.89	0.89
Hourly flow rate (vph)	3	13	341	0	0	174
Pedestrians	59		35			1
Lane Width (ft)	12.0		12.0			12.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	5		3			0
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			194			
pX, platoon unblocked						
vC, conflicting volume	609	401			400	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	609	401			400	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	98			100	
cM capacity (veh/h)	426	621			1112	

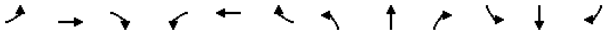
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	16	341	174
Volume Left	3	0	0
Volume Right	13	0	0
cSH	572	1700	1700
Volume to Capacity	0.03	0.20	0.10
Queue Length 95th (ft)	2	0	0
Control Delay (s)	11.5	0.0	0.0
Lane LOS	B		
Approach Delay (s)	11.5	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	27.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	325	22	14	155
Future Volume (Veh/h)	0	0	325	22	14	155
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.25	0.25	0.96	0.96	0.88	0.88
Hourly flow rate (vph)	0	0	339	23	16	176
Pedestrians	59		40			2
Lane Width (ft)	0.0		12.0			12.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	0		3			0
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			350			
pX, platoon unblocked						
vC, conflicting volume	658	412			421	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	658	412			421	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			99	
cM capacity (veh/h)	412	644			1149	

Direction, Lane #	NB 1	SB 1
Volume Total	362	192
Volume Left	0	16
Volume Right	23	0
cSH	1700	1149
Volume to Capacity	0.21	0.01
Queue Length 95th (ft)	0	1
Control Delay (s)	0.0	0.8
Lane LOS		A
Approach Delay (s)	0.0	0.8
Approach LOS		

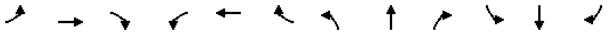
Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	30.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	0	0	5	0	19	2	323	0	0	164	1
Future Volume (Veh/h)	1	0	0	5	0	19	2	323	0	0	164	1
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.50	0.50	0.50	0.67	0.67	0.67	0.95	0.95	0.95	0.85	0.85	0.85
Hourly flow rate (vph)	2	0	0	7	0	28	2	340	0	0	193	1
Pedestrians		219			63			3			4	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		18			5			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								541				
pX, platoon unblocked												
vC, conflicting volume	788	820	416	604	820	407	413			403		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	788	820	416	604	820	407	413			403		
tC, single (s)	7.1	6.5	6.2	7.3	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.7	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	98	100	95	100			100		
cM capacity (veh/h)	199	241	523	301	241	612	946			1105		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	2	35	342	194
Volume Left	2	7	2	0
Volume Right	0	28	0	1
cSH	199	507	946	1700
Volume to Capacity	0.01	0.07	0.00	0.11
Queue Length 95th (ft)	1	6	0	0
Control Delay (s)	23.2	12.6	0.1	0.0
Lane LOS	C	B	A	
Approach Delay (s)	23.2	12.6	0.1	0.0
Approach LOS	C	B		

Intersection Summary					
Average Delay			0.9		
Intersection Capacity Utilization			29.8%	ICU Level of Service	A
Analysis Period (min)			15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	0	12	0	0	0	49	283	11	12	153	76
Future Volume (Veh/h)	13	0	12	0	0	0	49	283	11	12	153	76
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.69	0.69	0.69	0.25	0.25	0.25	0.93	0.93	0.93	0.83	0.83	0.83
Hourly flow rate (vph)	19	0	17	0	0	0	53	304	12	14	184	92
Pedestrians		207			69			62			1	
Lane Width (ft)		12.0			0.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		17			0			5			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								706				
pX, platoon unblocked												
vC, conflicting volume	882	956	499	822	996	380	483			385		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	882	956	499	822	996	380	483			385		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	90	100	96	100	100	100	94			99		
cM capacity (veh/h)	183	200	452	222	190	671	902			1185		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	36	369	290
Volume Left	19	53	14
Volume Right	17	12	92
cSH	254	902	1185
Volume to Capacity	0.14	0.06	0.01
Queue Length 95th (ft)	12	5	1
Control Delay (s)	21.5	1.9	0.5
Lane LOS	C	A	A
Approach Delay (s)	21.5	1.9	0.5
Approach LOS	C		

Intersection Summary				
Average Delay	2.3			
Intersection Capacity Utilization	53.5%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	10	451	498	9	207	81
Future Volume (vph)	10	451	498	9	207	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	11	12	12	10	10
Storage Length (ft)	100			0	0	140
Storage Lanes	0			0	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	1.00
Ped Bike Factor		0.99	0.99		0.96	
Frt			0.997			0.850
Flt Protected		0.999			0.950	
Satd. Flow (prot)	0	1635	3177	0	1516	1357
Flt Permitted		0.989			0.950	
Satd. Flow (perm)	0	1610	3177	0	1458	1357
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			6			88
Link Speed (mph)		25	25		25	
Link Distance (ft)		511	212		700	
Travel Time (s)		13.9	5.8		19.1	
Confl. Peds. (#/hr)	270			270	30	62
Confl. Bikes (#/hr)				6		
Peak Hour Factor	0.94	0.94	0.94	0.94	0.92	0.92
Heavy Vehicles (%)	0%	1%	1%	0%	0%	0%
Adj. Flow (vph)	11	480	530	10	225	88
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	491	540	0	225	88
Turn Type	Perm	NA	NA		Prot	Prot
Protected Phases		1	1		5	5
Permitted Phases	1					
Detector Phase	1	1	1		5	5
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0		8.0	8.0
Minimum Split (s)	28.0	28.0	28.0		18.0	18.0
Total Split (s)	42.0	42.0	42.0		18.0	18.0
Total Split (%)	70.0%	70.0%	70.0%		30.0%	30.0%
Maximum Green (s)	38.0	38.0	38.0		14.0	14.0
Yellow Time (s)	3.0	3.0	3.0		3.0	3.0
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0
Total Lost Time (s)		4.0	4.0		4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0
Recall Mode	C-Max	C-Max	C-Max		None	None
Walk Time (s)	8.0	8.0	8.0		6.0	6.0
Flash Dont Walk (s)	8.0	8.0	8.0		8.0	8.0
Pedestrian Calls (#/hr)	92	92	92		270	270
Act Effct Green (s)		38.0	38.0		14.0	14.0
Actuated g/C Ratio		0.63	0.63		0.23	0.23
v/c Ratio		0.48	0.27		0.64	0.23
Control Delay		7.8	5.4		30.6	6.9
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		7.8	5.4		30.6	6.9
LOS		A	A		C	A
Approach Delay		7.8	5.4		24.0	
Approach LOS		A	A		C	
90th %ile Green (s)	38.0	38.0	38.0		14.0	14.0
90th %ile Term Code	Coord	Coord	Coord		Max	Max
70th %ile Green (s)	38.0	38.0	38.0		14.0	14.0
70th %ile Term Code	Coord	Coord	Coord		Max	Max
50th %ile Green (s)	38.0	38.0	38.0		14.0	14.0
50th %ile Term Code	Coord	Coord	Coord		Ped	Ped
30th %ile Green (s)	38.0	38.0	38.0		14.0	14.0
30th %ile Term Code	Coord	Coord	Coord		Ped	Ped
10th %ile Green (s)	38.0	38.0	38.0		14.0	14.0
10th %ile Term Code	Coord	Coord	Coord		Ped	Ped
Queue Length 50th (ft)		79	37		74	0
Queue Length 95th (ft)		137	47		#154	30
Internal Link Dist (ft)		431	132		620	
Turn Bay Length (ft)						140
Base Capacity (vph)		1019	2014		353	384
Starvation Cap Reductn		0	0		0	0
Spillback Cap Reductn		0	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.48	0.27		0.64	0.23

Intersection Summary

Area Type: CBD
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 15 (25%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.64
Intersection Signal Delay: 10.6 — Intersection LOS: B
Intersection Capacity Utilization 54.7% — ICU Level of Service A
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1526: Ruggles St & Leon St

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø2
Lane Configurations							
Traffic Volume (vph)	0	643	520	0	40	28	
Future Volume (vph)	0	643	520	0	40	28	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	16	16	12	16	12	
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	
Ped Bike Factor					0.86	0.96	
Frt						0.850	
Flt Protected					0.950		
Satd. Flow (prot)	0	3610	3507	0	1841	1454	
Flt Permitted					0.950		
Satd. Flow (perm)	0	3610	3507	0	1582	1391	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)						31	
Link Speed (mph)		25	25		25		
Link Distance (ft)		170	404		298		
Travel Time (s)		4.6	11.0		8.1		
Confl. Peds. (#/hr)	37			37	94	21	
Confl. Bikes (#/hr)				1			
Peak Hour Factor	0.81	0.81	0.87	0.87	0.89	0.89	
Heavy Vehicles (%)	100%	2%	5%	100%	0%	0%	
Adj. Flow (vph)	0	794	598	0	45	31	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	794	598	0	45	31	
Turn Type		NA	NA		Prot	Perm	
Protected Phases		1	1		5		2
Permitted Phases						5	
Detector Phase		1	1		5	5	
Switch Phase							
Minimum Initial (s)		10.0	10.0		10.0	10.0	7.0
Minimum Split (s)		23.0	23.0		17.0	17.0	16.0
Total Split (s)		69.0	69.0		28.0	28.0	23.0
Total Split (%)		57.5%	57.5%		23.3%	23.3%	19%
Maximum Green (s)		65.0	65.0		24.0	24.0	21.0
Yellow Time (s)		3.0	3.0		3.0	3.0	2.0
All-Red Time (s)		1.0	1.0		1.0	1.0	0.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.0	4.0		4.0	4.0	
Lead/Lag		Lead	Lead				Lag
Lead-Lag Optimize?							
Vehicle Extension (s)		2.0	2.0		2.0	2.0	2.0
Recall Mode		C-Max	C-Max		None	None	None
Walk Time (s)							7.0
Flash Dont Walk (s)							7.0
Pedestrian Calls (#/hr)							152
Act Effct Green (s)		88.7	88.7		10.1	10.1	
Actuated g/C Ratio		0.74	0.74		0.08	0.08	
v/c Ratio		0.30	0.23		0.29	0.21	
Control Delay		7.6	5.6		56.9	20.7	
Queue Delay		0.3	0.5		0.0	0.0	
Total Delay		8.0	6.1		56.9	20.7	
LOS		A	A		E	C	
Approach Delay		8.0	6.1		42.1		
Approach LOS		A	A		D		
90th %ile Green (s)		85.6	85.6		10.4	10.4	14.0
90th %ile Term Code		Coord	Coord		Gap	Gap	Ped
70th %ile Green (s)		86.0	86.0		10.0	10.0	14.0
70th %ile Term Code		Coord	Coord		Min	Min	Ped
50th %ile Green (s)		86.0	86.0		10.0	10.0	14.0
50th %ile Term Code		Coord	Coord		Min	Min	Ped
30th %ile Green (s)		86.0	86.0		10.0	10.0	14.0
30th %ile Term Code		Coord	Coord		Min	Min	Ped
10th %ile Green (s)		100.0	100.0		0.0	0.0	14.0
10th %ile Term Code		Coord	Coord		Skip	Skip	Ped
Queue Length 50th (ft)		113	73		33	0	
Queue Length 95th (ft)		124	92		70	30	
Internal Link Dist (ft)		90	324		218		
Turn Bay Length (ft)							
Base Capacity (vph)		2669	2592		368	303	
Starvation Cap Reductn		1180	1456		0	0	
Spillback Cap Reductn		0	0		0	0	
Storage Cap Reductn		0	0		0	0	
Reduced v/c Ratio		0.53	0.53		0.12	0.10	

Intersection Summary			
Area Type:	CBD		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 80 (67%), Referenced to phase 1:EBWB, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.30			
Intersection Signal Delay: 9.0		Intersection LOS: A	
Intersection Capacity Utilization 34.7%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 3068: Ruggles St & Ruggles Bus Station Exit

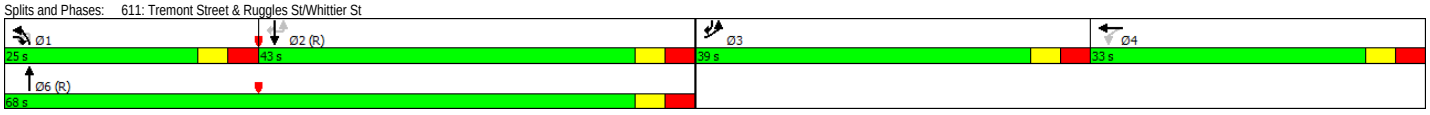
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations														
Traffic Volume (vph)	484	0	199	7	1	14	22	118	943	0	16	0	568	401
Future Volume (vph)	484	0	199	7	1	14	22	118	943	0	16	0	568	401
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	11	11	12	16	12	12	11	11	12	12	12	11	11
Storage Length (ft)	0		260	0		0		200		0		0		0
Storage Lanes	2		1	0		0		1		0		0		1
Taper Length (ft)	25			25				25				25		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	0.91	1.00	0.91	1.00	0.95	1.00	0.95	1.00
Ped Bike Factor	0.98				0.97			0.99						0.95
Frt			0.850		0.913									0.850
Flt Protected	0.950				0.984			0.950					0.999	
Satd. Flow (prot)	3120	0	1391	0	1699	0	0	1544	4513	0	0	0	3107	1378
Flt Permitted	0.950				0.984			0.211					0.903	
Satd. Flow (perm)	3043	0	1391	0	1690	0	0	340	4513	0	0	0	2809	1315
Right Turn on Red			Yes			Yes				Yes				No
Satd. Flow (RTOR)			205		18									
Link Speed (mph)		25			25				30				30	
Link Distance (ft)		404			351				690				318	
Travel Time (s)		11.0			9.6				15.7				7.2	
Confl. Peds. (#/hr)	16		10	10		16		16						16
Confl. Bikes (#/hr)										1				1
Peak Hour Factor	0.97	0.97	0.97	0.79	0.79	0.79	0.98	0.98	0.98	0.98	0.99	0.99	0.99	0.99
Heavy Vehicles (%)	1%	0%	1%	0%	0%	0%	0%	2%	0%	0%	0%	0%	1%	2%
Parking (#/hr)				15										
Adj. Flow (vph)	499	0	205	9	1	18	22	120	962	0	16	0	574	405
Shared Lane Traffic (%)														
Lane Group Flow (vph)	499	0	205	0	28	0	0	142	962	0	0	0	590	405
Turn Type	Prot		Over	Perm	NA		custom	Prot	NA		Perm		NA	pm+ov
Protected Phases	3		1!		4			1	6				2	3
Permitted Phases				4			1!				2			2
Detector Phase	3		1	4	4		1	1	6		2		2	3
Switch Phase														
Minimum Initial (s)	8.0		8.0	7.0	7.0		8.0	8.0	8.0		8.0		8.0	8.0
Minimum Split (s)	14.0		14.0	33.0	33.0		14.0	14.0	26.0		26.0		26.0	14.0
Total Split (s)	39.0		25.0	33.0	33.0		25.0	25.0	68.0		43.0		43.0	39.0
Total Split (%)	27.9%		17.9%	23.6%	23.6%		17.9%	17.9%	48.6%		30.7%		30.7%	27.9%
Maximum Green (s)	33.0		19.0	27.0	27.0		19.0	19.0	62.0		37.0		37.0	33.0
Yellow Time (s)	3.0		3.0	3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0
All-Red Time (s)	3.0		3.0	3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0
Lost Time Adjust (s)	0.0		0.0		0.0			0.0	0.0				0.0	0.0
Total Lost Time (s)	6.0		6.0		6.0			6.0	6.0				6.0	6.0
Lead/Lag	Lead		Lead	Lag	Lag		Lead	Lead			Lag		Lag	Lead
Lead-Lag Optimize?	Yes		Yes	Yes	Yes		Yes	Yes			Yes		Yes	Yes
Vehicle Extension (s)	3.0		2.0	2.0	2.0		2.0	2.0	2.0		2.0		2.0	3.0
Recall Mode	None		Min	Max	Max		Min	Min	C-Max		C-Max		C-Max	None
Walk Time (s)				7.0	7.0				8.0		8.0		8.0	
Flash Dont Walk (s)				19.0	19.0				12.0		12.0		12.0	
Pedestrian Calls (#/hr)				18	18				10		16		16	
Act Effct Green (s)	28.7		19.0		27.0			19.0	66.3				41.3	70.0
Actuated g/C Ratio	0.20		0.14		0.19			0.14	0.47				0.30	0.50
v/c Ratio	0.78		0.56		0.08			3.09	0.45				0.71	0.60
Control Delay	61.5		13.3		25.3			1013.3	26.0				44.4	41.8
Queue Delay	0.5		0.0		0.0			0.0	0.0				3.9	0.5
Total Delay	62.0		13.3		25.3			1013.3	26.0				48.3	42.3
LOS	E		B		C			F	C				D	D
Approach Delay		47.8			25.3				153.0				45.9	
Approach LOS		D			C				F				D	
90th %ile Green (s)	33.0		19.0	27.0	27.0		19.0	19.0	62.0		37.0		37.0	33.0
90th %ile Term Code	Max		Max	MaxR	MaxR		Max	Max	Coord		Coord		Coord	Max
70th %ile Green (s)	32.5		19.0	27.0	27.0		19.0	19.0	62.5		37.5		37.5	32.5
70th %ile Term Code	Gap		Max	MaxR	MaxR		Max	Max	Coord		Coord		Coord	Gap
50th %ile Green (s)	29.2		19.0	27.0	27.0		19.0	19.0	65.8		40.8		40.8	29.2
50th %ile Term Code	Gap		Max	MaxR	MaxR		Max	Max	Coord		Coord		Coord	Gap
30th %ile Green (s)	26.7		19.0	27.0	27.0		19.0	19.0	68.3		43.3		43.3	26.7
30th %ile Term Code	Gap		Max	MaxR	MaxR		Max	Max	Coord		Coord		Coord	Gap
10th %ile Green (s)	22.1		19.0	27.0	27.0		19.0	19.0	72.9		47.9		47.9	22.1
10th %ile Term Code	Gap		Max	MaxR	MaxR		Max	Max	Coord		Coord		Coord	Gap
Queue Length 50th (ft)	222		0		8			~225	212				278	365
Queue Length 95th (ft)	277		77		30			#366	266				355	449
Internal Link Dist (ft)		324			271				610				238	
Turn Bay Length (ft)			260					200						
Base Capacity (vph)	735		365		340			46	2137				828	712
Starvation Cap Reductn	50		0		0			0	0				159	83
Spillback Cap Reductn	20		0		0			0	0				0	0
Storage Cap Reductn	0		0		0			0	0				0	0
Reduced v/c Ratio	0.73		0.56		0.08			3.09	0.45				0.88	0.64

Intersection Summary

Area Type: CBD
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 0 (0%), Referenced to phase 2:SBTU and 6:NBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 3.09
Intersection Signal Delay: 87.9 Intersection LOS: F
Intersection Capacity Utilization 94.6% ICU Level of Service F
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
! Phase conflict between lane groups.

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



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	58	0	0	0	0	1351	106	0	927	0
Future Volume (vph)	0	0	58	0	0	0	0	1351	106	0	927	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	16	12	11	12	12	11	12
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	1.00
Ped Bike Factor								0.99				
Frt			0.865					0.989				
Flt Protected												
Satd. Flow (prot)	0	0	1479	0	0	0	0	4418	0	0	4468	0
Flt Permitted												
Satd. Flow (perm)	0	0	1479	0	0	0	0	4418	0	0	4468	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			210					25				
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		238			565			318			139	
Travel Time (s)		6.5			15.4			7.2			3.2	
Confl. Peds. (#/hr)						74			22			
Confl. Bikes (#/hr)									3			
Peak Hour Factor	0.91	0.91	0.91	0.25	0.25	0.25	0.98	0.98	0.98	0.99	0.99	0.99
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	1%	0%
Adj. Flow (vph)	0	0	64	0	0	0	0	1379	108	0	936	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	64	0	0	0	0	1487	0	0	936	0
Turn Type			Prot					NA			NA	
Protected Phases			5					1			1	
Permitted Phases												
Detector Phase			5					1			1	
Switch Phase												
Minimum Initial (s)			8.0					8.0			8.0	
Minimum Split (s)			30.0					24.0			24.0	
Total Split (s)			31.0					109.0			109.0	
Total Split (%)			22.1%					77.9%			77.9%	
Maximum Green (s)			26.0					104.0			104.0	
Yellow Time (s)			3.0					3.0			3.0	
All-Red Time (s)			2.0					2.0			2.0	
Lost Time Adjust (s)			0.0					0.0			0.0	
Total Lost Time (s)			5.0					5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)			2.0					2.0			2.0	
Recall Mode			None					C-Max			C-Max	
Walk Time (s)			8.0					8.0			8.0	
Flash Dont Walk (s)			17.0					6.0			6.0	
Pedestrian Calls (#/hr)			42					76			76	
Act Effct Green (s)			21.6					112.0			112.0	
Actuated g/C Ratio			0.15					0.80			0.80	
v/c Ratio			0.16					0.42			0.26	
Control Delay			0.8					5.8			2.3	
Queue Delay			0.0					0.3			0.2	
Total Delay			0.8					6.1			2.5	
LOS			A					A			A	
Approach Delay		0.8						6.1			2.5	
Approach LOS		A						A			A	
90th %ile Green (s)			25.0					105.0			105.0	
90th %ile Term Code			Ped					Coord			Coord	
70th %ile Green (s)			25.0					105.0			105.0	
70th %ile Term Code			Ped					Coord			Coord	
50th %ile Green (s)			25.0					105.0			105.0	
50th %ile Term Code			Ped					Coord			Coord	
30th %ile Green (s)			25.0					105.0			105.0	
30th %ile Term Code			Ped					Coord			Coord	
10th %ile Green (s)			0.0					135.0			135.0	
10th %ile Term Code			Skip					Coord			Coord	
Queue Length 50th (ft)			0					210			39	
Queue Length 95th (ft)			0					228			39	
Internal Link Dist (ft)		158			485			238			59	
Turn Bay Length (ft)												
Base Capacity (vph)			445					3539			3574	
Starvation Cap Reductn			0					1131			1513	
Spillback Cap Reductn			23					0			513	
Storage Cap Reductn			0					0			0	
Reduced v/c Ratio			0.15					0.62			0.45	

Intersection Summary

Area Type: CBD
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 65 (46%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.42
Intersection Signal Delay: 4.6 Intersection LOS: A
Intersection Capacity Utilization 35.9% ICU Level of Service A
Analysis Period (min) 15

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

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	172	180	452	105	39	238	314	0	26	304	14
Future Volume (vph)	8	172	180	452	105	39	238	314	0	26	304	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	13	12	13	13	12	12	11	16	12	14	12
Storage Length (ft)	0		0	350		0	0		0	0		0
Storage Lanes	0		1	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.95	0.95	1.00	0.95	0.95	0.95
Ped Bike Factor		1.00	0.98	1.00	0.99			0.99			1.00	
Frt			0.850		0.959						0.994	
Flt Protected		0.998		0.950				0.979			0.996	
Satd. Flow (prot)	0	1747	1454	3224	1673	0	0	3040	0	0	3394	0
Flt Permitted		0.998		0.950				0.655			0.883	
Satd. Flow (perm)	0	1746	1430	3214	1673	0	0	2019	0	0	3007	0
Right Turn on Red			Yes			No			No			Yes
Satd. Flow (RTOR)			186								3	
Link Speed (mph)		30			30			30			25	
Link Distance (ft)		298			524			245			216	
Travel Time (s)		6.8			11.9			5.6			5.9	
Confl. Peds. (#/hr)	8		2	2		8	18		14	14		18
Confl. Bikes (#/hr)									3			1
Peak Hour Factor	0.97	0.97	0.97	0.96	0.96	0.96	0.99	0.99	0.99	0.95	0.95	0.95
Heavy Vehicles (%)	0%	1%	0%	1%	1%	0%	0%	2%	0%	0%	1%	0%
Adj. Flow (vph)	8	177	186	471	109	41	240	317	0	27	320	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	185	186	471	150	0	0	557	0	0	362	0
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	5		6	6		7	1 7			1	
Permitted Phases			5				1 7			1		
Detector Phase	5	5	5	6	6		7	1 7		1	1	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	10.0	10.0		4.0			10.0	10.0	
Minimum Split (s)	24.0	24.0	24.0	22.0	22.0		9.0			26.0	26.0	
Total Split (s)	25.0	25.0	25.0	44.0	44.0		19.0			52.0	52.0	
Total Split (%)	17.9%	17.9%	17.9%	31.4%	31.4%		13.6%			37.1%	37.1%	
Maximum Green (s)	21.0	21.0	21.0	40.0	40.0		15.0			48.0	48.0	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0			3.0	3.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0			1.0	1.0	
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	Lead	Lag	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0			2.0	2.0	
Recall Mode	None	None	None	None	None		Max			C-Max	C-Max	
Walk Time (s)	7.0	7.0	7.0							7.0	7.0	
Flash Dont Walk (s)	13.0	13.0	13.0							15.0	15.0	
Pedestrian Calls (#/hr)	32	32	32							10	10	
Act Effct Green (s)		18.2	18.2	25.2	25.2			80.6			65.6	
Actuated g/C Ratio		0.13	0.13	0.18	0.18			0.58			0.47	
v/c Ratio		0.82	0.54	0.81	0.50			0.44			0.26	
Control Delay		78.8	23.6	66.4	56.7			12.7			24.3	
Queue Delay		7.7	1.6	0.0	0.0			0.0			0.0	
Total Delay		86.5	25.1	66.4	56.7			12.7			24.3	
LOS		F	C	E	E			B			C	
Approach Delay		55.7			64.1			12.7			24.3	
Approach LOS		E			E			B			C	
90th %ile Green (s)	21.0	21.0	21.0	31.9	31.9		15.0			56.1	56.1	
90th %ile Term Code	Max	Max	Max	Gap	Gap		MaxR			Coord	Coord	
70th %ile Green (s)	21.0	21.0	21.0	27.6	27.6		15.0			60.4	60.4	
70th %ile Term Code	Max	Max	Max	Gap	Gap		MaxR			Coord	Coord	
50th %ile Green (s)	20.0	20.0	20.0	25.1	25.1		15.0			63.9	63.9	
50th %ile Term Code	Ped	Ped	Ped	Gap	Gap		MaxR			Coord	Coord	
30th %ile Green (s)	16.5	16.5	16.5	22.5	22.5		15.0			70.0	70.0	
30th %ile Term Code	Gap	Gap	Gap	Gap	Gap		MaxR			Coord	Coord	
10th %ile Green (s)	12.4	12.4	12.4	18.9	18.9		15.0			77.7	77.7	
10th %ile Term Code	Gap	Gap	Gap	Gap	Gap		MaxR			Coord	Coord	
Queue Length 50th (ft)		176	40	214	125			117			104	
Queue Length 95th (ft)		m205	m74	262	186			146			157	
Internal Link Dist (ft)		218			444			165			136	
Turn Bay Length (ft)				350								
Base Capacity (vph)		262	372	921	478			1272			1411	
Starvation Cap Reductn		46	75	0	0			0			0	
Spillback Cap Reductn		0	0	0	0			0			0	
Storage Cap Reductn		0	0	0	0			0			0	
Reduced v/c Ratio		0.86	0.63	0.51	0.31			0.44			0.26	

Intersection Summary

Area Type: CBD
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 0 (0%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 39.9 — Intersection LOS: D
Intersection Capacity Utilization 75.3% — ICU Level of Service D
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3010: Tremont Street & Melnea Cass Boulevard

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø2
Lane Configurations													
Traffic Volume (vph)	2	1	0	57	25	275	1	34	122	237	59	1	
Future Volume (vph)	2	1	0	57	25	275	1	34	122	237	59	1	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor		0.94			0.95			0.93			0.96		
Frt						0.850		0.895					
Flt Protected		0.970			0.966						0.962		
Satd. Flow (prot)	0	1659	0	0	1652	1454	0	1433	0	0	1642	0	
Flt Permitted		0.930			0.847			0.997			0.962		
Satd. Flow (perm)	0	1503	0	0	1373	1454	0	1425	0	0	1585	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)						284		127					
Link Speed (mph)		25			25			25			25		
Link Distance (ft)		157			298			219			195		
Travel Time (s)		4.3			8.1			6.0			5.3		
Confl. Peds. (#/hr)	34		26	26		34	225		34	34		225	
Confl. Bikes (#/hr)									10			26	
Peak Hour Factor	0.38	0.38	0.38	0.97	0.97	0.97	0.96	0.96	0.96	0.96	0.96	0.96	
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Parking (#/hr)												0	
Adj. Flow (vph)	5	3	0	59	26	284	1	35	127	247	61	1	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	8	0	0	85	284	0	163	0	0	309	0	
Turn Type	Perm	NA		Perm	NA	pt+ov	Perm	NA		Split	NA		
Protected Phases		6			6	1 6		5		1	1		2
Permitted Phases	6			6			5						
Detector Phase	6	6		6	6	1 6	5	5		1	1		
Switch Phase													
Minimum Initial (s)	8.0	8.0		8.0	8.0		9.0	9.0		10.0	10.0		8.0
Minimum Split (s)	14.0	14.0		14.0	14.0		14.0	14.0		15.0	15.0		21.0
Total Split (s)	16.0	16.0		16.0	16.0		16.0	16.0		17.0	17.0		21.0
Total Split (%)	22.9%	22.9%		22.9%	22.9%		22.9%	22.9%		24.3%	24.3%		30%
Maximum Green (s)	12.0	12.0		12.0	12.0		12.0	12.0		13.0	13.0		18.0
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		2.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0		1.0
Lost Time Adjust (s)		0.0			0.0			0.0			0.0		
Total Lost Time (s)		4.0			4.0			4.0			4.0		
Lead/Lag	Lag	Lag		Lag	Lag		Lead	Lead		Lead	Lead		Lag
Lead-Lag Optimize?													
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0		2.0
Recall Mode	Max	Max		Max	Max		None	None		C-Max	C-Max		None
Walk Time (s)													7.0
Flash Dont Walk (s)													11.0
Pedestrian Calls (#/hr)													0
Act Effct Green (s)		35.3			35.3	52.3		9.7			13.0		
Actuated g/C Ratio		0.50			0.50	0.75		0.14			0.19		
v/c Ratio		0.01			0.12	0.25		0.53			1.02		
Control Delay		9.3			13.4	1.0		15.7			88.3		
Queue Delay		0.0			0.0	0.3		0.3			8.3		
Total Delay		9.3			13.4	1.3		16.0			96.6		
LOS		A			B	A		B			F		
Approach Delay		9.3			4.1			16.0			96.6		
Approach LOS		A			A			B			F		
90th %ile Green (s)	32.5	32.5		32.5	32.5		12.5	12.5		13.0	13.0		0.0
90th %ile Term Code	MaxR	MaxR		MaxR	MaxR		Gap	Gap		Coord	Coord		Skip
70th %ile Green (s)	36.0	36.0		36.0	36.0		9.0	9.0		13.0	13.0		0.0
70th %ile Term Code	MaxR	MaxR		MaxR	MaxR		Min	Min		Coord	Coord		Skip
50th %ile Green (s)	36.0	36.0		36.0	36.0		9.0	9.0		13.0	13.0		0.0
50th %ile Term Code	MaxR	MaxR		MaxR	MaxR		Min	Min		Coord	Coord		Skip
30th %ile Green (s)	36.0	36.0		36.0	36.0		9.0	9.0		13.0	13.0		0.0
30th %ile Term Code	MaxR	MaxR		MaxR	MaxR		Min	Min		Coord	Coord		Skip
10th %ile Green (s)	36.0	36.0		36.0	36.0		9.0	9.0		13.0	13.0		0.0
10th %ile Term Code	MaxR	MaxR		MaxR	MaxR		Min	Min		Coord	Coord		Skip
Queue Length 50th (ft)		2			26	0		14			~137		
Queue Length 95th (ft)		4			43	0		63			#286		
Internal Link Dist (ft)		77			218			139			115		
Turn Bay Length (ft)													
Base Capacity (vph)		757			692	1157		351			304		
Starvation Cap Reductn		0			0	419		0			0		
Spillback Cap Reductn		0			0	0		24			8		
Storage Cap Reductn		0			0	0		0			0		
Reduced v/c Ratio		0.01			0.12	0.38		0.50			1.04		

Intersection Summary

Area Type: CBD
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 17 (24%), Referenced to phase 1:SBTL, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.02
Intersection Signal Delay: 40.1 Intersection LOS: D
Intersection Capacity Utilization 51.3% ICU Level of Service A
Analysis Period (min) 15

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

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

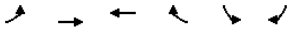
Splits and Phases: 2085: Columbus Ave & Melnea Cass Boulevard

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	583	157	20	508	78	214	202	42	154	195	62
Future Volume (vph)	53	583	157	20	508	78	214	202	42	154	195	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	120		0	120		0	0		225	0		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.96	0.93		0.93	0.98		0.97	0.98		0.95	0.98	
Frt		0.968			0.980			0.974			0.964	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3232	0	1719	3467	0	1805	1802	0	1805	1771	0
Flt Permitted	0.338			0.294			0.256			0.415		
Satd. Flow (perm)	604	3232	0	497	3467	0	473	1802	0	747	1771	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		35			17			9			13	
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		321			457			628			317	
Travel Time (s)		8.8			12.5			17.1			8.6	
Confl. Peds. (#/hr)	50		122	122		50	41		58	58		41
Confl. Bikes (#/hr)			7			4			13			18
Peak Hour Factor	0.95	0.95	0.95	0.97	0.97	0.97	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	1%	1%	5%	0%	1%	0%	1%	0%	0%	1%	2%
Parking (#/hr)												0
Adj. Flow (vph)	56	614	165	21	524	80	225	213	44	162	205	65
Shared Lane Traffic (%)												
Lane Group Flow (vph)	56	779	0	21	604	0	225	257	0	162	270	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases	6			2			4			8		
Detector Phase	1	6		5	2		7	4		3	8	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	12.0	54.0		12.0	54.0		20.0	38.0		16.0	34.0	
Total Split (s)	12.0	54.0		12.0	54.0		20.0	38.0		16.0	34.0	
Total Split (%)	10.0%	45.0%		10.0%	45.0%		16.7%	31.7%		13.3%	28.3%	
Maximum Green (s)	8.0	50.0		8.0	50.0		16.0	34.0		12.0	30.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
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	4.0		4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		10.0			10.0			7.0			7.0	
Flash Dont Walk (s)		15.0			15.0			17.0			17.0	
Pedestrian Calls (#/hr)		41			58			122			50	
Act Effct Green (s)	66.9	63.8		64.2	59.0		43.4	28.6		36.4	25.1	
Actuated g/C Ratio	0.56	0.53		0.54	0.49		0.36	0.24		0.30	0.21	
v/c Ratio	0.14	0.45		0.06	0.35		0.67	0.59		0.50	0.71	
Control Delay	13.8	19.1		13.5	20.3		37.3	44.4		31.5	52.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	13.8	19.1		13.5	20.3		37.3	44.4		31.5	52.5	
LOS	B	B		B	C		D	D		C	D	
Approach Delay		18.8			20.1			41.1			44.6	
Approach LOS		B			C			D			D	
90th %ile Green (s)	8.0	50.7		7.3	50.0		16.0	34.0		12.0	30.0	
90th %ile Term Code	Max	Coord		Gap	Coord		Max	Hold		Max	Max	
70th %ile Green (s)	7.9	55.6		6.5	54.2		16.0	29.9		12.0	25.9	
70th %ile Term Code	Gap	Coord		Gap	Coord		Max	Hold		Max	Gap	
50th %ile Green (s)	7.1	68.0		0.0	56.9		16.0	28.0		12.0	24.0	
50th %ile Term Code	Gap	Coord		Skip	Coord		Max	Hold		Max	Ped	
30th %ile Green (s)	6.4	69.5		0.0	59.1		14.5	27.2		11.3	24.0	
30th %ile Term Code	Gap	Coord		Skip	Coord		Gap	Hold		Gap	Ped	
10th %ile Green (s)	0.0	75.0		0.0	75.0		11.4	24.0		9.0	21.6	
10th %ile Term Code	Skip	Coord		Skip	Coord		Gap	Ped		Gap	Hold	
Queue Length 50th (ft)	18	163		7	147		125	172		86	189	
Queue Length 95th (ft)	43	288		21	215		176	244		129	268	
Internal Link Dist (ft)		241			377			548			237	
Turn Bay Length (ft)	120			120								
Base Capacity (vph)	414	1733		352	1714		350	517		336	452	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
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	0.14	0.45		0.06	0.35		0.64	0.50		0.48	0.60	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.71
Intersection Signal Delay: 28.4 — Intersection LOS: C
Intersection Capacity Utilization 69.7% — ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 95: Columbus Ave & Massachusetts Ave



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	15	643	507	41	0	0
Future Volume (Veh/h)	15	643	507	41	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.97	0.97	0.92	0.92
Hourly flow rate (vph)	16	691	523	42	0	0
Pedestrians					42	
Lane Width (ft)					0.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		212	170			
pX, platoon unblocked	0.95				0.95	0.95
vC, conflicting volume	607				964	324
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	484				859	187
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				100	100
cM capacity (veh/h)	1036				277	783

Direction, Lane #	EB 1	EB 2	WB 1	WB 2
Volume Total	246	461	349	216
Volume Left	16	0	0	0
Volume Right	0	0	0	42
cSH	1036	1700	1700	1700
Volume to Capacity	0.02	0.27	0.21	0.13
Queue Length 95th (ft)	1	0	0	0
Control Delay (s)	0.7	0.0	0.0	0.0
Lane LOS	A			
Approach Delay (s)	0.2		0.0	
Approach LOS				

Intersection Summary				
Average Delay	0.1			
Intersection Capacity Utilization	31.8%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	10	3	311	0	0	287
Future Volume (Veh/h)	10	3	311	0	0	287
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.65	0.65	0.95	0.95	0.96	0.96
Hourly flow rate (vph)	15	5	327	0	0	299
Pedestrians	63		37			1
Lane Width (ft)	12.0		12.0			12.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	5		3			0
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			195			
pX, platoon unblocked						
vC, conflicting volume	726	391			390	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	726	391			390	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	99			100	
cM capacity (veh/h)	362	627			1118	

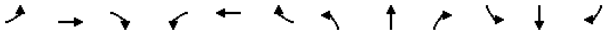
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	20	327	299
Volume Left	15	0	0
Volume Right	5	0	0
cSH	405	1700	1700
Volume to Capacity	0.05	0.19	0.18
Queue Length 95th (ft)	4	0	0
Control Delay (s)	14.4	0.0	0.0
Lane LOS	B		
Approach Delay (s)	14.4	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	26.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	290	24	20	287
Future Volume (Veh/h)	0	0	290	24	20	287
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.25	0.25	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	305	25	21	302
Pedestrians	58		39			
Lane Width (ft)	0.0		12.0			
Walking Speed (ft/s)	4.0		4.0			
Percent Blockage	0		3			
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			365			
pX, platoon unblocked						
vC, conflicting volume	758	376			388	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	758	376			388	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			98	
cM capacity (veh/h)	359	675			1182	

Direction, Lane #	NB 1	SB 1
Volume Total	330	323
Volume Left	0	21
Volume Right	25	0
cSH	1700	1182
Volume to Capacity	0.19	0.02
Queue Length 95th (ft)	0	1
Control Delay (s)	0.0	0.7
Lane LOS		A
Approach Delay (s)	0.0	0.7
Approach LOS		

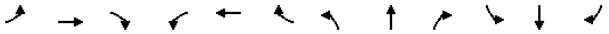
Intersection Summary				
Average Delay	0.3			
Intersection Capacity Utilization	34.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	1	4	0	12	0	290	0	0	302	0
Future Volume (Veh/h)	0	0	1	4	0	12	0	290	0	0	302	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.25	0.25	0.25	0.67	0.67	0.67	0.94	0.94	0.94	0.96	0.96	0.96
Hourly flow rate (vph)	0	0	4	6	0	18	0	309	0	0	315	0
Pedestrians		252			63			2			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		21			5			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								549				
pX, platoon unblocked												
vC, conflicting volume	897	939	569	693	939	375	567			372		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	897	939	569	693	939	375	567			372		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	98	100	97	100			100		
cM capacity (veh/h)	162	199	414	272	199	639	802			1135		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	4	24	309	315
Volume Left	0	6	0	0
Volume Right	4	18	0	0
cSH	414	478	802	1700
Volume to Capacity	0.01	0.05	0.00	0.19
Queue Length 95th (ft)	1	4	0	0
Control Delay (s)	13.8	12.9	0.0	0.0
Lane LOS	B	B		
Approach Delay (s)	13.8	12.9	0.0	0.0
Approach LOS	B	B		

Intersection Summary					
Average Delay	0.6				
Intersection Capacity Utilization	28.3%	ICU Level of Service		A	
Analysis Period (min)	15				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	73	9	70	0	0	0	14	277	11	5	232	29
Future Volume (Veh/h)	73	9	70	0	0	0	14	277	11	5	232	29
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.25	0.25	0.25	0.95	0.95	0.95	0.94	0.94	0.94
Hourly flow rate (vph)	78	10	75	0	0	0	15	292	12	5	247	31
Pedestrians		242			59			73			2	
Lane Width (ft)		12.0			0.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		20			0			6			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								727				
pX, platoon unblocked												
vC, conflicting volume	844	908	578	812	917	359	520			363		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	844	908	578	812	917	359	520			363		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	59	95	81	100	100	100	98			100		
cM capacity (veh/h)	189	217	390	182	214	689	843			1207		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	163	319	283
Volume Left	78	15	5
Volume Right	75	12	31
cSH	250	843	1207
Volume to Capacity	0.65	0.02	0.00
Queue Length 95th (ft)	102	1	0
Control Delay (s)	42.8	0.6	0.2
Lane LOS	E	A	A
Approach Delay (s)	42.8	0.6	0.2
Approach LOS	E		

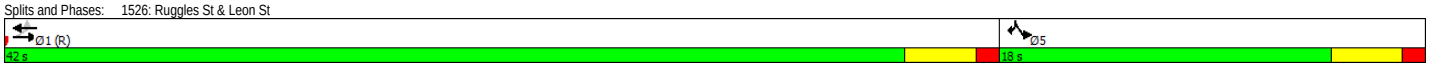
Intersection Summary				
Average Delay	9.4			
Intersection Capacity Utilization	47.3%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	17	562	798	12	43	20
Future Volume (vph)	17	562	798	12	43	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	11	12	12	10	10
Storage Length (ft)	100			0	0	140
Storage Lanes	0			0	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	1.00
Ped Bike Factor		1.00	0.99		0.98	
Frt			0.998			0.850
Flt Protected		0.999			0.950	
Satd. Flow (prot)	0	1605	3223	0	1516	1245
Flt Permitted		0.972			0.950	
Satd. Flow (perm)	0	1557	3223	0	1485	1245
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			5			22
Link Speed (mph)		25	25		35	
Link Distance (ft)		511	102		700	
Travel Time (s)		13.9	2.8		13.6	
Confl. Peds. (#/hr)	159			185	16	30
Confl. Bikes (#/hr)				1		13
Peak Hour Factor	0.95	0.95	0.95	0.95	0.90	0.90
Heavy Vehicles (%)	0%	3%	0%	3%	0%	9%
Adj. Flow (vph)	18	592	840	13	48	22
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	610	853	0	48	22
Turn Type	Perm	NA	NA		Prot	Prot
Protected Phases		1	1		5	5
Permitted Phases	1					
Detector Phase	1	1	1		5	5
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0		8.0	8.0
Minimum Split (s)	28.0	28.0	28.0		18.0	18.0
Total Split (s)	42.0	42.0	42.0		18.0	18.0
Total Split (%)	70.0%	70.0%	70.0%		30.0%	30.0%
Maximum Green (s)	38.0	38.0	38.0		14.0	14.0
Yellow Time (s)	3.0	3.0	3.0		3.0	3.0
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0
Total Lost Time (s)		4.0	4.0		4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0
Recall Mode	C-Max	C-Max	C-Max		None	None
Walk Time (s)	8.0	8.0	8.0		6.0	6.0
Flash Dont Walk (s)	8.0	8.0	8.0		8.0	8.0
Pedestrian Calls (#/hr)	80	80	80		8	8
Act Effct Green (s)		49.2	49.2		9.2	9.2
Actuated g/C Ratio		0.82	0.82		0.15	0.15
v/c Ratio		0.48	0.32		0.21	0.11
Control Delay		5.4	5.5		23.5	10.6
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		5.4	5.5		23.5	10.6
LOS		A	A		C	B
Approach Delay		5.4	5.5		19.4	
Approach LOS		A	A		B	
90th %ile Green (s)	38.0	38.0	38.0		14.0	14.0
90th %ile Term Code	Coord	Coord	Coord		Ped	Ped
70th %ile Green (s)	44.0	44.0	44.0		8.0	8.0
70th %ile Term Code	Coord	Coord	Coord		Min	Min
50th %ile Green (s)	44.0	44.0	44.0		8.0	8.0
50th %ile Term Code	Coord	Coord	Coord		Min	Min
30th %ile Green (s)	56.0	56.0	56.0		0.0	0.0
30th %ile Term Code	Coord	Coord	Coord		Skip	Skip
10th %ile Green (s)	56.0	56.0	56.0		0.0	0.0
10th %ile Term Code	Coord	Coord	Coord		Skip	Skip
Queue Length 50th (ft)		70	87		16	0
Queue Length 95th (ft)		200	m111		37	15
Internal Link Dist (ft)		431	22		620	
Turn Bay Length (ft)						140
Base Capacity (vph)		1276	2643		353	307
Starvation Cap Reductn		0	0		0	0
Spillback Cap Reductn		0	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.48	0.32		0.14	0.07

Intersection Summary

Area Type: CBD
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 47 (78%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.48
Intersection Signal Delay: 6.1 Intersection LOS: A
Intersection Capacity Utilization 64.6% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1526: Ruggles St & Leon St



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø2
Lane Configurations							
Traffic Volume (vph)	0	585	829	0	75	23	
Future Volume (vph)	0	585	829	0	75	23	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	16	16	12	16	12	
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	
Ped Bike Factor					0.85	0.93	
Frt						0.850	
Flt Protected					0.950		
Satd. Flow (prot)	0	3575	1882	0	1841	1454	
Flt Permitted					0.950		
Satd. Flow (perm)	0	3575	1882	0	1568	1356	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)						24	
Link Speed (mph)		25	25		35		
Link Distance (ft)		170	404		298		
Travel Time (s)		4.6	11.0		5.8		
Confl. Peds. (#/hr)	28			28	107	40	
Confl. Bikes (#/hr)				2		1	
Peak Hour Factor	0.96	0.96	0.95	0.95	0.94	0.94	
Heavy Vehicles (%)	0%	3%	3%	0%	0%	0%	
Adj. Flow (vph)	0	609	873	0	80	24	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	609	873	0	80	24	
Turn Type		NA	NA		Prot	Perm	
Protected Phases		1	1		5		2
Permitted Phases						5	
Detector Phase		1	1		5	5	
Switch Phase							
Minimum Initial (s)		10.0	10.0		10.0	10.0	7.0
Minimum Split (s)		23.0	23.0		17.0	17.0	16.0
Total Split (s)		27.0	27.0		17.0	17.0	16.0
Total Split (%)		45.0%	45.0%		28.3%	28.3%	27%
Maximum Green (s)		23.0	23.0		13.0	13.0	14.0
Yellow Time (s)		3.0	3.0		3.0	3.0	2.0
All-Red Time (s)		1.0	1.0		1.0	1.0	0.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.0	4.0		4.0	4.0	
Lead/Lag		Lead	Lead				Lag
Lead-Lag Optimize?							
Vehicle Extension (s)		2.0	2.0		2.0	2.0	2.0
Recall Mode		C-Max	C-Max		None	None	None
Walk Time (s)							7.0
Flash Dont Walk (s)							7.0
Pedestrian Calls (#/hr)							86
Act Effct Green (s)		35.6	35.6		10.0	10.0	
Actuated g/C Ratio		0.59	0.59		0.17	0.17	
v/c Ratio		0.29	0.78		0.26	0.10	
Control Delay		7.0	24.0		24.4	11.0	
Queue Delay		0.0	0.5		0.0	0.0	
Total Delay		7.0	24.5		24.4	11.0	
LOS		A	C		C	B	
Approach Delay		7.0	24.5		21.3		
Approach LOS		A	C		C		
90th %ile Green (s)		26.0	26.0		10.0	10.0	14.0
90th %ile Term Code		Coord	Coord		Min	Min	Ped
70th %ile Green (s)		26.0	26.0		10.0	10.0	14.0
70th %ile Term Code		Coord	Coord		Min	Min	Ped
50th %ile Green (s)		26.0	26.0		10.0	10.0	14.0
50th %ile Term Code		Coord	Coord		Min	Min	Ped
30th %ile Green (s)		40.0	40.0		0.0	0.0	14.0
30th %ile Term Code		Coord	Coord		Skip	Skip	Ped
10th %ile Green (s)		56.0	56.0		0.0	0.0	0.0
10th %ile Term Code		Coord	Coord		Skip	Skip	Skip
Queue Length 50th (ft)		77	~362		26	0	
Queue Length 95th (ft)		43	#558		59	17	
Internal Link Dist (ft)		90	324		218		
Turn Bay Length (ft)							
Base Capacity (vph)		2121	1116		398	312	
Starvation Cap Reductn		0	46		0	0	
Spillback Cap Reductn		0	0		0	0	
Storage Cap Reductn		0	0		0	0	
Reduced v/c Ratio		0.29	0.82		0.20	0.08	

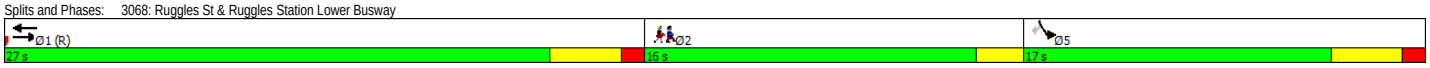
Intersection Summary

Area Type: CBD
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 4 (7%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.78
Intersection Signal Delay: 17.6 Intersection LOS: B
Intersection Capacity Utilization 63.5% ICU Level of Service B
Analysis Period (min) 15

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

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

Splits and Phases: 3068: Ruggles St & Ruggles Station Lower Busway



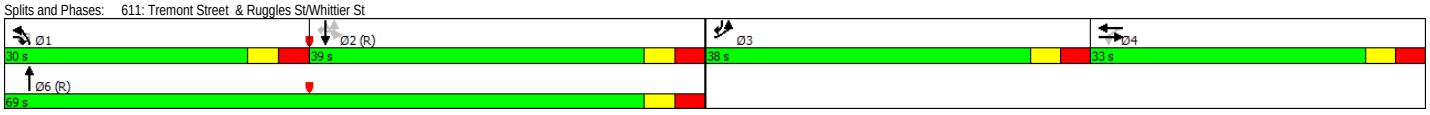
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations														
Traffic Volume (vph)	496	15	149	24	14	48	12	302	1038	16	17	52	495	514
Future Volume (vph)	496	15	149	24	14	48	12	302	1038	16	17	52	495	514
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	11	11	12	16	12	12	11	11	12	12	12	11	11
Storage Length (ft)	0		260	0		0		200		0		0		0
Storage Lanes	1		1	0		0		1		0		1		1
Taper Length (ft)	25			25				25				25		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	0.91	1.00	0.91	0.91	0.95	1.00	0.95	1.00
Ped Bike Factor	0.99				0.98				1.00			0.99		0.92
Frt			0.850		0.925				0.998					0.850
Flt Protected	0.950				0.986			0.950				0.950		
Satd. Flow (prot)	1513	1570	1351	0	1739	0	0	1512	4306	0	0	1624	3049	1378
Flt Permitted	0.950				0.911			0.167				0.245		
Satd. Flow (perm)	1492	1570	1351	0	1598	0	0	266	4306	0	0	414	3049	1268
Right Turn on Red			Yes			Yes				Yes				No
Satd. Flow (RTOR)			155		39				2					
Link Speed (mph)		25			25				30				30	
Link Distance (ft)		404			351				578				318	
Travel Time (s)		11.0			9.6				13.1				7.2	
Confl. Peds. (#/hr)	10		12	12		10		17		15		15		17
Confl. Bikes (#/hr)						1				2				2
Peak Hour Factor	0.96	0.96	0.96	0.81	0.81	0.81	0.95	0.95	0.95	0.95	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	2%	0%	4%	0%	0%	0%	0%	4%	1%	0%	0%	0%	3%	2%
Parking (#/hr)				15					0					
Adj. Flow (vph)	517	16	155	30	17	59	13	318	1093	17	17	53	505	524
Shared Lane Traffic (%)	0%													
Lane Group Flow (vph)	517	16	155	0	106	0	0	331	1110	0	0	70	505	524
Turn Type	Prot	NA	Over	Perm	NA		custom	Prot	NA		Perm	Perm	NA	pm+ov
Protected Phases	3	4	1!		4			1	6				2	3
Permitted Phases				4			1!				2	2		2
Detector Phase	3	4	1	4	4		1	1	6		2	2	2	3
Switch Phase														
Minimum Initial (s)	9.0	8.0	8.0	8.0	8.0		8.0	8.0	16.0		16.0	16.0	16.0	9.0
Minimum Split (s)	15.0	32.0	14.0	32.0	32.0		14.0	14.0	26.0		26.0	26.0	26.0	15.0
Total Split (s)	38.0	33.0	30.0	33.0	33.0		30.0	30.0	69.0		39.0	39.0	39.0	38.0
Total Split (%)	27.1%	23.6%	21.4%	23.6%	23.6%		21.4%	21.4%	49.3%		27.9%	27.9%	27.9%	27.1%
Maximum Green (s)	32.0	27.0	24.0	27.0	27.0		24.0	24.0	63.0		33.0	33.0	33.0	32.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0			0.0	0.0			0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0		6.0			6.0	6.0			6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag		Lead	Lead			Lag	Lag	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes			Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0		2.0	2.0	2.0	2.0
Recall Mode	None	None	None	None	None		None	None	C-Max		C-Max	C-Max	C-Max	None
Walk Time (s)		7.0		7.0	7.0				8.0		8.0	8.0	8.0	
Flash Dont Walk (s)		19.0		19.0	19.0				12.0		12.0	12.0	12.0	
Pedestrian Calls (#/hr)		4		4	4				10		10	10	10	
Act Effct Green (s)	32.0	32.0	24.0		23.2			24.0	66.8			36.8	36.8	68.8
Actuated g/C Ratio	0.23	0.23	0.17		0.17			0.17	0.48			0.26	0.26	0.49
v/c Ratio	1.50	0.04	0.43		0.36			7.36	0.54			0.65	0.63	0.81
Control Delay	276.4	42.7	11.2		34.1			2913.7	27.9			96.3	72.8	43.0
Queue Delay	0.7	0.0	0.0		0.0			0.0	0.1			5.5	1.9	0.6
Total Delay	277.1	42.7	11.2		34.1			2913.7	27.9			101.7	74.7	43.5
LOS	F	D	B		C			F	C			F	E	D
Approach Delay		211.8			34.1				690.8				61.6	
Approach LOS		F			C				F				E	
90th %ile Green (s)	32.0	27.0	24.0	27.0	27.0		24.0	24.0	63.0		33.0	33.0	33.0	32.0
90th %ile Term Code	Max	Max	Max	Max	Max		Max	Max	Coord		Coord	Coord	Coord	Max
70th %ile Green (s)	32.0	27.0	24.0	27.0	27.0		24.0	24.0	63.0		33.0	33.0	33.0	32.0
70th %ile Term Code	Max	Max	Max	Max	Max		Max	Max	Coord		Coord	Coord	Coord	Max
50th %ile Green (s)	32.0	27.0	24.0	27.0	27.0		24.0	24.0	63.0		33.0	33.0	33.0	32.0
50th %ile Term Code	Max	Max	Max	Max	Max		Max	Max	Coord		Coord	Coord	Coord	Max
30th %ile Green (s)	32.0	27.0	24.0	27.0	27.0		24.0	24.0	63.0		33.0	33.0	33.0	32.0
30th %ile Term Code	Max	Max	Max	Max	Max		Max	Max	Coord		Coord	Coord	Coord	Max
10th %ile Green (s)	32.0	8.0	24.0	8.0	8.0		24.0	24.0	82.0		52.0	52.0	52.0	32.0
10th %ile Term Code	Max	Min	Max	Min	Min		Max	Max	Coord		Coord	Coord	Coord	Max
Queue Length 50th (ft)	~684	11	0		52			~553	269			67	255	269
Queue Length 95th (ft)	#921	33	64		95			#753	317			#150	316	#458
Internal Link Dist (ft)		324			271				498				238	
Turn Bay Length (ft)			260					200						
Base Capacity (vph)	345	358	360		339			45	2055			108	801	647
Starvation Cap Reductn	22	0	0		0			0	0			0	159	16
Spillback Cap Reductn	0	0	0		1			0	136			13	0	0
Storage Cap Reductn	0	0	0		0			0	0			0	0	0
Reduced v/c Ratio	1.60	0.04	0.43		0.31			7.36	0.58			0.74	0.79	0.83

Intersection Summary

Area Type: CBD
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 48 (34%), Referenced to phase 2:SBTL and 6:NBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 7.36
Intersection Signal Delay: 363.6 Intersection LOS: F
Intersection Capacity Utilization 82.3% ICU Level of Service E
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
! Phase conflict between lane groups.

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



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	45	0	0	0	0	1536	57	0	1037	0
Future Volume (vph)	0	0	45	0	0	0	0	1536	57	0	1037	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	16	12	11	12	12	11	12
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	1.00
Ped Bike Factor								1.00				
Frt			0.865					0.995				
Flt Protected												
Satd. Flow (prot)	0	0	1479	0	0	0	0	4386	0	0	4424	0
Flt Permitted												
Satd. Flow (perm)	0	0	1479	0	0	0	0	4386	0	0	4424	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			162					10				
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		195			565			318			141	
Travel Time (s)		5.3			15.4			7.2			3.2	
Confl. Peds. (#/hr)						98			21			
Confl. Bikes (#/hr)									3			
Peak Hour Factor	0.90	0.90	0.90	0.25	0.25	0.25	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	2%	0%
Adj. Flow (vph)	0	0	50	0	0	0	0	1567	58	0	1058	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	50	0	0	0	0	1625	0	0	1058	0
Turn Type			Prot					NA			NA	
Protected Phases			5					1			1	
Permitted Phases												
Detector Phase			5					1			1	
Switch Phase												
Minimum Initial (s)			4.0					10.0			10.0	
Minimum Split (s)			33.0					24.0			24.0	
Total Split (s)			33.0					107.0			107.0	
Total Split (%)			23.6%					76.4%			76.4%	
Maximum Green (s)			28.0					102.0			102.0	
Yellow Time (s)			3.0					3.0			3.0	
All-Red Time (s)			2.0					2.0			2.0	
Lost Time Adjust (s)			0.0					0.0			0.0	
Total Lost Time (s)			5.0					5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)			3.0					3.0			3.0	
Recall Mode			None					C-Max			C-Max	
Walk Time (s)			8.0					8.0			8.0	
Flash Dont Walk (s)			17.0					6.0			6.0	
Pedestrian Calls (#/hr)			0					6			6	
Act Effct Green (s)			5.5					127.6			127.6	
Actuated g/C Ratio			0.04					0.91			0.91	
v/c Ratio			0.23					0.41			0.26	
Control Delay			2.6					4.7			0.3	
Queue Delay			0.2					1.2			0.1	
Total Delay			2.8					5.9			0.4	
LOS			A					A			A	
Approach Delay		2.8						5.9			0.4	
Approach LOS		A						A			A	
90th %ile Green (s)			5.5					124.5			124.5	
90th %ile Term Code			Gap					Coord			Coord	
70th %ile Green (s)			5.5					124.5			124.5	
70th %ile Term Code			Gap					Coord			Coord	
50th %ile Green (s)			5.5					124.5			124.5	
50th %ile Term Code			Gap					Coord			Coord	
30th %ile Green (s)			5.5					124.5			124.5	
30th %ile Term Code			Gap					Coord			Coord	
10th %ile Green (s)			0.0					135.0			135.0	
10th %ile Term Code			Skip					Coord			Coord	
Queue Length 50th (ft)			0					209			4	
Queue Length 95th (ft)			0					m217			10	
Internal Link Dist (ft)		115			485			238			61	
Turn Bay Length (ft)												
Base Capacity (vph)			425					3998			4032	
Starvation Cap Reductn			0					2041			1390	
Spillback Cap Reductn			130					0			514	
Storage Cap Reductn			0					0			0	
Reduced v/c Ratio			0.17					0.83			0.40	

Intersection Summary

Area Type: CBD
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 73 (52%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.41
Intersection Signal Delay: 3.7 Intersection LOS: A
Intersection Capacity Utilization 38.6% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

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

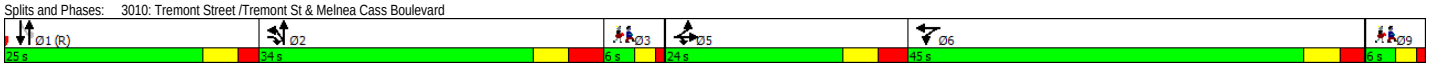
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø3	Ø9
Lane Configurations														
Traffic Volume (vph)	6	84	72	658	178	30	292	400	0	21	327	19		
Future Volume (vph)	6	84	72	658	178	30	292	400	0	21	327	19		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Lane Width (ft)	12	13	12	13	13	12	12	11	16	12	14	12		
Storage Length (ft)	0		0	350		0	0		0	0		0		
Storage Lanes	0		1	1		0	0		0	0		0		
Taper Length (ft)	25			25			25			25				
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.95	0.95	1.00	0.95	0.95	0.95		
Ped Bike Factor		1.00		0.99	0.99			0.99			1.00			
Frt			0.850		0.978						0.992			
Flt Protected		0.997		0.950				0.979			0.997			
Satd. Flow (prot)	0	1745	1411	3224	1696	0	0	2993	0	0	3301	0		
Flt Permitted		0.997		0.950				0.631			0.881			
Satd. Flow (perm)	0	1740	1411	3203	1696	0	0	1917	0	0	2917	0		
Right Turn on Red			Yes			No			No			Yes		
Satd. Flow (RTOR)			113								3			
Link Speed (mph)		30			30			30			30			
Link Distance (ft)		312			560			205			296			
Travel Time (s)		7.1			12.7			4.7			6.7			
Confl. Peds. (#/hr)	23		3	3		23	15		4	4		15		
Confl. Bikes (#/hr)									3			2		
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.98	0.98	0.98	0.96	0.96	0.96		
Heavy Vehicles (%)	0%	1%	3%	1%	1%	0%	1%	4%	1%	0%	4%	0%		
Adj. Flow (vph)	6	87	74	678	184	31	298	408	0	22	341	20		
Shared Lane Traffic (%)														
Lane Group Flow (vph)	0	93	74	678	215	0	0	706	0	0	383	0		
Turn Type	Split	NA	pt+ov	Split	NA		Prot	NA		Perm	NA			
Protected Phases	5	5	2 5	6	6		2	1 2			1		3	9
Permitted Phases										1				
Detector Phase	5	5	2 5	6	6		1 7	1 2		1	1			
Switch Phase														
Minimum Initial (s)	10.0	10.0		8.0	8.0		8.0			10.0	10.0		1.0	1.0
Minimum Split (s)	23.5	23.5		22.0	22.0		15.0			24.5	24.5		6.0	6.0
Total Split (s)	24.0	24.0		45.0	45.0		34.0			25.0	25.0		6.0	6.0
Total Split (%)	17.1%	17.1%		32.1%	32.1%		24.3%			17.9%	17.9%		4%	4%
Maximum Green (s)	17.5	17.5		39.0	39.0		27.0			19.5	19.5		3.0	3.0
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5			3.5	3.5		2.0	2.0
All-Red Time (s)	3.0	3.0		2.5	2.5		3.5			2.0	2.0		1.0	1.0
Lost Time Adjust (s)		0.0		0.0	0.0						0.0			
Total Lost Time (s)		6.5		6.0	6.0						5.5			
Lead/Lag	Lead	Lead		Lag	Lag		Lag			Lead	Lead			
Lead-Lag Optimize?							Yes			Yes	Yes			
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0			2.0	2.0		3.0	3.0
Recall Mode	None	None		None	None		None			C-Max	C-Max		None	None
Walk Time (s)	3.0	3.0		3.0	3.0					7.0	7.0		2.0	2.0
Flash Dont Walk (s)	14.0	14.0		13.0	13.0					12.0	12.0		1.0	1.0
Pedestrian Calls (#/hr)	5	5		0	0					0	0		0	0
Act Effct Green (s)		12.5	46.0	33.7	33.7			70.2			41.7			
Actuated g/C Ratio		0.09	0.33	0.24	0.24			0.50			0.30			
v/c Ratio		0.60	0.14	0.87	0.53			1.10			0.44			
Control Delay		85.9	8.7	63.7	50.4			120.5			43.0			
Queue Delay		0.0	0.0	0.0	0.0			0.0			0.0			
Total Delay		85.9	8.7	63.7	50.4			120.5			43.0			
LOS		F	A	E	D			F			D			
Approach Delay		51.7			60.5			120.5			43.0			
Approach LOS		D			E			F			D			
90th %ile Green (s)	17.0	17.0		39.0	39.0		27.0			32.0	32.0		0.0	0.0
90th %ile Term Code	Ped	Ped		Max	Max		Max			Coord	Coord		Skip	Skip
70th %ile Green (s)	13.9	13.9		37.4	37.4		27.0			36.7	36.7		0.0	0.0
70th %ile Term Code	Gap	Gap		Gap	Gap		Max			Coord	Coord		Skip	Skip
50th %ile Green (s)	11.8	11.8		34.6	34.6		27.0			41.6	41.6		0.0	0.0
50th %ile Term Code	Gap	Gap		Gap	Gap		Max			Coord	Coord		Skip	Skip
30th %ile Green (s)	10.0	10.0		31.0	31.0		27.0			47.0	47.0		0.0	0.0
30th %ile Term Code	Min	Min		Gap	Gap		Max			Coord	Coord		Skip	Skip
10th %ile Green (s)	10.0	10.0		26.7	26.7		27.0			51.3	51.3		0.0	0.0
10th %ile Term Code	Min	Min		Gap	Gap		Max			Coord	Coord		Skip	Skip
Queue Length 50th (ft)		90	1	305	170			~374			147			
Queue Length 95th (ft)		150	22	365	243			#514			218			
Internal Link Dist (ft)		232			480			125			216			
Turn Bay Length (ft)				350										
Base Capacity (vph)		218	585	898	472			644			871			
Starvation Cap Reductn		0	0	0	0			0			0			
Spillback Cap Reductn		0	0	0	0			0			0			
Storage Cap Reductn		0	0	0	0			0			0			
Reduced v/c Ratio		0.43	0.13	0.76	0.46			1.10			0.44			

Intersection Summary

Area Type: CBD
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 0 (0%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.10
Intersection Signal Delay: 76.4 — Intersection LOS: E
Intersection Capacity Utilization 79.2% — ICU Level of Service D
Analysis Period (min) 15

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

Splits and Phases: 3010: Tremont Street /Tremont St & Melnea Cass Boulevard

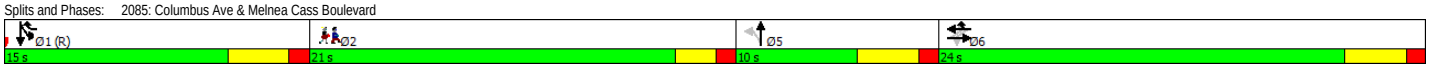


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø2
Lane Configurations													
Traffic Volume (vph)	10	5	0	144	21	323	1	17	37	119	46	3	
Future Volume (vph)	10	5	0	144	21	323	1	17	37	119	46	3	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor		0.98			0.98			0.89			0.97		
Frt						0.850		0.909			0.998		
Flt Protected		0.969			0.958			0.999			0.966		
Satd. Flow (prot)	0	1657	0	0	1624	1439	0	1395	0	0	1611	0	
Flt Permitted		0.827			0.738			0.989			0.966		
Satd. Flow (perm)	0	1384	0	0	1229	1439	0	1370	0	0	1583	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)						330		42			1		
Link Speed (mph)		35			35			25			35		
Link Distance (ft)		247			312			212			194		
Travel Time (s)		4.8			6.1			5.8			3.8		
Confl. Peds. (#/hr)	24		12	12		24	187		14	14		187	
Confl. Bikes (#/hr)									38			8	
Peak Hour Factor	0.75	0.75	0.75	0.98	0.98	0.98	0.88	0.88	0.88	0.94	0.94	0.94	
Heavy Vehicles (%)	0%	0%	0%	1%	0%	1%	0%	0%	0%	2%	0%	0%	
Parking (#/hr)												0	
Adj. Flow (vph)	13	7	0	147	21	330	1	19	42	127	49	3	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	20	0	0	168	330	0	62	0	0	179	0	
Turn Type	Perm	NA		Perm	NA	pt+ov	Perm	NA		Split	NA		
Protected Phases		6			6	1 6		5		1	1		2
Permitted Phases	6			6			5						
Detector Phase	6	6		6	6	1 6	5	5		1	1		
Switch Phase													
Minimum Initial (s)	8.0	8.0		8.0	8.0		5.0	5.0		10.0	10.0		8.0
Minimum Split (s)	14.0	14.0		14.0	14.0		10.0	10.0		15.0	15.0		21.0
Total Split (s)	24.0	24.0		24.0	24.0		10.0	10.0		15.0	15.0		21.0
Total Split (%)	34.3%	34.3%		34.3%	34.3%		14.3%	14.3%		21.4%	21.4%		30%
Maximum Green (s)	20.0	20.0		20.0	20.0		6.0	6.0		11.0	11.0		18.0
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		2.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0		1.0
Lost Time Adjust (s)		0.0			0.0			0.0			0.0		
Total Lost Time (s)		4.0			4.0			4.0			4.0		
Lead/Lag	Lag	Lag		Lag	Lag		Lead	Lead		Lead	Lead		Lag
Lead-Lag Optimize?													
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0		2.0
Recall Mode	None	None		None	None		None	None		C-Max	C-Max		None
Walk Time (s)													7.0
Flash Dont Walk (s)													11.0
Pedestrian Calls (#/hr)													0
Act Effct Green (s)		14.1			14.1	60.9		6.3			41.2		
Actuated g/C Ratio		0.20			0.20	0.87		0.09			0.59		
v/c Ratio		0.07			0.68	0.26		0.39			0.19		
Control Delay		20.3			27.8	3.1		21.5			10.4		
Queue Delay		0.0			0.0	0.3		0.0			0.0		
Total Delay		20.3			27.8	3.4		21.5			10.4		
LOS		C			C	A		C			B		
Approach Delay		20.3			11.6			21.5			10.4		
Approach LOS		C			B			C			B		
90th %ile Green (s)	21.0	21.0		21.0	21.0		9.1	9.1		27.9	27.9		0.0
90th %ile Term Code	Gap	Gap		Gap	Gap		Gap	Gap		Coord	Coord		Skip
70th %ile Green (s)	16.6	16.6		16.6	16.6		7.0	7.0		34.4	34.4		0.0
70th %ile Term Code	Gap	Gap		Gap	Gap		Gap	Gap		Coord	Coord		Skip
50th %ile Green (s)	13.9	13.9		13.9	13.9		5.5	5.5		38.6	38.6		0.0
50th %ile Term Code	Gap	Gap		Gap	Gap		Gap	Gap		Coord	Coord		Skip
30th %ile Green (s)	11.1	11.1		11.1	11.1		0.0	0.0		50.9	50.9		0.0
30th %ile Term Code	Gap	Gap		Gap	Gap		Skip	Skip		Coord	Coord		Skip
10th %ile Green (s)	8.0	8.0		8.0	8.0		0.0	0.0		54.0	54.0		0.0
10th %ile Term Code	Min	Min		Min	Min		Skip	Skip		Coord	Coord		Skip
Queue Length 50th (ft)		7			72	51		8			35		
Queue Length 95th (ft)		17			m114	m123		39			93		
Internal Link Dist (ft)		167			232			132			114		
Turn Bay Length (ft)													
Base Capacity (vph)		399			354	1292		171			947		
Starvation Cap Reductn		0			0	500		0			0		
Spillback Cap Reductn		0			0	0		0			0		
Storage Cap Reductn		0			0	0		0			0		
Reduced v/c Ratio		0.05			0.47	0.42		0.36			0.19		

Intersection Summary

Area Type: CBD
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 24 (34%), Referenced to phase 1:SBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.68
Intersection Signal Delay: 12.4 Intersection LOS: B
Intersection Capacity Utilization 45.7% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2085: Columbus Ave & Melnea Cass Boulevard

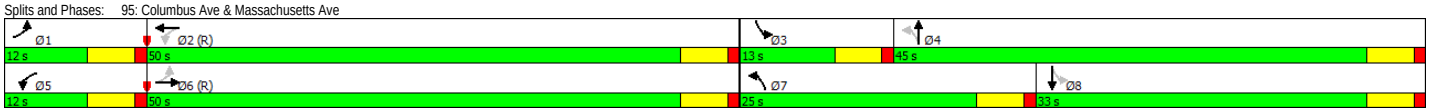


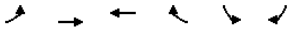
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	488	115	23	393	114	240	177	36	89	114	39
Future Volume (vph)	28	488	115	23	393	114	240	177	36	89	114	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	120		0	120		0	0		225	0		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.94	0.94		0.90	0.96		0.93	0.99		0.96	0.97	
Frt		0.971			0.966			0.974			0.962	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1687	3226	0	1656	3280	0	1805	1795	0	1805	1731	0
Flt Permitted	0.405			0.343			0.418			0.616		
Satd. Flow (perm)	679	3226	0	541	3280	0	742	1795	0	1124	1731	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		27			36			9			13	
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		328			280			940			267	
Travel Time (s)		6.4			5.5			18.3			5.2	
Confl. Peds. (#/hr)	57		125	125		57	69		36	36		69
Confl. Bikes (#/hr)			10			5			27			14
Peak Hour Factor	0.96	0.96	0.96	0.98	0.98	0.98	0.93	0.93	0.93	0.91	0.91	0.91
Heavy Vehicles (%)	7%	2%	2%	9%	3%	1%	0%	2%	0%	0%	2%	3%
Parking (#/hr)												0
Adj. Flow (vph)	29	508	120	23	401	116	258	190	39	98	125	43
Shared Lane Traffic (%)												
Lane Group Flow (vph)	29	628	0	23	517	0	258	229	0	98	168	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases	6			2			4			8		
Detector Phase	1	6		5	2		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	6.0		5.0	6.0		6.0	6.0		6.0	8.0	
Minimum Split (s)	10.0	30.0		10.0	30.0		11.0	29.0		11.0	29.0	
Total Split (s)	12.0	50.0		12.0	50.0		25.0	45.0		13.0	33.0	
Total Split (%)	10.0%	41.7%		10.0%	41.7%		20.8%	37.5%		10.8%	27.5%	
Maximum Green (s)	7.0	45.0		7.0	45.0		20.0	40.0		8.0	28.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		10.0			10.0			7.0			7.0	
Flash Dont Walk (s)		15.0			15.0			17.0			17.0	
Pedestrian Calls (#/hr)		57			36			125			58	
Act Effct Green (s)	61.6	57.3		61.3	57.2		45.5	32.8		30.6	22.8	
Actuated g/C Ratio	0.51	0.48		0.51	0.48		0.38	0.27		0.26	0.19	
v/c Ratio	0.07	0.40		0.07	0.33		0.59	0.46		0.30	0.50	
Control Delay	15.1	22.1		15.2	20.5		32.2	37.3		26.9	45.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	15.1	22.1		15.2	20.5		32.2	37.3		26.9	45.1	
LOS	B	C		B	C		C	D		C	D	
Approach Delay		21.8			20.3			34.6			38.4	
Approach LOS		C			C			C			D	
90th %ile Green (s)	7.9	48.4		7.6	48.1		20.0	36.0		8.0	24.0	
90th %ile Term Code	Gap	Coord		Gap	Coord		Max	Hold		Max	Ped	
70th %ile Green (s)	7.0	49.2		6.8	49.0		20.0	36.0		8.0	24.0	
70th %ile Term Code	Gap	Coord		Gap	Coord		Max	Hold		Max	Ped	
50th %ile Green (s)	6.5	50.4		6.3	50.2		19.3	35.3		8.0	24.0	
50th %ile Term Code	Gap	Coord		Gap	Coord		Gap	Hold		Max	Ped	
30th %ile Green (s)	0.0	64.5		0.0	64.5		16.5	32.5		8.0	24.0	
30th %ile Term Code	Skip	Coord		Skip	Coord		Gap	Hold		Max	Ped	
10th %ile Green (s)	0.0	74.2		0.0	74.2		12.8	24.0		6.8	18.0	
10th %ile Term Code	Skip	Coord		Skip	Coord		Gap	Ped		Gap	Hold	
Queue Length 50th (ft)	11	173		9	132		137	137		47	107	
Queue Length 95th (ft)	27	232		23	183		205	212		84	178	
Internal Link Dist (ft)		248			200			860			187	
Turn Bay Length (ft)	120			120								
Base Capacity (vph)	409	1555		343	1582		458	604		334	413	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
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	0.07	0.40		0.07	0.33		0.56	0.38		0.29	0.41	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.59
Intersection Signal Delay: 26.9 — Intersection LOS: C
Intersection Capacity Utilization 68.0% — ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 95: Columbus Ave & Massachusetts Ave





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	20	585	811	41	0	0
Future Volume (Veh/h)	20	585	811	41	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.98	0.98	0.97	0.97	0.25	0.25
Hourly flow rate (vph)	20	597	836	42	0	0
Pedestrians		44	6		37	
Lane Width (ft)		12.0	12.0		0.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		4	1		0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		211	170			
pX, platoon unblocked						
vC, conflicting volume	915				1238	520
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	915				1238	520
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				100	100
cM capacity (veh/h)	754				165	488

Direction, Lane #	EB 1	EB 2	WB 1	WB 2
Volume Total	219	398	557	321
Volume Left	20	0	0	0
Volume Right	0	0	0	42
cSH	754	1700	1700	1700
Volume to Capacity	0.03	0.23	0.33	0.19
Queue Length 95th (ft)	2	0	0	0
Control Delay (s)	1.2	0.0	0.0	0.0
Lane LOS	A			
Approach Delay (s)	0.4		0.0	
Approach LOS				

Intersection Summary				
Average Delay			0.2	
Intersection Capacity Utilization			48.4%	ICU Level of Service
Analysis Period (min)			15	

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	3	13	350	0	0	165
Future Volume (Veh/h)	3	13	350	0	0	165
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	0.98	0.98	0.89	0.89
Hourly flow rate (vph)	3	13	357	0	0	185
Pedestrians	59		35			1
Lane Width (ft)	12.0		12.0			12.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	5		3			0
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			194			
pX, platoon unblocked						
vC, conflicting volume	636	417			416	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	636	417			416	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	98			100	
cM capacity (veh/h)	411	608			1097	

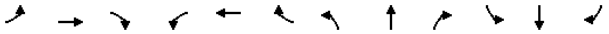
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	16	357	185
Volume Left	3	0	0
Volume Right	13	0	0
cSH	558	1700	1700
Volume to Capacity	0.03	0.21	0.11
Queue Length 95th (ft)	2	0	0
Control Delay (s)	11.6	0.0	0.0
Lane LOS	B		
Approach Delay (s)	11.6	0.0	0.0
Approach LOS	B		

Intersection Summary				
Average Delay	0.3			
Intersection Capacity Utilization	28.7%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	341	23	14	165
Future Volume (Veh/h)	0	0	341	23	14	165
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.25	0.25	0.96	0.96	0.88	0.88
Hourly flow rate (vph)	0	0	355	24	16	188
Pedestrians	59		40			2
Lane Width (ft)	0.0		12.0			12.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	0		3			0
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			350			
pX, platoon unblocked						
vC, conflicting volume	686	428			438	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	686	428			438	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			99	
cM capacity (veh/h)	397	630			1133	

Direction, Lane #	NB 1	SB 1
Volume Total	379	204
Volume Left	0	16
Volume Right	24	0
cSH	1700	1133
Volume to Capacity	0.22	0.01
Queue Length 95th (ft)	0	1
Control Delay (s)	0.0	0.8
Lane LOS		A
Approach Delay (s)	0.0	0.8
Approach LOS		

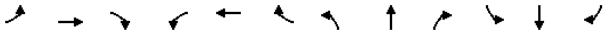
Intersection Summary				
Average Delay	0.3			
Intersection Capacity Utilization	30.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	0	1	5	0	20	2	338	0	0	174	1
Future Volume (Veh/h)	1	0	1	5	0	20	2	338	0	0	174	1
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.50	0.50	0.50	0.67	0.67	0.67	0.95	0.95	0.95	0.85	0.85	0.85
Hourly flow rate (vph)	2	0	2	7	0	30	2	356	0	0	205	1
Pedestrians		219			63			3			4	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		18			5			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								541				
pX, platoon unblocked												
vC, conflicting volume	818	848	428	634	848	423	425			419		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	818	848	428	634	848	423	425			419		
tC, single (s)	7.1	6.5	6.2	7.3	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.7	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	98	100	95	100			100		
cM capacity (veh/h)	190	232	515	286	232	600	936			1091		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	4	37	358	206
Volume Left	2	7	2	0
Volume Right	2	30	0	1
cSH	277	497	936	1700
Volume to Capacity	0.01	0.07	0.00	0.12
Queue Length 95th (ft)	1	6	0	0
Control Delay (s)	18.2	12.8	0.1	0.0
Lane LOS	C	B	A	
Approach Delay (s)	18.2	12.8	0.1	0.0
Approach LOS	C	B		

Intersection Summary				
Average Delay	0.9			
Intersection Capacity Utilization	30.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	0	15	0	0	0	57	296	6	9	159	83
Future Volume (Veh/h)	18	0	15	0	0	0	57	296	6	9	159	83
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.69	0.69	0.69	0.25	0.25	0.25	0.93	0.93	0.93	0.83	0.83	0.83
Hourly flow rate (vph)	26	0	22	0	0	0	61	318	6	11	192	100
Pedestrians		207			69			62			1	
Lane Width (ft)		12.0			0.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		17			0			5			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								706				
pX, platoon unblocked												
vC, conflicting volume	915	986	511	860	1033	391	499			393		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	915	986	511	860	1033	391	499			393		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	85	100	95	100	100	100	93			99		
cM capacity (veh/h)	173	191	445	205	179	661	890			1177		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	48	385	303
Volume Left	26	61	11
Volume Right	22	6	100
cSH	240	890	1177
Volume to Capacity	0.20	0.07	0.01
Queue Length 95th (ft)	18	6	1
Control Delay (s)	23.7	2.1	0.4
Lane LOS	C	A	A
Approach Delay (s)	23.7	2.1	0.4
Approach LOS	C		

Intersection Summary				
Average Delay			2.8	
Intersection Capacity Utilization			58.7%	ICU Level of Service
Analysis Period (min)			15	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	10	588	614	9	214	84
Future Volume (vph)	10	588	614	9	214	84
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	11	12	12	10	10
Storage Length (ft)	100			0	0	140
Storage Lanes	0			0	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	1.00
Ped Bike Factor		1.00	0.99		0.96	
Frt			0.998			0.850
Flt Protected		0.999			0.950	
Satd. Flow (prot)	0	1635	3186	0	1516	1357
Flt Permitted		0.989			0.950	
Satd. Flow (perm)	0	1614	3186	0	1458	1357
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			5			89
Link Speed (mph)		25	25		25	
Link Distance (ft)		511	212		700	
Travel Time (s)		13.9	5.8		19.1	
Confl. Peds. (#/hr)	270			270	30	62
Confl. Bikes (#/hr)				6		
Peak Hour Factor	0.94	0.94	0.94	0.94	0.92	0.92
Heavy Vehicles (%)	0%	1%	1%	0%	0%	0%
Adj. Flow (vph)	11	626	653	10	233	91
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	637	663	0	233	91
Turn Type	Perm	NA	NA		Prot	Prot
Protected Phases		1	1		5	5
Permitted Phases	1					
Detector Phase	1	1	1		5	5
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0		8.0	8.0
Minimum Split (s)	28.0	28.0	28.0		18.0	18.0
Total Split (s)	42.0	42.0	42.0		18.0	18.0
Total Split (%)	70.0%	70.0%	70.0%		30.0%	30.0%
Maximum Green (s)	38.0	38.0	38.0		14.0	14.0
Yellow Time (s)	3.0	3.0	3.0		3.0	3.0
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0
Total Lost Time (s)		4.0	4.0		4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0
Recall Mode	C-Max	C-Max	C-Max		None	None
Walk Time (s)	8.0	8.0	8.0		6.0	6.0
Flash Dont Walk (s)	8.0	8.0	8.0		8.0	8.0
Pedestrian Calls (#/hr)	92	92	92		270	270
Act Effct Green (s)		38.0	38.0		14.0	14.0
Actuated g/C Ratio		0.63	0.63		0.23	0.23
v/c Ratio		0.62	0.33		0.66	0.24
Control Delay		10.1	5.8		31.9	7.2
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		10.1	5.8		31.9	7.2
LOS		B	A		C	A
Approach Delay		10.1	5.8		24.9	
Approach LOS		B	A		C	
90th %ile Green (s)	38.0	38.0	38.0		14.0	14.0
90th %ile Term Code	Coord	Coord	Coord		Max	Max
70th %ile Green (s)	38.0	38.0	38.0		14.0	14.0
70th %ile Term Code	Coord	Coord	Coord		Max	Max
50th %ile Green (s)	38.0	38.0	38.0		14.0	14.0
50th %ile Term Code	Coord	Coord	Coord		Ped	Ped
30th %ile Green (s)	38.0	38.0	38.0		14.0	14.0
30th %ile Term Code	Coord	Coord	Coord		Ped	Ped
10th %ile Green (s)	38.0	38.0	38.0		14.0	14.0
10th %ile Term Code	Coord	Coord	Coord		Ped	Ped
Queue Length 50th (ft)		117	48		76	1
Queue Length 95th (ft)		206	61		#161	31
Internal Link Dist (ft)		431	132		620	
Turn Bay Length (ft)						140
Base Capacity (vph)		1022	2019		353	384
Starvation Cap Reductn		0	0		0	0
Spillback Cap Reductn		0	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.62	0.33		0.66	0.24

Intersection Summary

Area Type: CBD
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 15 (25%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.66
Intersection Signal Delay: 11.3 — Intersection LOS: B
Intersection Capacity Utilization 63.1% — ICU Level of Service B
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1526: Ruggles St & Leon St

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø2
Lane Configurations							
Traffic Volume (vph)	0	787	636	0	41	29	
Future Volume (vph)	0	787	636	0	41	29	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	16	16	12	16	12	
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	
Ped Bike Factor					0.86	0.96	
Frt						0.850	
Flt Protected					0.950		
Satd. Flow (prot)	0	3610	3507	0	1841	1454	
Flt Permitted					0.950		
Satd. Flow (perm)	0	3610	3507	0	1582	1391	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)						33	
Link Speed (mph)		25	25		25		
Link Distance (ft)		170	404		298		
Travel Time (s)		4.6	11.0		8.1		
Confl. Peds. (#/hr)	37			37	94	21	
Confl. Bikes (#/hr)				1			
Peak Hour Factor	0.81	0.81	0.87	0.87	0.89	0.89	
Heavy Vehicles (%)	100%	2%	5%	100%	0%	0%	
Adj. Flow (vph)	0	972	731	0	46	33	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	972	731	0	46	33	
Turn Type		NA	NA		Prot	Perm	
Protected Phases		1	1		5		2
Permitted Phases						5	
Detector Phase		1	1		5	5	
Switch Phase							
Minimum Initial (s)		10.0	10.0		10.0	10.0	7.0
Minimum Split (s)		23.0	23.0		17.0	17.0	16.0
Total Split (s)		69.0	69.0		28.0	28.0	23.0
Total Split (%)		57.5%	57.5%		23.3%	23.3%	19%
Maximum Green (s)		65.0	65.0		24.0	24.0	21.0
Yellow Time (s)		3.0	3.0		3.0	3.0	2.0
All-Red Time (s)		1.0	1.0		1.0	1.0	0.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.0	4.0		4.0	4.0	
Lead/Lag		Lead	Lead				Lag
Lead-Lag Optimize?							
Vehicle Extension (s)		2.0	2.0		2.0	2.0	2.0
Recall Mode		C-Max	C-Max		None	None	None
Walk Time (s)							7.0
Flash Dont Walk (s)							7.0
Pedestrian Calls (#/hr)							152
Act Effct Green (s)		88.7	88.7		10.1	10.1	
Actuated g/C Ratio		0.74	0.74		0.08	0.08	
v/c Ratio		0.36	0.28		0.30	0.22	
Control Delay		8.4	5.9		57.0	20.5	
Queue Delay		0.5	0.6		0.0	0.0	
Total Delay		8.9	6.5		57.0	20.5	
LOS		A	A		E	C	
Approach Delay		8.9	6.5		41.8		
Approach LOS		A	A		D		
90th %ile Green (s)		85.5	85.5		10.5	10.5	14.0
90th %ile Term Code		Coord	Coord		Gap	Gap	Ped
70th %ile Green (s)		86.0	86.0		10.0	10.0	14.0
70th %ile Term Code		Coord	Coord		Min	Min	Ped
50th %ile Green (s)		86.0	86.0		10.0	10.0	14.0
50th %ile Term Code		Coord	Coord		Min	Min	Ped
30th %ile Green (s)		86.0	86.0		10.0	10.0	14.0
30th %ile Term Code		Coord	Coord		Min	Min	Ped
10th %ile Green (s)		100.0	100.0		0.0	0.0	14.0
10th %ile Term Code		Coord	Coord		Skip	Skip	Ped
Queue Length 50th (ft)		153	94		34	0	
Queue Length 95th (ft)		161	116		72	32	
Internal Link Dist (ft)		90	324		218		
Turn Bay Length (ft)							
Base Capacity (vph)		2668	2592		368	304	
Starvation Cap Reductn		1141	1384		0	0	
Spillback Cap Reductn		0	0		0	0	
Storage Cap Reductn		0	0		0	0	
Reduced v/c Ratio		0.64	0.61		0.13	0.11	

Intersection Summary			
Area Type:	CBD		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 80 (67%), Referenced to phase 1:EBWB, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.36			
Intersection Signal Delay: 9.4		Intersection LOS: A	
Intersection Capacity Utilization 39.2%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 3068: Ruggles St & Ruggles Bus Station Exit

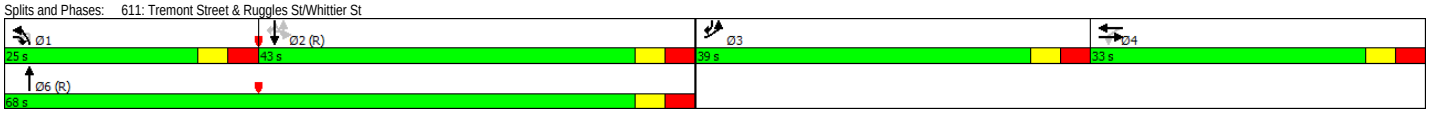
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations														
Traffic Volume (vph)	520	26	282	14	27	105	23	174	1043	51	17	127	635	420
Future Volume (vph)	520	26	282	14	27	105	23	174	1043	51	17	127	635	420
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	11	11	12	16	12	12	11	11	12	12	12	11	11
Storage Length (ft)	0		260	0		0		200		0		0		0
Storage Lanes	1		1	0		0		1		0		1		1
Taper Length (ft)	25			25				25				25		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	0.91	1.00	0.91	0.91	0.95	1.00	0.95	1.00
Ped Bike Factor	0.98				0.97			0.99	1.00					0.95
Frt			0.850		0.903				0.993					0.850
Flt Protected	0.950				0.995			0.950				0.950		
Satd. Flow (prot)	1528	1570	1391	0	1695	0	0	1543	4477	0	0	1624	3110	1378
Flt Permitted	0.950				0.972			0.211				0.243		
Satd. Flow (perm)	1497	1570	1391	0	1653	0	0	340	4477	0	0	416	3110	1315
Right Turn on Red			Yes			Yes				Yes				No
Satd. Flow (RTOR)			291		45				7					
Link Speed (mph)		25			25				30				30	
Link Distance (ft)		404			351				690				318	
Travel Time (s)		11.0			9.6				15.7				7.2	
Confl. Peds. (#/hr)	16		10	10		16		16						16
Confl. Bikes (#/hr)										1				1
Peak Hour Factor	0.97	0.97	0.97	0.79	0.79	0.79	0.98	0.98	0.98	0.98	0.99	0.99	0.99	0.99
Heavy Vehicles (%)	1%	0%	1%	0%	0%	0%	0%	2%	0%	0%	0%	0%	1%	2%
Parking (#/hr)				15										
Adj. Flow (vph)	536	27	291	18	34	133	23	178	1064	52	17	128	641	424
Shared Lane Traffic (%)	0%													
Lane Group Flow (vph)	536	27	291	0	185	0	0	201	1116	0	0	145	641	424
Turn Type	Prot	NA	Over	Perm	NA		custom	Prot	NA		Perm	Perm	NA	pm+ov
Protected Phases	3	4	1!		4			1	6				2	3
Permitted Phases				4			1!				2	2		2
Detector Phase	3	4	1	4	4		1	1	6		2	2	2	3
Switch Phase														
Minimum Initial (s)	8.0	7.0	8.0	7.0	7.0		8.0	8.0	8.0		8.0	8.0	8.0	8.0
Minimum Split (s)	14.0	33.0	14.0	33.0	33.0		14.0	14.0	26.0		26.0	26.0	26.0	14.0
Total Split (s)	39.0	33.0	25.0	33.0	33.0		25.0	25.0	68.0		43.0	43.0	43.0	39.0
Total Split (%)	27.9%	23.6%	17.9%	23.6%	23.6%		17.9%	17.9%	48.6%		30.7%	30.7%	30.7%	27.9%
Maximum Green (s)	33.0	27.0	19.0	27.0	27.0		19.0	19.0	62.0		37.0	37.0	37.0	33.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0			0.0	0.0			0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0		6.0			6.0	6.0			6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag		Lead	Lead			Lag	Lag	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes			Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0		2.0	2.0	2.0	3.0
Recall Mode	None	Max	Min	Max	Max		Min	Min	C-Max		C-Max	C-Max	C-Max	None
Walk Time (s)		7.0		7.0	7.0				8.0		8.0	8.0	8.0	
Flash Dont Walk (s)		19.0		19.0	19.0				12.0		12.0	12.0	12.0	
Pedestrian Calls (#/hr)		18		18	18				10		16	16	16	
Act Effct Green (s)	33.0	33.0	19.0		27.0			19.0	62.0			37.0	37.0	70.0
Actuated g/C Ratio	0.24	0.24	0.14		0.19			0.14	0.44			0.26	0.26	0.50
v/c Ratio	1.49	0.07	0.66		0.52			4.37	0.56			1.33	0.78	0.63
Control Delay	271.6	42.5	13.7		43.9			1579.2	30.1			235.1	51.0	41.9
Queue Delay	1.0	0.0	0.0		0.0			0.0	0.0			0.0	15.7	0.8
Total Delay	272.7	42.5	13.7		43.9			1579.2	30.1			235.1	66.7	42.7
LOS	F	D	B		D			F	C			F	E	D
Approach Delay		177.1			43.9				266.5				78.5	
Approach LOS		F			D				F				E	
90th %ile Green (s)	33.0	27.0	19.0	27.0	27.0		19.0	19.0	62.0		37.0	37.0	37.0	33.0
90th %ile Term Code	Max	MaxR	Max	MaxR	MaxR		Max	Max	Coord		Coord	Coord	Coord	Max
70th %ile Green (s)	33.0	27.0	19.0	27.0	27.0		19.0	19.0	62.0		37.0	37.0	37.0	33.0
70th %ile Term Code	Max	MaxR	Max	MaxR	MaxR		Max	Max	Coord		Coord	Coord	Coord	Max
50th %ile Green (s)	33.0	27.0	19.0	27.0	27.0		19.0	19.0	62.0		37.0	37.0	37.0	33.0
50th %ile Term Code	Max	MaxR	Max	MaxR	MaxR		Max	Max	Coord		Coord	Coord	Coord	Max
30th %ile Green (s)	33.0	27.0	19.0	27.0	27.0		19.0	19.0	62.0		37.0	37.0	37.0	33.0
30th %ile Term Code	Max	MaxR	Max	MaxR	MaxR		Max	Max	Coord		Coord	Coord	Coord	Max
10th %ile Green (s)	33.0	27.0	19.0	27.0	27.0		19.0	19.0	62.0		37.0	37.0	37.0	33.0
10th %ile Term Code	Max	MaxR	Max	MaxR	MaxR		Max	Max	Coord		Coord	Coord	Coord	Max
Queue Length 50th (ft)	~708	20	0		115			~336	270			~172	288	342
Queue Length 95th (ft)	#946	48	93		162			#499	317			#318	364	470
Internal Link Dist (ft)		324			271				610				238	
Turn Bay Length (ft)			260					200						
Base Capacity (vph)	360	370	440		355			46	1986			109	821	672
Starvation Cap Reductn	32	0	0		0			0	0			0	176	77
Spillback Cap Reductn	9	0	0		0			0	0			0	0	0
Storage Cap Reductn	0	0	0		0			0	0			0	0	0
Reduced v/c Ratio	1.63	0.07	0.66		0.52			4.37	0.56			1.33	0.99	0.71

Intersection Summary

Area Type: CBD
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 4.37
Intersection Signal Delay: 169.8 Intersection LOS: F
Intersection Capacity Utilization 95.8% ICU Level of Service F
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
! Phase conflict between lane groups.

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



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	60	0	0	0	0	1547	110	0	1139	0
Future Volume (vph)	0	0	60	0	0	0	0	1547	110	0	1139	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	16	12	11	12	12	11	12
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	1.00
Ped Bike Factor								0.99				
Frt			0.865					0.990				
Flt Protected												
Satd. Flow (prot)	0	0	1479	0	0	0	0	4426	0	0	4468	0
Flt Permitted												
Satd. Flow (perm)	0	0	1479	0	0	0	0	4426	0	0	4468	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			142					22				
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		238			565			318			139	
Travel Time (s)		6.5			15.4			7.2			3.2	
Confl. Peds. (#/hr)						74			22			
Confl. Bikes (#/hr)									3			
Peak Hour Factor	0.91	0.91	0.91	0.25	0.25	0.25	0.98	0.98	0.98	0.99	0.99	0.99
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	1%	0%
Adj. Flow (vph)	0	0	66	0	0	0	0	1579	112	0	1151	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	66	0	0	0	0	1691	0	0	1151	0
Turn Type			Prot					NA			NA	
Protected Phases			5					1			1	
Permitted Phases												
Detector Phase			5					1			1	
Switch Phase												
Minimum Initial (s)			8.0					8.0			8.0	
Minimum Split (s)			30.0					24.0			24.0	
Total Split (s)			31.0					109.0			109.0	
Total Split (%)			22.1%					77.9%			77.9%	
Maximum Green (s)			26.0					104.0			104.0	
Yellow Time (s)			3.0					3.0			3.0	
All-Red Time (s)			2.0					2.0			2.0	
Lost Time Adjust (s)			0.0					0.0			0.0	
Total Lost Time (s)			5.0					5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)			2.0					2.0			2.0	
Recall Mode			None					C-Max			C-Max	
Walk Time (s)			8.0					8.0			8.0	
Flash Dont Walk (s)			17.0					6.0			6.0	
Pedestrian Calls (#/hr)			42					76			76	
Act Effct Green (s)			21.6					112.0			112.0	
Actuated g/C Ratio			0.15					0.80			0.80	
v/c Ratio			0.19					0.48			0.32	
Control Delay			1.2					4.5			5.3	
Queue Delay			0.0					0.3			0.3	
Total Delay			1.2					4.8			5.6	
LOS			A					A			A	
Approach Delay		1.2						4.8			5.6	
Approach LOS		A						A			A	
90th %ile Green (s)			25.0					105.0			105.0	
90th %ile Term Code			Ped					Coord			Coord	
70th %ile Green (s)			25.0					105.0			105.0	
70th %ile Term Code			Ped					Coord			Coord	
50th %ile Green (s)			25.0					105.0			105.0	
50th %ile Term Code			Ped					Coord			Coord	
30th %ile Green (s)			25.0					105.0			105.0	
30th %ile Term Code			Ped					Coord			Coord	
10th %ile Green (s)			0.0					135.0			135.0	
10th %ile Term Code			Skip					Coord			Coord	
Queue Length 50th (ft)			0					174			114	
Queue Length 95th (ft)			0					m157			134	
Internal Link Dist (ft)		158			485			238			59	
Turn Bay Length (ft)												
Base Capacity (vph)			390					3545			3574	
Starvation Cap Reductn			0					1031			1591	
Spillback Cap Reductn			14					0			484	
Storage Cap Reductn			0					0			0	
Reduced v/c Ratio			0.18					0.67			0.58	

Intersection Summary

Area Type: CBD
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 65 (46%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.48
Intersection Signal Delay: 5.0 Intersection LOS: A
Intersection Capacity Utilization 40.2% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

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

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø3	Ø9
Lane Configurations														
Traffic Volume (vph)	67	187	186	513	111	45	246	409	0	31	390	15		
Future Volume (vph)	67	187	186	513	111	45	246	409	0	31	390	15		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Lane Width (ft)	12	13	12	13	13	12	12	11	16	12	14	12		
Storage Length (ft)	0		0	350		0	0		0	0		0		
Storage Lanes	0		1	1		0	0		0	0		0		
Taper Length (ft)	25			25			25			25				
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.95	0.95	1.00	0.95	0.95	0.95		
Ped Bike Factor		0.99		1.00	0.99			0.99			1.00			
Frt			0.850		0.957						0.995			
Flt Protected		0.987		0.950				0.982			0.996			
Satd. Flow (prot)	0	1731	1454	3224	1661	0	0	3046	0	0	3397	0		
Flt Permitted		0.987		0.950				0.628			0.854			
Satd. Flow (perm)	0	1722	1454	3211	1661	0	0	1937	0	0	2913	0		
Right Turn on Red			Yes			No			No			Yes		
Satd. Flow (RTOR)			192								2			
Link Speed (mph)		30			30			30			25			
Link Distance (ft)		298			524			245			216			
Travel Time (s)		6.8			11.9			5.6			5.9			
Confl. Peds. (#/hr)	8		2	2		8	18		14	14		18		
Confl. Bikes (#/hr)									3			1		
Peak Hour Factor	0.97	0.97	0.97	0.96	0.96	0.96	0.99	0.99	0.99	0.95	0.95	0.95		
Heavy Vehicles (%)	0%	1%	0%	1%	1%	0%	0%	2%	0%	0%	1%	0%		
Adj. Flow (vph)	69	193	192	534	116	47	248	413	0	33	411	16		
Shared Lane Traffic (%)														
Lane Group Flow (vph)	0	262	192	534	163	0	0	661	0	0	460	0		
Turn Type	Split	NA	pt+ov	Split	NA		Prot	NA		Perm	NA			
Protected Phases	5	5	2 5	6	6		2	1 2			1		3	9
Permitted Phases										1				
Detector Phase	5	5	2 5	6	6		2	1 2		1	1			
Switch Phase														
Minimum Initial (s)	10.0	10.0		8.0	8.0		8.0			10.0	10.0		1.0	1.0
Minimum Split (s)	23.5	23.5		22.0	22.0		15.0			24.5	24.5		19.0	19.0
Total Split (s)	26.0	26.0		44.0	44.0		22.0			36.0	36.0		19.0	19.0
Total Split (%)	15.7%	15.7%		26.5%	26.5%		13.3%			21.7%	21.7%		11%	11%
Maximum Green (s)	19.5	19.5		38.0	38.0		15.0			30.5	30.5		16.0	16.0
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5			3.5	3.5		2.0	2.0
All-Red Time (s)	3.0	3.0		2.5	2.5		3.5			2.0	2.0		1.0	1.0
Lost Time Adjust (s)		0.0		0.0	0.0						0.0			
Total Lost Time (s)		6.5		6.0	6.0						5.5			
Lead/Lag	Lead	Lead		Lag	Lag		Lag			Lead	Lead			
Lead-Lag Optimize?										Yes	Yes			
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0			3.0	3.0		3.0	3.0
Recall Mode	None	None		None	None		None			C-Max	C-Max		None	None
Walk Time (s)	3.0	3.0		3.0	3.0					7.0	7.0		2.0	2.0
Flash Dont Walk (s)	14.0	14.0		13.0	13.0					12.0	12.0		1.0	1.0
Pedestrian Calls (#/hr)	32	32		0	0					10	10		0	0
Act Effct Green (s)		19.5	41.0	32.8	32.8			90.2			73.7			
Actuated g/C Ratio		0.12	0.25	0.20	0.20			0.54			0.44			
v/c Ratio		1.29	0.38	0.84	0.50			1.82			0.36			
Control Delay		216.4	8.3	76.2	64.0			414.5			32.0			
Queue Delay		2.1	1.3	0.0	0.0			0.0			0.0			
Total Delay		218.5	9.5	76.2	64.0			414.5			32.0			
LOS		F	A	E	E			F			C			
Approach Delay		130.1			73.3			414.5			32.0			
Approach LOS		F			E			F			C			
90th %ile Green (s)	19.5	19.5		38.0	38.0		15.0			68.5	68.5		0.0	0.0
90th %ile Term Code	Max	Max		Max	Max		Max			Coord	Coord		Skip	Skip
70th %ile Green (s)	19.5	19.5		36.2	36.2		15.0			70.3	70.3		0.0	0.0
70th %ile Term Code	Max	Max		Gap	Gap		Max			Coord	Coord		Skip	Skip
50th %ile Green (s)	19.5	19.5		33.5	33.5		15.0			73.0	73.0		0.0	0.0
50th %ile Term Code	Max	Max		Gap	Gap		Max			Coord	Coord		Skip	Skip
30th %ile Green (s)	19.5	19.5		30.7	30.7		15.0			75.8	75.8		0.0	0.0
30th %ile Term Code	Max	Max		Gap	Gap		Max			Coord	Coord		Skip	Skip
10th %ile Green (s)	19.5	19.5		25.7	25.7		15.0			80.8	80.8		0.0	0.0
10th %ile Term Code	Max	Max		Gap	Gap		Max			Coord	Coord		Skip	Skip
Queue Length 50th (ft)		~361	0	289	159			~535			173			
Queue Length 95th (ft)		#552	67	348	232			#673			232			
Internal Link Dist (ft)		218			444			165			136			
Turn Bay Length (ft)				350										
Base Capacity (vph)		203	503	738	380			363			1294			
Starvation Cap Reductn		25	157	0	0			0			0			
Spillback Cap Reductn		0	0	0	0			0			0			
Storage Cap Reductn		0	0	0	0			0			0			
Reduced v/c Ratio		1.47	0.55	0.72	0.43			1.82			0.36			

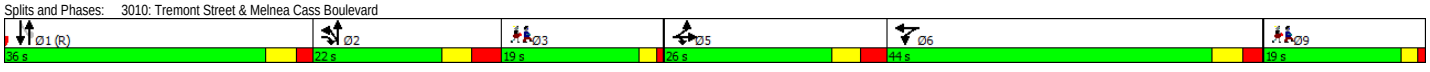
Intersection Summary

Area Type: CBD
Cycle Length: 166
Actuated Cycle Length: 166
Offset: 0 (0%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.82
Intersection Signal Delay: 175.6 — Intersection LOS: F
Intersection Capacity Utilization 87.2% — ICU Level of Service E
Analysis Period (min) 15

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

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

Splits and Phases: 3010: Tremont Street & Melnea Cass Boulevard



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø2
Lane Configurations													
Traffic Volume (vph)	2	1	0	59	26	287	1	35	126	247	68	1	
Future Volume (vph)	2	1	0	59	26	287	1	35	126	247	68	1	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor		0.95			0.95			0.93			0.96		
Frt						0.850		0.895					
Flt Protected		0.970			0.967						0.962		
Satd. Flow (prot)	0	1659	0	0	1654	1454	0	1433	0	0	1642	0	
Flt Permitted		0.929			0.846			0.997			0.962		
Satd. Flow (perm)	0	1501	0	0	1371	1454	0	1425	0	0	1586	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)						296		131					
Link Speed (mph)		25			25			25			25		
Link Distance (ft)		157			298			219			195		
Travel Time (s)		4.3			8.1			6.0			5.3		
Confl. Peds. (#/hr)	34		26	26		34	225		34	34		225	
Confl. Bikes (#/hr)									10			26	
Peak Hour Factor	0.38	0.38	0.38	0.97	0.97	0.97	0.96	0.96	0.96	0.96	0.96	0.96	
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Parking (#/hr)												0	
Adj. Flow (vph)	5	3	0	61	27	296	1	36	131	257	71	1	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	8	0	0	88	296	0	168	0	0	329	0	
Turn Type	Perm	NA		Perm	NA	pt+ov	Perm	NA		Split	NA		
Protected Phases		6			6	1 6		5		1	1		2
Permitted Phases	6			6			5						
Detector Phase	6	6		6	6	1 6	5	5		1	1		
Switch Phase													
Minimum Initial (s)	8.0	8.0		8.0	8.0		9.0	9.0		10.0	10.0		8.0
Minimum Split (s)	14.0	14.0		14.0	14.0		14.0	14.0		15.0	15.0		21.0
Total Split (s)	16.0	16.0		16.0	16.0		16.0	16.0		17.0	17.0		21.0
Total Split (%)	22.9%	22.9%		22.9%	22.9%		22.9%	22.9%		24.3%	24.3%		30%
Maximum Green (s)	12.0	12.0		12.0	12.0		12.0	12.0		13.0	13.0		18.0
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		2.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0		1.0
Lost Time Adjust (s)		0.0			0.0			0.0			0.0		
Total Lost Time (s)		4.0			4.0			4.0			4.0		
Lead/Lag	Lag	Lag		Lag	Lag		Lead	Lead		Lead	Lead		Lag
Lead-Lag Optimize?													
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0		2.0
Recall Mode	Max	Max		Max	Max		None	None		C-Max	C-Max		None
Walk Time (s)													7.0
Flash Dont Walk (s)													11.0
Pedestrian Calls (#/hr)													0
Act Effct Green (s)		35.3			35.3	52.3		9.7			13.0		
Actuated g/C Ratio		0.50			0.50	0.75		0.14			0.19		
v/c Ratio		0.01			0.13	0.26		0.54			1.08		
Control Delay		9.3			10.3	1.0		15.7			106.7		
Queue Delay		0.0			0.0	0.5		0.0			0.0		
Total Delay		9.3			10.3	1.5		15.7			106.7		
LOS		A			B	A		B			F		
Approach Delay		9.3			3.5			15.7			106.7		
Approach LOS		A			A			B			F		
90th %ile Green (s)	32.4	32.4		32.4	32.4		12.6	12.6		13.0	13.0		0.0
90th %ile Term Code	MaxR	MaxR		MaxR	MaxR		Gap	Gap		Coord	Coord		Skip
70th %ile Green (s)	36.0	36.0		36.0	36.0		9.0	9.0		13.0	13.0		0.0
70th %ile Term Code	MaxR	MaxR		MaxR	MaxR		Min	Min		Coord	Coord		Skip
50th %ile Green (s)	36.0	36.0		36.0	36.0		9.0	9.0		13.0	13.0		0.0
50th %ile Term Code	MaxR	MaxR		MaxR	MaxR		Min	Min		Coord	Coord		Skip
30th %ile Green (s)	36.0	36.0		36.0	36.0		9.0	9.0		13.0	13.0		0.0
30th %ile Term Code	MaxR	MaxR		MaxR	MaxR		Min	Min		Coord	Coord		Skip
10th %ile Green (s)	36.0	36.0		36.0	36.0		9.0	9.0		13.0	13.0		0.0
10th %ile Term Code	MaxR	MaxR		MaxR	MaxR		Min	Min		Coord	Coord		Skip
Queue Length 50th (ft)		2			18	0		15			~162		
Queue Length 95th (ft)		4			45	17		64			#309		
Internal Link Dist (ft)		77			218			139			115		
Turn Bay Length (ft)													
Base Capacity (vph)		756			691	1160		354			304		
Starvation Cap Reductn		0			0	506		0			0		
Spillback Cap Reductn		0			0	0		0			0		
Storage Cap Reductn		0			0	0		0			0		
Reduced v/c Ratio		0.01			0.13	0.45		0.47			1.08		

Intersection Summary

Area Type: CBD
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 17 (24%), Referenced to phase 1:SBTL, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.08
Intersection Signal Delay: 44.1 Intersection LOS: D
Intersection Capacity Utilization 52.4% ICU Level of Service A
Analysis Period (min) 15

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

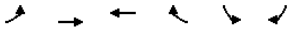
Splits and Phases: 2085: Columbus Ave & Melnea Cass Boulevard

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	604	166	21	529	81	233	209	43	160	202	64
Future Volume (vph)	55	604	166	21	529	81	233	209	43	160	202	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	120		0	120		0	0		225	0		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.96	0.93		0.94	0.98		0.97	0.98		0.95	0.98	
Frt		0.968			0.980			0.975			0.964	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3227	0	1719	3467	0	1805	1804	0	1805	1772	0
Flt Permitted	0.331			0.269			0.236			0.408		
Satd. Flow (perm)	593	3227	0	457	3467	0	436	1804	0	735	1772	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		36			17			9			13	
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		321			457			628			317	
Travel Time (s)		8.8			12.5			17.1			8.6	
Confl. Peds. (#/hr)	50		122	122		50	41		58	58		41
Confl. Bikes (#/hr)			7			4			13			18
Peak Hour Factor	0.95	0.95	0.95	0.97	0.97	0.97	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	1%	1%	5%	0%	1%	0%	1%	0%	0%	1%	2%
Parking (#/hr)												0
Adj. Flow (vph)	58	636	175	22	545	84	245	220	45	168	213	67
Shared Lane Traffic (%)												
Lane Group Flow (vph)	58	811	0	22	629	0	245	265	0	168	280	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases	6			2			4			8		
Detector Phase	1	6		5	2		7	4		3	8	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	12.0	54.0		12.0	54.0		20.0	38.0		16.0	34.0	
Total Split (s)	12.0	54.0		12.0	54.0		20.0	38.0		16.0	34.0	
Total Split (%)	10.0%	45.0%		10.0%	45.0%		16.7%	31.7%		13.3%	28.3%	
Maximum Green (s)	8.0	50.0		8.0	50.0		16.0	34.0		12.0	30.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
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	4.0		4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		10.0			10.0			7.0			7.0	
Flash Dont Walk (s)		15.0			15.0			17.0			17.0	
Pedestrian Calls (#/hr)		41			58			122			50	
Act Effct Green (s)	66.0	61.3		63.8	58.6		44.0	28.9		36.5	25.1	
Actuated g/C Ratio	0.55	0.51		0.53	0.49		0.37	0.24		0.30	0.21	
v/c Ratio	0.15	0.49		0.07	0.37		0.74	0.60		0.52	0.73	
Control Delay	14.0	21.0		13.7	20.8		40.9	44.7		31.8	54.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	14.0	21.0		13.7	20.8		40.9	44.7		31.8	54.0	
LOS	B	C		B	C		D	D		C	D	
Approach Delay		20.5			20.6			42.9			45.7	
Approach LOS		C			C			D			D	
90th %ile Green (s)	8.0	50.6		7.4	50.0		16.0	34.0		12.0	30.0	
90th %ile Term Code	Max	Coord		Gap	Coord		Max	Hold		Max	Max	
70th %ile Green (s)	8.0	54.8		6.6	53.4		16.0	30.6		12.0	26.6	
70th %ile Term Code	Gap	Coord		Gap	Coord		Max	Hold		Max	Gap	
50th %ile Green (s)	7.2	57.9		6.1	56.8		16.0	28.0		12.0	24.0	
50th %ile Term Code	Gap	Coord		Gap	Coord		Max	Hold		Max	Ped	
30th %ile Green (s)	6.5	68.5		0.0	58.0		15.5	28.0		11.5	24.0	
30th %ile Term Code	Gap	Coord		Skip	Coord		Gap	Hold		Gap	Ped	
10th %ile Green (s)	0.0	74.8		0.0	74.8		12.1	24.0		9.2	21.1	
10th %ile Term Code	Skip	Coord		Skip	Coord		Gap	Ped		Gap	Hold	
Queue Length 50th (ft)	19	211		7	155		138	179		90	198	
Queue Length 95th (ft)	44	304		22	225		191	253		133	279	
Internal Link Dist (ft)		241			377			548			237	
Turn Bay Length (ft)	120			120								
Base Capacity (vph)	405	1666		331	1701		343	517		334	452	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
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	0.14	0.49		0.07	0.37		0.71	0.51		0.50	0.62	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 29.7 — Intersection LOS: C
Intersection Capacity Utilization 71.8% — ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 95: Columbus Ave & Massachusetts Ave



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	16	787	623	42	0	0
Future Volume (Veh/h)	16	787	623	42	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.97	0.97	0.92	0.92
Hourly flow rate (vph)	17	846	642	43	0	0
Pedestrians					42	
Lane Width (ft)					0.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		212	170			
pX, platoon unblocked	0.94				0.94	0.94
vC, conflicting volume	727				1162	384
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	569				1035	203
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				100	100
cM capacity (veh/h)	947				209	752

Direction, Lane #	EB 1	EB 2	WB 1	WB 2
Volume Total	299	564	428	257
Volume Left	17	0	0	0
Volume Right	0	0	0	43
cSH	947	1700	1700	1700
Volume to Capacity	0.02	0.33	0.25	0.15
Queue Length 95th (ft)	1	0	0	0
Control Delay (s)	0.7	0.0	0.0	0.0
Lane LOS	A			
Approach Delay (s)	0.2		0.0	
Approach LOS				

Intersection Summary				
Average Delay			0.1	
Intersection Capacity Utilization			36.5%	ICU Level of Service
Analysis Period (min)			15	

A

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	10	3	324	0	0	306
Future Volume (Veh/h)	10	3	324	0	0	306
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.65	0.65	0.95	0.95	0.96	0.96
Hourly flow rate (vph)	15	5	341	0	0	319
Pedestrians	63		37			1
Lane Width (ft)	12.0		12.0			12.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	5		3			0
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			195			
pX, platoon unblocked						
vC, conflicting volume	760	405			404	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	760	405			404	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	99			100	
cM capacity (veh/h)	346	615			1104	

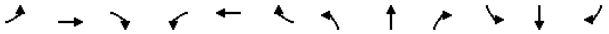
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	20	341	319
Volume Left	15	0	0
Volume Right	5	0	0
cSH	389	1700	1700
Volume to Capacity	0.05	0.20	0.19
Queue Length 95th (ft)	4	0	0
Control Delay (s)	14.8	0.0	0.0
Lane LOS	B		
Approach Delay (s)	14.8	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	27.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	302	25	21	306
Future Volume (Veh/h)	0	0	302	25	21	306
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.25	0.25	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	318	26	22	322
Pedestrians	58		39			
Lane Width (ft)	0.0		12.0			
Walking Speed (ft/s)	4.0		4.0			
Percent Blockage	0		3			
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			365			
pX, platoon unblocked						
vC, conflicting volume	794	389			402	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	794	389			402	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			98	
cM capacity (veh/h)	342	664			1168	

Direction, Lane #	NB 1	SB 1
Volume Total	344	344
Volume Left	0	22
Volume Right	26	0
cSH	1700	1168
Volume to Capacity	0.20	0.02
Queue Length 95th (ft)	0	1
Control Delay (s)	0.0	0.7
Lane LOS		A
Approach Delay (s)	0.0	0.7
Approach LOS		

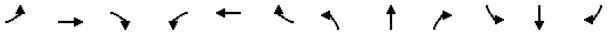
Intersection Summary				
Average Delay	0.3			
Intersection Capacity Utilization	36.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	1	4	0	12	0	302	0	0	322	0
Future Volume (Veh/h)	0	0	1	4	0	12	0	302	0	0	322	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.25	0.25	0.25	0.67	0.67	0.67	0.94	0.94	0.94	0.96	0.96	0.96
Hourly flow rate (vph)	0	0	4	6	0	18	0	321	0	0	335	0
Pedestrians		252			63			2			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		21			5			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								549				
pX, platoon unblocked												
vC, conflicting volume	929	971	589	725	971	387	587			384		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	929	971	589	725	971	387	587			384		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	98	100	97	100			100		
cM capacity (veh/h)	154	191	404	259	191	629	788			1123		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	4	24	321	335
Volume Left	0	6	0	0
Volume Right	4	18	0	0
cSH	404	463	788	1700
Volume to Capacity	0.01	0.05	0.00	0.20
Queue Length 95th (ft)	1	4	0	0
Control Delay (s)	14.0	13.2	0.0	0.0
Lane LOS	B	B		
Approach Delay (s)	14.0	13.2	0.0	0.0
Approach LOS	B	B		

Intersection Summary					
Average Delay	0.5				
Intersection Capacity Utilization	29.3%	ICU Level of Service		A	
Analysis Period (min)	15				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	86	10	79	0	0	0	18	288	8	3	242	33
Future Volume (Veh/h)	86	10	79	0	0	0	18	288	8	3	242	33
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.25	0.25	0.25	0.95	0.95	0.95	0.94	0.94	0.94
Hourly flow rate (vph)	92	11	85	0	0	0	19	303	8	3	257	35
Pedestrians		242			59			73			2	
Lane Width (ft)		12.0			0.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		20			0			6			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								727				
pX, platoon unblocked												
vC, conflicting volume	870	930	590	848	944	368	534			370		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	870	930	590	848	944	368	534			370		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	49	95	78	100	100	100	98			100		
cM capacity (veh/h)	181	209	384	165	206	681	833			1200		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	188	330	295
Volume Left	92	19	3
Volume Right	85	8	35
cSH	241	833	1200
Volume to Capacity	0.78	0.02	0.00
Queue Length 95th (ft)	143	2	0
Control Delay (s)	58.5	0.8	0.1
Lane LOS	F	A	A
Approach Delay (s)	58.5	0.8	0.1
Approach LOS	F		

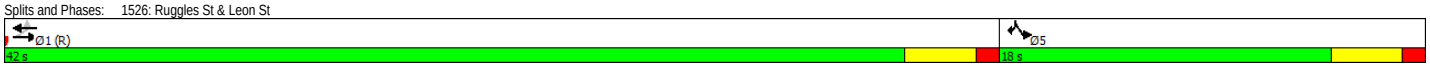
Intersection Summary				
Average Delay	13.9			
Intersection Capacity Utilization	52.8%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	17	574	801	12	43	20
Future Volume (vph)	17	574	801	12	43	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	11	12	12	10	10
Storage Length (ft)	100			0	0	140
Storage Lanes	0			0	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	1.00
Ped Bike Factor		1.00	0.99		0.98	
Frt			0.998			0.850
Flt Protected		0.999			0.950	
Satd. Flow (prot)	0	1605	3223	0	1516	1245
Flt Permitted		0.973			0.950	
Satd. Flow (perm)	0	1559	3223	0	1485	1245
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			5			22
Link Speed (mph)		25	25		35	
Link Distance (ft)		511	102		700	
Travel Time (s)		13.9	2.8		13.6	
Confl. Peds. (#/hr)	159			185	16	30
Confl. Bikes (#/hr)				1		13
Peak Hour Factor	0.95	0.95	0.95	0.95	0.90	0.90
Heavy Vehicles (%)	0%	3%	0%	3%	0%	9%
Adj. Flow (vph)	18	604	843	13	48	22
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	622	856	0	48	22
Turn Type	Perm	NA	NA		Prot	Prot
Protected Phases		1	1		5	5
Permitted Phases	1					
Detector Phase	1	1	1		5	5
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0		8.0	8.0
Minimum Split (s)	28.0	28.0	28.0		18.0	18.0
Total Split (s)	42.0	42.0	42.0		18.0	18.0
Total Split (%)	70.0%	70.0%	70.0%		30.0%	30.0%
Maximum Green (s)	38.0	38.0	38.0		14.0	14.0
Yellow Time (s)	3.0	3.0	3.0		3.0	3.0
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0
Total Lost Time (s)		4.0	4.0		4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0
Recall Mode	C-Max	C-Max	C-Max		None	None
Walk Time (s)	8.0	8.0	8.0		6.0	6.0
Flash Dont Walk (s)	8.0	8.0	8.0		8.0	8.0
Pedestrian Calls (#/hr)	80	80	80		8	8
Act Effct Green (s)		49.2	49.2		9.2	9.2
Actuated g/C Ratio		0.82	0.82		0.15	0.15
v/c Ratio		0.49	0.32		0.21	0.11
Control Delay		5.5	5.5		23.5	10.6
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		5.5	5.5		23.5	10.6
LOS		A	A		C	B
Approach Delay		5.5	5.5		19.4	
Approach LOS		A	A		B	
90th %ile Green (s)	38.0	38.0	38.0		14.0	14.0
90th %ile Term Code	Coord	Coord	Coord		Ped	Ped
70th %ile Green (s)	44.0	44.0	44.0		8.0	8.0
70th %ile Term Code	Coord	Coord	Coord		Min	Min
50th %ile Green (s)	44.0	44.0	44.0		8.0	8.0
50th %ile Term Code	Coord	Coord	Coord		Min	Min
30th %ile Green (s)	56.0	56.0	56.0		0.0	0.0
30th %ile Term Code	Coord	Coord	Coord		Skip	Skip
10th %ile Green (s)	56.0	56.0	56.0		0.0	0.0
10th %ile Term Code	Coord	Coord	Coord		Skip	Skip
Queue Length 50th (ft)		72	87		16	0
Queue Length 95th (ft)		206	m111		37	15
Internal Link Dist (ft)		431	22		620	
Turn Bay Length (ft)						140
Base Capacity (vph)		1278	2643		353	307
Starvation Cap Reductn		0	0		0	0
Spillback Cap Reductn		0	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.49	0.32		0.14	0.07

Intersection Summary

Area Type: CBD
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 47 (78%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.49
Intersection Signal Delay: 6.1 — Intersection LOS: A
Intersection Capacity Utilization 65.3% — ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1526: Ruggles St & Leon St



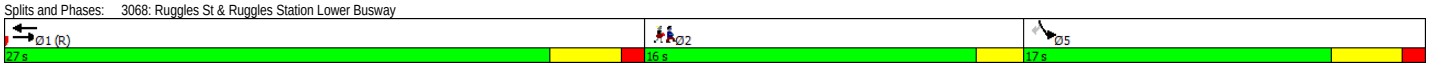
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø2
Lane Configurations							
Traffic Volume (vph)	0	597	832	0	75	23	
Future Volume (vph)	0	597	832	0	75	23	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	16	16	12	16	12	
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	
Ped Bike Factor					0.85	0.93	
Frt						0.850	
Flt Protected					0.950		
Satd. Flow (prot)	0	3575	1882	0	1841	1454	
Flt Permitted					0.950		
Satd. Flow (perm)	0	3575	1882	0	1568	1356	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)						24	
Link Speed (mph)		25	25		35		
Link Distance (ft)		170	404		298		
Travel Time (s)		4.6	11.0		5.8		
Confl. Peds. (#/hr)	28			28	107	40	
Confl. Bikes (#/hr)				2		1	
Peak Hour Factor	0.96	0.96	0.95	0.95	0.94	0.94	
Heavy Vehicles (%)	0%	3%	3%	0%	0%	0%	
Adj. Flow (vph)	0	622	876	0	80	24	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	622	876	0	80	24	
Turn Type		NA	NA		Prot	Perm	
Protected Phases		1	1		5		2
Permitted Phases						5	
Detector Phase		1	1		5	5	
Switch Phase							
Minimum Initial (s)		10.0	10.0		10.0	10.0	7.0
Minimum Split (s)		23.0	23.0		17.0	17.0	16.0
Total Split (s)		27.0	27.0		17.0	17.0	16.0
Total Split (%)		45.0%	45.0%		28.3%	28.3%	27%
Maximum Green (s)		23.0	23.0		13.0	13.0	14.0
Yellow Time (s)		3.0	3.0		3.0	3.0	2.0
All-Red Time (s)		1.0	1.0		1.0	1.0	0.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.0	4.0		4.0	4.0	
Lead/Lag		Lead	Lead				Lag
Lead-Lag Optimize?							
Vehicle Extension (s)		2.0	2.0		2.0	2.0	2.0
Recall Mode		C-Max	C-Max		None	None	None
Walk Time (s)							7.0
Flash Dont Walk (s)							7.0
Pedestrian Calls (#/hr)							86
Act Effct Green (s)		35.6	35.6		10.0	10.0	
Actuated g/C Ratio		0.59	0.59		0.17	0.17	
v/c Ratio		0.29	0.78		0.26	0.10	
Control Delay		7.0	24.2		24.4	11.0	
Queue Delay		0.0	0.5		0.0	0.0	
Total Delay		7.0	24.7		24.4	11.0	
LOS		A	C		C	B	
Approach Delay		7.0	24.7		21.3		
Approach LOS		A	C		C		
90th %ile Green (s)		26.0	26.0		10.0	10.0	14.0
90th %ile Term Code		Coord	Coord		Min	Min	Ped
70th %ile Green (s)		26.0	26.0		10.0	10.0	14.0
70th %ile Term Code		Coord	Coord		Min	Min	Ped
50th %ile Green (s)		26.0	26.0		10.0	10.0	14.0
50th %ile Term Code		Coord	Coord		Min	Min	Ped
30th %ile Green (s)		40.0	40.0		0.0	0.0	14.0
30th %ile Term Code		Coord	Coord		Skip	Skip	Ped
10th %ile Green (s)		56.0	56.0		0.0	0.0	0.0
10th %ile Term Code		Coord	Coord		Skip	Skip	Skip
Queue Length 50th (ft)		78	~365		26	0	
Queue Length 95th (ft)		44	#561		59	17	
Internal Link Dist (ft)		90	324		218		
Turn Bay Length (ft)							
Base Capacity (vph)		2121	1116		398	312	
Starvation Cap Reductn		0	46		0	0	
Spillback Cap Reductn		0	0		0	0	
Storage Cap Reductn		0	0		0	0	
Reduced v/c Ratio		0.29	0.82		0.20	0.08	

Intersection Summary

Area Type: CBD
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 4 (7%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.78
Intersection Signal Delay: 17.6 Intersection LOS: B
Intersection Capacity Utilization 63.7% ICU Level of Service B
Analysis Period (min) 15

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

Splits and Phases: 3068: Ruggles St & Ruggles Station Lower Busway



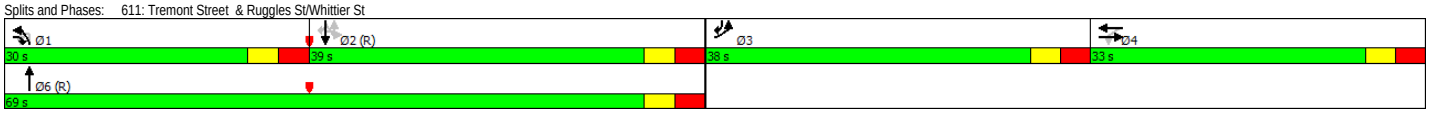
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations														
Traffic Volume (vph)	508	15	149	24	14	48	12	302	1064	16	17	52	501	517
Future Volume (vph)	508	15	149	24	14	48	12	302	1064	16	17	52	501	517
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	11	11	12	16	12	12	11	11	12	12	12	11	11
Storage Length (ft)	0		260	0		0		200		0		0		0
Storage Lanes	1		1	0		0		1		0		1		1
Taper Length (ft)	25			25				25				25		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	0.91	1.00	0.91	0.91	0.95	1.00	0.95	1.00
Ped Bike Factor	0.99				0.98				1.00			0.99		0.92
Frt			0.850		0.925				0.998					0.850
Flt Protected	0.950				0.986			0.950				0.950		
Satd. Flow (prot)	1513	1570	1351	0	1739	0	0	1512	4306	0	0	1624	3049	1378
Flt Permitted	0.950				0.911			0.167				0.238		
Satd. Flow (perm)	1492	1570	1351	0	1598	0	0	266	4306	0	0	403	3049	1268
Right Turn on Red			Yes			Yes				Yes				No
Satd. Flow (RTOR)			155		36				2					
Link Speed (mph)		25			25				30				30	
Link Distance (ft)		404			351				578				318	
Travel Time (s)		11.0			9.6				13.1				7.2	
Confl. Peds. (#/hr)	10		12	12		10		17		15		15		17
Confl. Bikes (#/hr)						1				2				2
Peak Hour Factor	0.96	0.96	0.96	0.81	0.81	0.81	0.95	0.95	0.95	0.95	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	2%	0%	4%	0%	0%	0%	0%	4%	1%	0%	0%	0%	3%	2%
Parking (#/hr)				15					0					
Adj. Flow (vph)	529	16	155	30	17	59	13	318	1120	17	17	53	511	528
Shared Lane Traffic (%)	0%													
Lane Group Flow (vph)	529	16	155	0	106	0	0	331	1137	0	0	70	511	528
Turn Type	Prot	NA	Over	Perm	NA		custom	Prot	NA		Perm	Perm	NA	pm+ov
Protected Phases	3	4	1!		4			1	6				2	3
Permitted Phases				4			1!				2	2		2
Detector Phase	3	4	1	4	4		1	1	6		2	2	2	3
Switch Phase														
Minimum Initial (s)	9.0	8.0	8.0	8.0	8.0		8.0	8.0	16.0		16.0	16.0	16.0	9.0
Minimum Split (s)	15.0	32.0	14.0	32.0	32.0		14.0	14.0	26.0		26.0	26.0	26.0	15.0
Total Split (s)	38.0	33.0	30.0	33.0	33.0		30.0	30.0	69.0		39.0	39.0	39.0	38.0
Total Split (%)	27.1%	23.6%	21.4%	23.6%	23.6%		21.4%	21.4%	49.3%		27.9%	27.9%	27.9%	27.1%
Maximum Green (s)	32.0	27.0	24.0	27.0	27.0		24.0	24.0	63.0		33.0	33.0	33.0	32.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0			0.0	0.0			0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0		6.0			6.0	6.0			6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag		Lead	Lead			Lag	Lag	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes			Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0		2.0	2.0	2.0	2.0
Recall Mode	None	None	None	None	None		None	None	C-Max		C-Max	C-Max	C-Max	None
Walk Time (s)		7.0		7.0	7.0				8.0		8.0	8.0	8.0	
Flash Dont Walk (s)		19.0		19.0	19.0				12.0		12.0	12.0	12.0	
Pedestrian Calls (#/hr)		4		4	4				10		10	10	10	
Act Effct Green (s)	32.0	32.0	24.0		23.2			24.0	66.8			36.8	36.8	68.8
Actuated g/C Ratio	0.23	0.23	0.17		0.17			0.17	0.48			0.26	0.26	0.49
v/c Ratio	1.53	0.04	0.43		0.36			7.36	0.55			0.67	0.64	0.82
Control Delay	290.7	42.7	11.2		35.7			2913.7	28.1			98.5	72.5	43.5
Queue Delay	0.7	0.0	0.0		0.0			0.0	0.1			0.0	2.0	0.6
Total Delay	291.5	42.7	11.2		35.7			2913.7	28.2			98.5	74.5	44.1
LOS	F	D	B		D			F	C			F	E	D
Approach Delay		223.7			35.7				678.8				61.5	
Approach LOS		F			D				F				E	
90th %ile Green (s)	32.0	27.0	24.0	27.0	27.0		24.0	24.0	63.0		33.0	33.0	33.0	32.0
90th %ile Term Code	Max	Max	Max	Max	Max		Max	Max	Coord		Coord	Coord	Coord	Max
70th %ile Green (s)	32.0	27.0	24.0	27.0	27.0		24.0	24.0	63.0		33.0	33.0	33.0	32.0
70th %ile Term Code	Max	Max	Max	Max	Max		Max	Max	Coord		Coord	Coord	Coord	Max
50th %ile Green (s)	32.0	27.0	24.0	27.0	27.0		24.0	24.0	63.0		33.0	33.0	33.0	32.0
50th %ile Term Code	Max	Max	Max	Max	Max		Max	Max	Coord		Coord	Coord	Coord	Max
30th %ile Green (s)	32.0	27.0	24.0	27.0	27.0		24.0	24.0	63.0		33.0	33.0	33.0	32.0
30th %ile Term Code	Max	Max	Max	Max	Max		Max	Max	Coord		Coord	Coord	Coord	Max
10th %ile Green (s)	32.0	8.0	24.0	8.0	8.0		24.0	24.0	82.0		52.0	52.0	52.0	32.0
10th %ile Term Code	Max	Min	Max	Min	Min		Max	Max	Coord		Coord	Coord	Coord	Max
Queue Length 50th (ft)	~708	11	0		54			~553	278			67	257	276
Queue Length 95th (ft)	#947	33	64		97			#753	327			#153	320	#468
Internal Link Dist (ft)		324			271				498				238	
Turn Bay Length (ft)			260					200						
Base Capacity (vph)	345	358	360		337			45	2055			105	801	647
Starvation Cap Reductn	22	0	0		0			0	0			0	158	15
Spillback Cap Reductn	0	0	0		1			0	137			0	0	0
Storage Cap Reductn	0	0	0		0			0	0			0	0	0
Reduced v/c Ratio	1.64	0.04	0.43		0.32			7.36	0.59			0.67	0.79	0.84

Intersection Summary

Area Type: CBD
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 48 (34%), Referenced to phase 2:SBTL and 6:NBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 7.36
Intersection Signal Delay: 362.1 Intersection LOS: F
Intersection Capacity Utilization 82.5% ICU Level of Service E
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
! Phase conflict between lane groups.

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

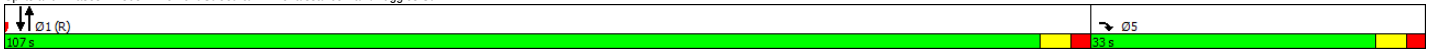


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	45	0	0	0	0	1574	57	0	1046	0
Future Volume (vph)	0	0	45	0	0	0	0	1574	57	0	1046	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	16	12	11	12	12	11	12
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	1.00
Ped Bike Factor								1.00				
Frt			0.865					0.995				
Flt Protected												
Satd. Flow (prot)	0	0	1479	0	0	0	0	4386	0	0	4424	0
Flt Permitted												
Satd. Flow (perm)	0	0	1479	0	0	0	0	4386	0	0	4424	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			159					10				
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		195			565			318			141	
Travel Time (s)		5.3			15.4			7.2			3.2	
Confl. Peds. (#/hr)						98			21			
Confl. Bikes (#/hr)									3			
Peak Hour Factor	0.90	0.90	0.90	0.25	0.25	0.25	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	2%	0%
Adj. Flow (vph)	0	0	50	0	0	0	0	1606	58	0	1067	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	50	0	0	0	0	1664	0	0	1067	0
Turn Type			Prot					NA			NA	
Protected Phases			5					1			1	
Permitted Phases												
Detector Phase			5					1			1	
Switch Phase												
Minimum Initial (s)			4.0					10.0			10.0	
Minimum Split (s)			33.0					24.0			24.0	
Total Split (s)			33.0					107.0			107.0	
Total Split (%)			23.6%					76.4%			76.4%	
Maximum Green (s)			28.0					102.0			102.0	
Yellow Time (s)			3.0					3.0			3.0	
All-Red Time (s)			2.0					2.0			2.0	
Lost Time Adjust (s)			0.0					0.0			0.0	
Total Lost Time (s)			5.0					5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)			3.0					3.0			3.0	
Recall Mode			None					C-Max			C-Max	
Walk Time (s)			8.0					8.0			8.0	
Flash Dont Walk (s)			17.0					6.0			6.0	
Pedestrian Calls (#/hr)			0					6			6	
Act Effct Green (s)			5.5					127.6			127.6	
Actuated g/C Ratio			0.04					0.91			0.91	
v/c Ratio			0.24					0.42			0.26	
Control Delay			2.7					4.8			0.3	
Queue Delay			0.2					1.4			0.1	
Total Delay			2.9					6.2			0.4	
LOS			A					A			A	
Approach Delay		2.9						6.2			0.4	
Approach LOS		A						A			A	
90th %ile Green (s)			5.5					124.5			124.5	
90th %ile Term Code			Gap					Coord			Coord	
70th %ile Green (s)			5.5					124.5			124.5	
70th %ile Term Code			Gap					Coord			Coord	
50th %ile Green (s)			5.5					124.5			124.5	
50th %ile Term Code			Gap					Coord			Coord	
30th %ile Green (s)			5.5					124.5			124.5	
30th %ile Term Code			Gap					Coord			Coord	
10th %ile Green (s)			0.0					135.0			135.0	
10th %ile Term Code			Skip					Coord			Coord	
Queue Length 50th (ft)			0					217			5	
Queue Length 95th (ft)			0					m224			13	
Internal Link Dist (ft)		115			485			238			61	
Turn Bay Length (ft)												
Base Capacity (vph)			423					3998			4032	
Starvation Cap Reductn			0					2036			1393	
Spillback Cap Reductn			131					0			539	
Storage Cap Reductn			0					0			0	
Reduced v/c Ratio			0.17					0.85			0.40	

Intersection Summary

Area Type: CBD
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 73 (52%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.42
Intersection Signal Delay: 3.9 Intersection LOS: A
Intersection Capacity Utilization 39.4% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

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



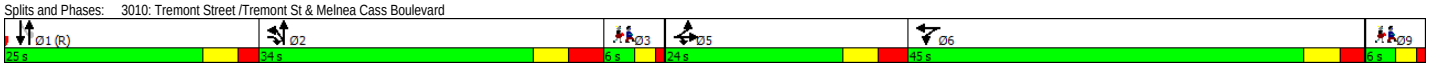
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø3	Ø9
Lane Configurations														
Traffic Volume (vph)	6	88	81	658	197	30	330	400	0	21	327	19		
Future Volume (vph)	6	88	81	658	197	30	330	400	0	21	327	19		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Lane Width (ft)	12	13	12	13	13	12	12	11	16	12	14	12		
Storage Length (ft)	0		0	350		0	0		0	0		0		
Storage Lanes	0		1	1		0	0		0	0		0		
Taper Length (ft)	25			25			25			25				
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.95	0.95	1.00	0.95	0.95	0.95		
Ped Bike Factor		1.00		0.99	0.99			0.99			1.00			
Frt			0.850		0.980						0.992			
Flt Protected		0.997		0.950				0.978			0.997			
Satd. Flow (prot)	0	1745	1411	3224	1701	0	0	2993	0	0	3301	0		
Flt Permitted		0.997		0.950				0.623			0.866			
Satd. Flow (perm)	0	1741	1411	3203	1701	0	0	1894	0	0	2868	0		
Right Turn on Red			Yes			No			No			Yes		
Satd. Flow (RTOR)			113								3			
Link Speed (mph)		30			30			30			30			
Link Distance (ft)		312			560			205			296			
Travel Time (s)		7.1			12.7			4.7			6.7			
Confl. Peds. (#/hr)	23		3	3		23	15		4	4		15		
Confl. Bikes (#/hr)									3			2		
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.98	0.98	0.98	0.96	0.96	0.96		
Heavy Vehicles (%)	0%	1%	3%	1%	1%	0%	1%	4%	1%	0%	4%	0%		
Adj. Flow (vph)	6	91	84	678	203	31	337	408	0	22	341	20		
Shared Lane Traffic (%)														
Lane Group Flow (vph)	0	97	84	678	234	0	0	745	0	0	383	0		
Turn Type	Split	NA	pt+ov	Split	NA		Prot	NA		Perm	NA			
Protected Phases	5	5	2 5	6	6		2	1 2			1		3	9
Permitted Phases										1				
Detector Phase	5	5	2 5	6	6		1 7	1 2		1	1			
Switch Phase														
Minimum Initial (s)	10.0	10.0		8.0	8.0		8.0			10.0	10.0		1.0	1.0
Minimum Split (s)	23.5	23.5		22.0	22.0		15.0			24.5	24.5		6.0	6.0
Total Split (s)	24.0	24.0		45.0	45.0		34.0			25.0	25.0		6.0	6.0
Total Split (%)	17.1%	17.1%		32.1%	32.1%		24.3%			17.9%	17.9%		4%	4%
Maximum Green (s)	17.5	17.5		39.0	39.0		27.0			19.5	19.5		3.0	3.0
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5			3.5	3.5		2.0	2.0
All-Red Time (s)	3.0	3.0		2.5	2.5		3.5			2.0	2.0		1.0	1.0
Lost Time Adjust (s)		0.0		0.0	0.0						0.0			
Total Lost Time (s)		6.5		6.0	6.0						5.5			
Lead/Lag	Lead	Lead		Lag	Lag		Lag			Lead	Lead			
Lead-Lag Optimize?							Yes			Yes	Yes			
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0			2.0	2.0		3.0	3.0
Recall Mode	None	None		None	None		None			C-Max	C-Max		None	None
Walk Time (s)	3.0	3.0		3.0	3.0					7.0	7.0		2.0	2.0
Flash Dont Walk (s)	14.0	14.0		13.0	13.0					12.0	12.0		1.0	1.0
Pedestrian Calls (#/hr)	5	5		0	0					0	0		0	0
Act Effct Green (s)		12.7	46.2	33.9	33.9			69.9			41.4			
Actuated g/C Ratio		0.09	0.33	0.24	0.24			0.50			0.30			
v/c Ratio		0.61	0.16	0.87	0.57			1.17			0.45			
Control Delay		86.9	10.4	63.3	51.8			145.2			43.4			
Queue Delay		0.0	0.0	0.0	0.0			0.0			0.0			
Total Delay		86.9	10.4	63.3	51.8			145.2			43.4			
LOS		F	B	E	D			F			D			
Approach Delay		51.4			60.3			145.2			43.4			
Approach LOS		D			E			F			D			
90th %ile Green (s)	17.2	17.2		39.0	39.0		27.0			31.8	31.8		0.0	0.0
90th %ile Term Code	Gap	Gap		Max	Max		Max			Coord	Coord		Skip	Skip
70th %ile Green (s)	14.2	14.2		37.4	37.4		27.0			36.4	36.4		0.0	0.0
70th %ile Term Code	Gap	Gap		Gap	Gap		Max			Coord	Coord		Skip	Skip
50th %ile Green (s)	12.1	12.1		34.6	34.6		27.0			41.3	41.3		0.0	0.0
50th %ile Term Code	Gap	Gap		Gap	Gap		Max			Coord	Coord		Skip	Skip
30th %ile Green (s)	10.1	10.1		31.7	31.7		27.0			46.2	46.2		0.0	0.0
30th %ile Term Code	Gap	Gap		Gap	Gap		Max			Coord	Coord		Skip	Skip
10th %ile Green (s)	10.0	10.0		26.7	26.7		27.0			51.3	51.3		0.0	0.0
10th %ile Term Code	Min	Min		Gap	Gap		Max			Coord	Coord		Skip	Skip
Queue Length 50th (ft)		93	1	305	187			~421			148			
Queue Length 95th (ft)		155	41	365	266			#562			220			
Internal Link Dist (ft)		232			480			125			216			
Turn Bay Length (ft)				350										
Base Capacity (vph)		218	585	898	473			637			850			
Starvation Cap Reductn		0	0	0	0			0			0			
Spillback Cap Reductn		0	0	0	0			0			0			
Storage Cap Reductn		0	0	0	0			0			0			
Reduced v/c Ratio		0.44	0.14	0.76	0.49			1.17			0.45			

Intersection Summary

Area Type: CBD
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 0 (0%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.17
Intersection Signal Delay: 85.1 — Intersection LOS: F
Intersection Capacity Utilization 80.5% — ICU Level of Service D
Analysis Period (min) 15

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

Splits and Phases: 3010: Tremont Street /Tremont St & Melnea Cass Boulevard

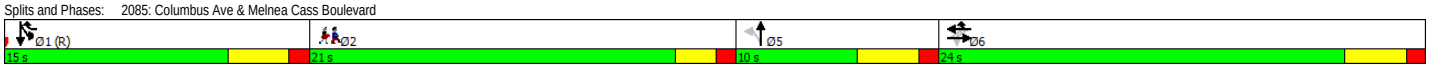


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø2
Lane Configurations													
Traffic Volume (vph)	10	5	0	144	21	380	1	17	37	132	46	3	
Future Volume (vph)	10	5	0	144	21	380	1	17	37	132	46	3	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor		0.98			0.98			0.89			0.97		
Frt						0.850		0.909			0.998		
Flt Protected		0.969			0.958			0.999			0.965		
Satd. Flow (prot)	0	1657	0	0	1624	1439	0	1395	0	0	1610	0	
Flt Permitted		0.827			0.738			0.989			0.965		
Satd. Flow (perm)	0	1384	0	0	1229	1439	0	1370	0	0	1581	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)						388		42			1		
Link Speed (mph)		35			35			25			35		
Link Distance (ft)		247			312			212			194		
Travel Time (s)		4.8			6.1			5.8			3.8		
Confl. Peds. (#/hr)	24		12	12		24	187		14	14		187	
Confl. Bikes (#/hr)									38			8	
Peak Hour Factor	0.75	0.75	0.75	0.98	0.98	0.98	0.88	0.88	0.88	0.94	0.94	0.94	
Heavy Vehicles (%)	0%	0%	0%	1%	0%	1%	0%	0%	0%	2%	0%	0%	
Parking (#/hr)												0	
Adj. Flow (vph)	13	7	0	147	21	388	1	19	42	140	49	3	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	20	0	0	168	388	0	62	0	0	192	0	
Turn Type	Perm	NA		Perm	NA	pt+ov	Perm	NA		Split	NA		
Protected Phases		6			6	1 6		5		1	1		2
Permitted Phases	6			6			5						
Detector Phase	6	6		6	6	1 6	5	5		1	1		
Switch Phase													
Minimum Initial (s)	8.0	8.0		8.0	8.0		5.0	5.0		10.0	10.0		8.0
Minimum Split (s)	14.0	14.0		14.0	14.0		10.0	10.0		15.0	15.0		21.0
Total Split (s)	24.0	24.0		24.0	24.0		10.0	10.0		15.0	15.0		21.0
Total Split (%)	34.3%	34.3%		34.3%	34.3%		14.3%	14.3%		21.4%	21.4%		30%
Maximum Green (s)	20.0	20.0		20.0	20.0		6.0	6.0		11.0	11.0		18.0
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		2.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0		1.0
Lost Time Adjust (s)		0.0			0.0			0.0			0.0		
Total Lost Time (s)		4.0			4.0			4.0			4.0		
Lead/Lag	Lag	Lag		Lag	Lag		Lead	Lead		Lead	Lead		Lag
Lead-Lag Optimize?													
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0		2.0
Recall Mode	None	None		None	None		None	None		C-Max	C-Max		None
Walk Time (s)													7.0
Flash Dont Walk (s)													11.0
Pedestrian Calls (#/hr)													0
Act Effct Green (s)		14.1			14.1	60.9		6.3			41.2		
Actuated g/C Ratio		0.20			0.20	0.87		0.09			0.59		
v/c Ratio		0.07			0.68	0.30		0.39			0.20		
Control Delay		20.3			26.1	3.6		21.5			10.5		
Queue Delay		0.0			0.0	0.4		0.0			0.0		
Total Delay		20.3			26.1	4.0		21.5			10.5		
LOS		C			C	A		C			B		
Approach Delay		20.3			10.7			21.5			10.5		
Approach LOS		C			B			C			B		
90th %ile Green (s)	21.0	21.0		21.0	21.0		9.1	9.1		27.9	27.9		0.0
90th %ile Term Code	Gap	Gap		Gap	Gap		Gap	Gap		Coord	Coord		Skip
70th %ile Green (s)	16.6	16.6		16.6	16.6		7.0	7.0		34.4	34.4		0.0
70th %ile Term Code	Gap	Gap		Gap	Gap		Gap	Gap		Coord	Coord		Skip
50th %ile Green (s)	13.9	13.9		13.9	13.9		5.5	5.5		38.6	38.6		0.0
50th %ile Term Code	Gap	Gap		Gap	Gap		Gap	Gap		Coord	Coord		Skip
30th %ile Green (s)	11.1	11.1		11.1	11.1		0.0	0.0		50.9	50.9		0.0
30th %ile Term Code	Gap	Gap		Gap	Gap		Skip	Skip		Coord	Coord		Skip
10th %ile Green (s)	8.0	8.0		8.0	8.0		0.0	0.0		54.0	54.0		0.0
10th %ile Term Code	Min	Min		Min	Min		Skip	Skip		Coord	Coord		Skip
Queue Length 50th (ft)		7			73	90		8			38		
Queue Length 95th (ft)		17			m109	m148		39			100		
Internal Link Dist (ft)		167			232			132			114		
Turn Bay Length (ft)													
Base Capacity (vph)		399			354	1300		171			947		
Starvation Cap Reductn		0			0	486		0			0		
Spillback Cap Reductn		0			0	0		0			0		
Storage Cap Reductn		0			0	0		0			0		
Reduced v/c Ratio		0.05			0.47	0.48		0.36			0.20		

Intersection Summary

Area Type: CBD
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 24 (34%), Referenced to phase 1:SBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.68
Intersection Signal Delay: 11.7 Intersection LOS: B
Intersection Capacity Utilization 49.6% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2085: Columbus Ave & Melnea Cass Boulevard

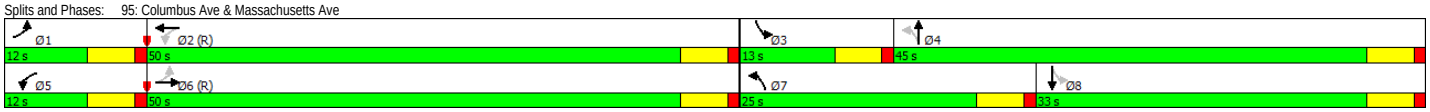


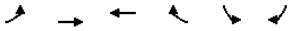
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	488	135	23	393	114	246	177	36	89	122	39
Future Volume (vph)	28	488	135	23	393	114	246	177	36	89	122	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	120		0	120		0	0		225	0		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.94	0.93		0.91	0.96		0.94	0.99		0.96	0.97	
Frt		0.967			0.966			0.974			0.964	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1687	3184	0	1656	3280	0	1805	1795	0	1805	1737	0
Flt Permitted	0.404			0.332			0.399			0.616		
Satd. Flow (perm)	678	3184	0	526	3280	0	710	1795	0	1124	1737	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		34			36			9			13	
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		328			280			940			267	
Travel Time (s)		6.4			5.5			18.3			5.2	
Confl. Peds. (#/hr)	57		125	125		57	69		36	36		69
Confl. Bikes (#/hr)			10			5			27			14
Peak Hour Factor	0.96	0.96	0.96	0.98	0.98	0.98	0.93	0.93	0.93	0.91	0.91	0.91
Heavy Vehicles (%)	7%	2%	2%	9%	3%	1%	0%	2%	0%	0%	2%	3%
Parking (#/hr)												0
Adj. Flow (vph)	29	508	141	23	401	116	265	190	39	98	134	43
Shared Lane Traffic (%)												
Lane Group Flow (vph)	29	649	0	23	517	0	265	229	0	98	177	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases	6			2			4			8		
Detector Phase	1	6		5	2		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	6.0		5.0	6.0		6.0	6.0		6.0	8.0	
Minimum Split (s)	10.0	30.0		10.0	30.0		11.0	29.0		11.0	29.0	
Total Split (s)	12.0	50.0		12.0	50.0		25.0	45.0		13.0	33.0	
Total Split (%)	10.0%	41.7%		10.0%	41.7%		20.8%	37.5%		10.8%	27.5%	
Maximum Green (s)	7.0	45.0		7.0	45.0		20.0	40.0		8.0	28.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		10.0			10.0			7.0			7.0	
Flash Dont Walk (s)		15.0			15.0			17.0			17.0	
Pedestrian Calls (#/hr)		57			36			125			58	
Act Effct Green (s)	61.5	57.2		61.2	57.0		45.7	32.9		30.5	22.7	
Actuated g/C Ratio	0.51	0.48		0.51	0.48		0.38	0.27		0.25	0.19	
v/c Ratio	0.07	0.42		0.07	0.33		0.61	0.46		0.30	0.52	
Control Delay	15.2	22.3		15.3	20.6		32.8	37.2		26.9	46.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	15.2	22.3		15.3	20.6		32.8	37.2		26.9	46.1	
LOS	B	C		B	C		C	D		C	D	
Approach Delay		22.0			20.4			34.8			39.2	
Approach LOS		C			C			C			D	
90th %ile Green (s)	7.9	48.4		7.6	48.1		20.0	36.0		8.0	24.0	
90th %ile Term Code	Gap	Coord		Gap	Coord		Max	Hold		Max	Ped	
70th %ile Green (s)	7.0	49.2		6.8	49.0		20.0	36.0		8.0	24.0	
70th %ile Term Code	Gap	Coord		Gap	Coord		Max	Hold		Max	Ped	
50th %ile Green (s)	6.5	50.0		6.3	49.8		19.7	35.7		8.0	24.0	
50th %ile Term Code	Gap	Coord		Gap	Coord		Gap	Hold		Max	Ped	
30th %ile Green (s)	0.0	64.1		0.0	64.1		16.9	32.9		8.0	24.0	
30th %ile Term Code	Skip	Coord		Skip	Coord		Gap	Hold		Max	Ped	
10th %ile Green (s)	0.0	74.2		0.0	74.2		13.1	24.0		6.8	17.7	
10th %ile Term Code	Skip	Coord		Skip	Coord		Gap	Ped		Gap	Hold	
Queue Length 50th (ft)	11	180		9	133		141	137		47	114	
Queue Length 95th (ft)	27	240		23	183		211	212		84	187	
Internal Link Dist (ft)		248			200			860			187	
Turn Bay Length (ft)	120			120								
Base Capacity (vph)	408	1534		335	1577		452	604		333	415	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
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	0.07	0.42		0.07	0.33		0.59	0.38		0.29	0.43	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.61
Intersection Signal Delay: 27.1 — Intersection LOS: C
Intersection Capacity Utilization 68.4% — ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 95: Columbus Ave & Massachusetts Ave





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	20	597	814	41	0	0
Future Volume (Veh/h)	20	597	814	41	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.98	0.98	0.97	0.97	0.25	0.25
Hourly flow rate (vph)	20	609	839	42	0	0
Pedestrians		44	6		37	
Lane Width (ft)		12.0	12.0		0.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		4	1		0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		211	170			
pX, platoon unblocked						
vC, conflicting volume	918				1248	522
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	918				1248	522
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				100	100
cM capacity (veh/h)	752				163	487

Direction, Lane #	EB 1	EB 2	WB 1	WB 2
Volume Total	223	406	559	322
Volume Left	20	0	0	0
Volume Right	0	0	0	42
cSH	752	1700	1700	1700
Volume to Capacity	0.03	0.24	0.33	0.19
Queue Length 95th (ft)	2	0	0	0
Control Delay (s)	1.2	0.0	0.0	0.0
Lane LOS	A			
Approach Delay (s)	0.4		0.0	
Approach LOS				

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	48.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	3	13	407	0	0	178
Future Volume (Veh/h)	3	13	407	0	0	178
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	0.98	0.98	0.89	0.89
Hourly flow rate (vph)	3	13	415	0	0	200
Pedestrians	59		35			1
Lane Width (ft)	12.0		12.0			12.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	5		3			0
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			194			
pX, platoon unblocked						
vC, conflicting volume	709	475			474	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	709	475			474	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	98			100	
cM capacity (veh/h)	373	564			1045	

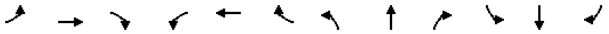
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	16	415	200
Volume Left	3	0	0
Volume Right	13	0	0
cSH	515	1700	1700
Volume to Capacity	0.03	0.24	0.12
Queue Length 95th (ft)	2	0	0
Control Delay (s)	12.2	0.0	0.0
Lane LOS	B		
Approach Delay (s)	12.2	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	31.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	398	23	14	178
Future Volume (Veh/h)	0	0	398	23	14	178
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.25	0.25	0.96	0.96	0.88	0.88
Hourly flow rate (vph)	0	0	415	24	16	202
Pedestrians	59		40			2
Lane Width (ft)	0.0		12.0			12.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	0		3			0
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			350			
pX, platoon unblocked						
vC, conflicting volume	760	488			498	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	760	488			498	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			99	
cM capacity (veh/h)	359	583			1076	

Direction, Lane #	NB 1	SB 1
Volume Total	439	218
Volume Left	0	16
Volume Right	24	0
cSH	1700	1076
Volume to Capacity	0.26	0.01
Queue Length 95th (ft)	0	1
Control Delay (s)	0.0	0.7
Lane LOS		A
Approach Delay (s)	0.0	0.7
Approach LOS		

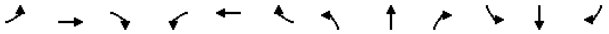
Intersection Summary				
Average Delay	0.2			
Intersection Capacity Utilization	33.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	0	14	5	0	20	59	338	0	0	174	30
Future Volume (Veh/h)	8	0	14	5	0	20	59	338	0	0	174	30
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.50	0.50	0.50	0.67	0.67	0.67	0.95	0.95	0.95	0.85	0.85	0.85
Hourly flow rate (vph)	16	0	28	7	0	30	62	356	0	0	205	35
Pedestrians		219			63			3			4	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		18			5			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								541				
pX, platoon unblocked												
vC, conflicting volume	956	984	444	796	1002	423	459			419		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	956	984	444	796	1002	423	459			419		
tC, single (s)	7.1	6.5	6.2	7.3	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.7	4.0	3.3	2.2			2.2		
p0 queue free %	89	100	94	96	100	95	93			100		
cM capacity (veh/h)	146	181	504	199	176	600	910			1091		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	44	37	418	240
Volume Left	16	7	62	0
Volume Right	28	30	0	35
cSH	266	435	910	1700
Volume to Capacity	0.17	0.09	0.07	0.14
Queue Length 95th (ft)	15	7	5	0
Control Delay (s)	21.2	14.1	2.1	0.0
Lane LOS	C	B	A	
Approach Delay (s)	21.2	14.1	2.1	0.0
Approach LOS	C	B		

Intersection Summary				
Average Delay			3.1	
Intersection Capacity Utilization			49.0%	ICU Level of Service
Analysis Period (min)			15	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	0	15	0	0	0	57	303	6	9	188	83
Future Volume (Veh/h)	18	0	15	0	0	0	57	303	6	9	188	83
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.69	0.69	0.69	0.25	0.25	0.25	0.93	0.93	0.93	0.83	0.83	0.83
Hourly flow rate (vph)	26	0	22	0	0	0	61	326	6	11	227	100
Pedestrians		207			69			62			1	
Lane Width (ft)		12.0			0.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		17			0			5			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								706				
pX, platoon unblocked												
vC, conflicting volume	958	1029	546	903	1076	399	534			401		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	958	1029	546	903	1076	399	534			401		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	84	100	95	100	100	100	93			99		
cM capacity (veh/h)	161	180	425	191	168	655	864			1169		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	48	393	338
Volume Left	26	61	11
Volume Right	22	6	100
cSH	225	864	1169
Volume to Capacity	0.21	0.07	0.01
Queue Length 95th (ft)	20	6	1
Control Delay (s)	25.2	2.2	0.4
Lane LOS	D	A	A
Approach Delay (s)	25.2	2.2	0.4
Approach LOS	D		

Intersection Summary					
Average Delay			2.8		
Intersection Capacity Utilization			60.3%	ICU Level of Service	B
Analysis Period (min)			15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	10	590	618	9	214	84
Future Volume (vph)	10	590	618	9	214	84
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	11	12	12	10	10
Storage Length (ft)	100			0	0	140
Storage Lanes	0			0	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	1.00
Ped Bike Factor		1.00	0.99		0.96	
Frt			0.998			0.850
Flt Protected		0.999			0.950	
Satd. Flow (prot)	0	1635	3186	0	1516	1357
Flt Permitted		0.989			0.950	
Satd. Flow (perm)	0	1614	3186	0	1458	1357
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			5			89
Link Speed (mph)		25	25		25	
Link Distance (ft)		511	212		700	
Travel Time (s)		13.9	5.8		19.1	
Confl. Peds. (#/hr)	270			270	30	62
Confl. Bikes (#/hr)				6		
Peak Hour Factor	0.94	0.94	0.94	0.94	0.92	0.92
Heavy Vehicles (%)	0%	1%	1%	0%	0%	0%
Adj. Flow (vph)	11	628	657	10	233	91
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	639	667	0	233	91
Turn Type	Perm	NA	NA		Prot	Prot
Protected Phases		1	1		5	5
Permitted Phases	1					
Detector Phase	1	1	1		5	5
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0		8.0	8.0
Minimum Split (s)	28.0	28.0	28.0		18.0	18.0
Total Split (s)	42.0	42.0	42.0		18.0	18.0
Total Split (%)	70.0%	70.0%	70.0%		30.0%	30.0%
Maximum Green (s)	38.0	38.0	38.0		14.0	14.0
Yellow Time (s)	3.0	3.0	3.0		3.0	3.0
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0
Total Lost Time (s)		4.0	4.0		4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0
Recall Mode	C-Max	C-Max	C-Max		None	None
Walk Time (s)	8.0	8.0	8.0		6.0	6.0
Flash Dont Walk (s)	8.0	8.0	8.0		8.0	8.0
Pedestrian Calls (#/hr)	92	92	92		270	270
Act Effct Green (s)		38.0	38.0		14.0	14.0
Actuated g/C Ratio		0.63	0.63		0.23	0.23
v/c Ratio		0.63	0.33		0.66	0.24
Control Delay		10.1	5.8		31.9	7.2
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		10.1	5.8		31.9	7.2
LOS		B	A		C	A
Approach Delay		10.1	5.8		24.9	
Approach LOS		B	A		C	
90th %ile Green (s)	38.0	38.0	38.0		14.0	14.0
90th %ile Term Code	Coord	Coord	Coord		Max	Max
70th %ile Green (s)	38.0	38.0	38.0		14.0	14.0
70th %ile Term Code	Coord	Coord	Coord		Max	Max
50th %ile Green (s)	38.0	38.0	38.0		14.0	14.0
50th %ile Term Code	Coord	Coord	Coord		Ped	Ped
30th %ile Green (s)	38.0	38.0	38.0		14.0	14.0
30th %ile Term Code	Coord	Coord	Coord		Ped	Ped
10th %ile Green (s)	38.0	38.0	38.0		14.0	14.0
10th %ile Term Code	Coord	Coord	Coord		Ped	Ped
Queue Length 50th (ft)		118	48		76	1
Queue Length 95th (ft)		208	61		#161	31
Internal Link Dist (ft)		431	132		620	
Turn Bay Length (ft)						140
Base Capacity (vph)		1022	2019		353	384
Starvation Cap Reductn		0	0		0	0
Spillback Cap Reductn		0	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.63	0.33		0.66	0.24

Intersection Summary

Area Type: CBD
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 15 (25%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.66
Intersection Signal Delay: 11.3 — Intersection LOS: B
Intersection Capacity Utilization 63.2% — ICU Level of Service B
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1526: Ruggles St & Leon St

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø2
Lane Configurations							
Traffic Volume (vph)	0	789	640	0	41	29	
Future Volume (vph)	0	789	640	0	41	29	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	16	16	12	16	12	
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	
Ped Bike Factor					0.86	0.96	
Frt						0.850	
Flt Protected					0.950		
Satd. Flow (prot)	0	3610	3507	0	1841	1454	
Flt Permitted					0.950		
Satd. Flow (perm)	0	3610	3507	0	1582	1391	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)						33	
Link Speed (mph)		25	25		25		
Link Distance (ft)		170	404		298		
Travel Time (s)		4.6	11.0		8.1		
Confl. Peds. (#/hr)	37			37	94	21	
Confl. Bikes (#/hr)				1			
Peak Hour Factor	0.81	0.81	0.87	0.87	0.89	0.89	
Heavy Vehicles (%)	100%	2%	5%	100%	0%	0%	
Adj. Flow (vph)	0	974	736	0	46	33	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	974	736	0	46	33	
Turn Type		NA	NA		Prot	Perm	
Protected Phases		1	1		5		2
Permitted Phases						5	
Detector Phase		1	1		5	5	
Switch Phase							
Minimum Initial (s)		10.0	10.0		10.0	10.0	7.0
Minimum Split (s)		23.0	23.0		17.0	17.0	16.0
Total Split (s)		69.0	69.0		28.0	28.0	23.0
Total Split (%)		57.5%	57.5%		23.3%	23.3%	19%
Maximum Green (s)		65.0	65.0		24.0	24.0	21.0
Yellow Time (s)		3.0	3.0		3.0	3.0	2.0
All-Red Time (s)		1.0	1.0		1.0	1.0	0.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.0	4.0		4.0	4.0	
Lead/Lag		Lead	Lead				Lag
Lead-Lag Optimize?							
Vehicle Extension (s)		2.0	2.0		2.0	2.0	2.0
Recall Mode		C-Max	C-Max		None	None	None
Walk Time (s)							7.0
Flash Dont Walk (s)							7.0
Pedestrian Calls (#/hr)							152
Act Effct Green (s)		88.7	88.7		10.1	10.1	
Actuated g/C Ratio		0.74	0.74		0.08	0.08	
v/c Ratio		0.37	0.28		0.30	0.22	
Control Delay		8.4	5.9		57.0	20.5	
Queue Delay		0.5	0.6		0.0	0.0	
Total Delay		9.0	6.5		57.0	20.5	
LOS		A	A		E	C	
Approach Delay		9.0	6.5		41.8		
Approach LOS		A	A		D		
90th %ile Green (s)		85.5	85.5		10.5	10.5	14.0
90th %ile Term Code		Coord	Coord		Gap	Gap	Ped
70th %ile Green (s)		86.0	86.0		10.0	10.0	14.0
70th %ile Term Code		Coord	Coord		Min	Min	Ped
50th %ile Green (s)		86.0	86.0		10.0	10.0	14.0
50th %ile Term Code		Coord	Coord		Min	Min	Ped
30th %ile Green (s)		86.0	86.0		10.0	10.0	14.0
30th %ile Term Code		Coord	Coord		Min	Min	Ped
10th %ile Green (s)		100.0	100.0		0.0	0.0	14.0
10th %ile Term Code		Coord	Coord		Skip	Skip	Ped
Queue Length 50th (ft)		154	95		34	0	
Queue Length 95th (ft)		161	117		72	32	
Internal Link Dist (ft)		90	324		218		
Turn Bay Length (ft)							
Base Capacity (vph)		2668	2592		368	304	
Starvation Cap Reductn		1141	1382		0	0	
Spillback Cap Reductn		0	0		0	0	
Storage Cap Reductn		0	0		0	0	
Reduced v/c Ratio		0.64	0.61		0.13	0.11	

Intersection Summary			
Area Type:	CBD		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 80 (67%), Referenced to phase 1:EBWB, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.37			
Intersection Signal Delay: 9.4		Intersection LOS: A	
Intersection Capacity Utilization 39.2%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 3068: Ruggles St & Ruggles Bus Station Exit

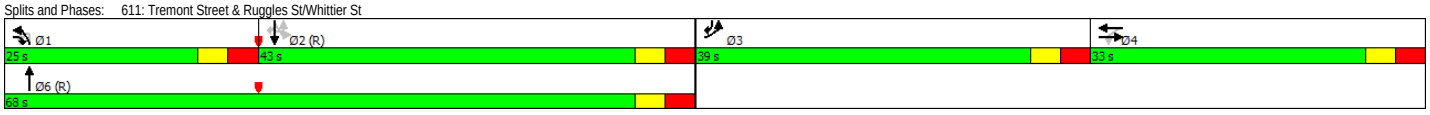
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations														
Traffic Volume (vph)	522	26	282	14	27	105	23	174	1048	51	17	127	644	424
Future Volume (vph)	522	26	282	14	27	105	23	174	1048	51	17	127	644	424
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	11	11	12	16	12	12	11	11	12	12	12	11	11
Storage Length (ft)	0		260	0		0		200		0		0		0
Storage Lanes	1		1	0		0		1		0		1		1
Taper Length (ft)	25			25				25				25		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	0.91	1.00	0.91	0.91	0.95	1.00	0.95	1.00
Ped Bike Factor	0.98				0.97			0.99	1.00					0.95
Frt			0.850		0.903				0.993					0.850
Flt Protected	0.950				0.995			0.950				0.950		
Satd. Flow (prot)	1528	1570	1391	0	1695	0	0	1543	4477	0	0	1624	3110	1378
Flt Permitted	0.950				0.972			0.211				0.242		
Satd. Flow (perm)	1497	1570	1391	0	1653	0	0	340	4477	0	0	414	3110	1315
Right Turn on Red			Yes			Yes				Yes				No
Satd. Flow (RTOR)			291		44				7					
Link Speed (mph)		25			25				30				30	
Link Distance (ft)		404			351				690				318	
Travel Time (s)		11.0			9.6				15.7				7.2	
Confl. Peds. (#/hr)	16		10	10		16		16						16
Confl. Bikes (#/hr)										1				1
Peak Hour Factor	0.97	0.97	0.97	0.79	0.79	0.79	0.98	0.98	0.98	0.98	0.99	0.99	0.99	0.99
Heavy Vehicles (%)	1%	0%	1%	0%	0%	0%	0%	2%	0%	0%	0%	0%	1%	2%
Parking (#/hr)				15										
Adj. Flow (vph)	538	27	291	18	34	133	23	178	1069	52	17	128	651	428
Shared Lane Traffic (%)	0%													
Lane Group Flow (vph)	538	27	291	0	185	0	0	201	1121	0	0	145	651	428
Turn Type	Prot	NA	Over	Perm	NA		custom	Prot	NA		Perm	Perm	NA	pm+ov
Protected Phases	3	4	1!		4			1	6				2	3
Permitted Phases				4			1!				2	2		2
Detector Phase	3	4	1	4	4		1	1	6		2	2	2	3
Switch Phase														
Minimum Initial (s)	8.0	7.0	8.0	7.0	7.0		8.0	8.0	8.0		8.0	8.0	8.0	8.0
Minimum Split (s)	14.0	33.0	14.0	33.0	33.0		14.0	14.0	26.0		26.0	26.0	26.0	14.0
Total Split (s)	39.0	33.0	25.0	33.0	33.0		25.0	25.0	68.0		43.0	43.0	43.0	39.0
Total Split (%)	27.9%	23.6%	17.9%	23.6%	23.6%		17.9%	17.9%	48.6%		30.7%	30.7%	30.7%	27.9%
Maximum Green (s)	33.0	27.0	19.0	27.0	27.0		19.0	19.0	62.0		37.0	37.0	37.0	33.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0			0.0	0.0			0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0		6.0			6.0	6.0			6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag		Lead	Lead			Lag	Lag	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes			Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0		2.0	2.0	2.0	3.0
Recall Mode	None	Max	Min	Max	Max		Min	Min	C-Max		C-Max	C-Max	C-Max	None
Walk Time (s)		7.0		7.0	7.0				8.0		8.0	8.0	8.0	
Flash Dont Walk (s)		19.0		19.0	19.0				12.0		12.0	12.0	12.0	
Pedestrian Calls (#/hr)		18		18	18				10		16	16	16	
Act Effct Green (s)	33.0	33.0	19.0		27.0			19.0	62.0			37.0	37.0	70.0
Actuated g/C Ratio	0.24	0.24	0.14		0.19			0.14	0.44			0.26	0.26	0.50
v/c Ratio	1.49	0.07	0.66		0.52			4.37	0.56			1.33	0.79	0.64
Control Delay	273.9	42.5	13.7		44.2			1579.2	30.1			235.1	51.6	42.2
Queue Delay	1.0	0.0	0.0		0.0			0.0	0.0			0.0	18.0	0.9
Total Delay	274.9	42.5	13.7		44.2			1579.2	30.1			235.1	69.7	43.1
LOS	F	D	B		D			F	C			F	E	D
Approach Delay		178.8			44.2				265.7				80.0	
Approach LOS		F			D				F				E	
90th %ile Green (s)	33.0	27.0	19.0	27.0	27.0		19.0	19.0	62.0		37.0	37.0	37.0	33.0
90th %ile Term Code	Max	MaxR	Max	MaxR	MaxR		Max	Max	Coord		Coord	Coord	Coord	Max
70th %ile Green (s)	33.0	27.0	19.0	27.0	27.0		19.0	19.0	62.0		37.0	37.0	37.0	33.0
70th %ile Term Code	Max	MaxR	Max	MaxR	MaxR		Max	Max	Coord		Coord	Coord	Coord	Max
50th %ile Green (s)	33.0	27.0	19.0	27.0	27.0		19.0	19.0	62.0		37.0	37.0	37.0	33.0
50th %ile Term Code	Max	MaxR	Max	MaxR	MaxR		Max	Max	Coord		Coord	Coord	Coord	Max
30th %ile Green (s)	33.0	27.0	19.0	27.0	27.0		19.0	19.0	62.0		37.0	37.0	37.0	33.0
30th %ile Term Code	Max	MaxR	Max	MaxR	MaxR		Max	Max	Coord		Coord	Coord	Coord	Max
10th %ile Green (s)	33.0	27.0	19.0	27.0	27.0		19.0	19.0	62.0		37.0	37.0	37.0	33.0
10th %ile Term Code	Max	MaxR	Max	MaxR	MaxR		Max	Max	Coord		Coord	Coord	Coord	Max
Queue Length 50th (ft)	~711	20	0		116			~336	271			~172	294	347
Queue Length 95th (ft)	#950	48	93		163			#499	319			#318	371	474
Internal Link Dist (ft)		324			271				610				238	
Turn Bay Length (ft)			260					200						
Base Capacity (vph)	360	370	440		354			46	1986			109	821	672
Starvation Cap Reductn	31	0	0		0			0	0			0	173	76
Spillback Cap Reductn	10	0	0		0			0	0			0	0	0
Storage Cap Reductn	0	0	0		0			0	0			0	0	0
Reduced v/c Ratio	1.64	0.07	0.66		0.52			4.37	0.56			1.33	1.00	0.72

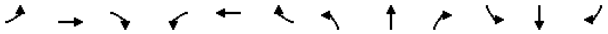
Intersection Summary

Area Type: CBD
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 4.37
Intersection Signal Delay: 170.1 Intersection LOS: F
Intersection Capacity Utilization 96.0% ICU Level of Service F
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
! Phase conflict between lane groups.

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





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	60	0	0	0	0	1554	110	0	1152	0
Future Volume (vph)	0	0	60	0	0	0	0	1554	110	0	1152	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	16	12	11	12	12	11	12
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	1.00
Ped Bike Factor								0.99				
Frt			0.865					0.990				
Flt Protected												
Satd. Flow (prot)	0	0	1479	0	0	0	0	4427	0	0	4468	0
Flt Permitted												
Satd. Flow (perm)	0	0	1479	0	0	0	0	4427	0	0	4468	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			138					22				
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		238			565			318			139	
Travel Time (s)		6.5			15.4			7.2			3.2	
Confl. Peds. (#/hr)						74			22			
Confl. Bikes (#/hr)									3			
Peak Hour Factor	0.91	0.91	0.91	0.25	0.25	0.25	0.98	0.98	0.98	0.99	0.99	0.99
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	1%	0%
Adj. Flow (vph)	0	0	66	0	0	0	0	1586	112	0	1164	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	66	0	0	0	0	1698	0	0	1164	0
Turn Type			Prot					NA			NA	
Protected Phases			5					1			1	
Permitted Phases												
Detector Phase			5					1			1	
Switch Phase												
Minimum Initial (s)			8.0					8.0			8.0	
Minimum Split (s)			30.0					24.0			24.0	
Total Split (s)			31.0					109.0			109.0	
Total Split (%)			22.1%					77.9%			77.9%	
Maximum Green (s)			26.0					104.0			104.0	
Yellow Time (s)			3.0					3.0			3.0	
All-Red Time (s)			2.0					2.0			2.0	
Lost Time Adjust (s)			0.0					0.0			0.0	
Total Lost Time (s)			5.0					5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)			2.0					2.0			2.0	
Recall Mode			None					C-Max			C-Max	
Walk Time (s)			8.0					8.0			8.0	
Flash Dont Walk (s)			17.0					6.0			6.0	
Pedestrian Calls (#/hr)			42					76			76	
Act Effct Green (s)			21.6					112.0			112.0	
Actuated g/C Ratio			0.15					0.80			0.80	
v/c Ratio			0.19					0.48			0.33	
Control Delay			1.2					4.5			5.3	
Queue Delay			0.0					0.3			0.3	
Total Delay			1.3					4.8			5.6	
LOS			A					A			A	
Approach Delay		1.3						4.8			5.6	
Approach LOS		A						A			A	
90th %ile Green (s)			25.0					105.0			105.0	
90th %ile Term Code			Ped					Coord			Coord	
70th %ile Green (s)			25.0					105.0			105.0	
70th %ile Term Code			Ped					Coord			Coord	
50th %ile Green (s)			25.0					105.0			105.0	
50th %ile Term Code			Ped					Coord			Coord	
30th %ile Green (s)			25.0					105.0			105.0	
30th %ile Term Code			Ped					Coord			Coord	
10th %ile Green (s)			0.0					135.0			135.0	
10th %ile Term Code			Skip					Coord			Coord	
Queue Length 50th (ft)			0					175			116	
Queue Length 95th (ft)			0					m158			135	
Internal Link Dist (ft)		158			485			238			59	
Turn Bay Length (ft)												
Base Capacity (vph)			387					3545			3574	
Starvation Cap Reductn			0					1031			1584	
Spillback Cap Reductn			15					0			507	
Storage Cap Reductn			0					0			0	
Reduced v/c Ratio			0.18					0.68			0.58	

Intersection Summary			
Area Type:	CBD		
Cycle Length: 140			
Actuated Cycle Length: 140			
Offset: 65 (46%), Referenced to phase 1:NBSB, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.48			
Intersection Signal Delay: 5.0		Intersection LOS: A	
Intersection Capacity Utilization 40.4%		ICU Level of Service A	
Analysis Period (min) 15			

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

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

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø3	Ø9
Lane Configurations														
Traffic Volume (vph)	67	194	199	513	115	45	253	409	0	31	390	15		
Future Volume (vph)	67	194	199	513	115	45	253	409	0	31	390	15		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Lane Width (ft)	12	13	12	13	13	12	12	11	16	12	14	12		
Storage Length (ft)	0		0	350		0	0		0	0		0		
Storage Lanes	0		1	1		0	0		0	0		0		
Taper Length (ft)	25			25			25			25				
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.95	0.95	1.00	0.95	0.95	0.95		
Ped Bike Factor		0.99		1.00	0.99			0.99			1.00			
Frt			0.850		0.958						0.995			
Flt Protected		0.987		0.950				0.981			0.996			
Satd. Flow (prot)	0	1731	1454	3224	1663	0	0	3043	0	0	3397	0		
Flt Permitted		0.987		0.950				0.626			0.853			
Satd. Flow (perm)	0	1722	1454	3211	1663	0	0	1931	0	0	2909	0		
Right Turn on Red			Yes			No			No			Yes		
Satd. Flow (RTOR)			205								2			
Link Speed (mph)		30			30			30			25			
Link Distance (ft)		298			524			245			216			
Travel Time (s)		6.8			11.9			5.6			5.9			
Confl. Peds. (#/hr)	8		2	2		8	18		14	14		18		
Confl. Bikes (#/hr)									3			1		
Peak Hour Factor	0.97	0.97	0.97	0.96	0.96	0.96	0.99	0.99	0.99	0.95	0.95	0.95		
Heavy Vehicles (%)	0%	1%	0%	1%	1%	0%	0%	2%	0%	0%	1%	0%		
Adj. Flow (vph)	69	200	205	534	120	47	256	413	0	33	411	16		
Shared Lane Traffic (%)														
Lane Group Flow (vph)	0	269	205	534	167	0	0	669	0	0	460	0		
Turn Type	Split	NA	pt+ov	Split	NA		Prot	NA		Perm	NA			
Protected Phases	5	5	2 5	6	6		2	1 2			1		3	9
Permitted Phases										1				
Detector Phase	5	5	2 5	6	6		2	1 2		1	1			
Switch Phase														
Minimum Initial (s)	10.0	10.0		8.0	8.0		8.0			10.0	10.0		1.0	1.0
Minimum Split (s)	23.5	23.5		22.0	22.0		15.0			24.5	24.5		19.0	19.0
Total Split (s)	26.0	26.0		44.0	44.0		22.0			36.0	36.0		19.0	19.0
Total Split (%)	15.7%	15.7%		26.5%	26.5%		13.3%			21.7%	21.7%		11%	11%
Maximum Green (s)	19.5	19.5		38.0	38.0		15.0			30.5	30.5		16.0	16.0
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5			3.5	3.5		2.0	2.0
All-Red Time (s)	3.0	3.0		2.5	2.5		3.5			2.0	2.0		1.0	1.0
Lost Time Adjust (s)		0.0		0.0	0.0						0.0			
Total Lost Time (s)		6.5		6.0	6.0						5.5			
Lead/Lag	Lead	Lead		Lag	Lag		Lag			Lead	Lead			
Lead-Lag Optimize?										Yes	Yes			
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0			3.0	3.0		3.0	3.0
Recall Mode	None	None		None	None		None			C-Max	C-Max		None	None
Walk Time (s)	3.0	3.0		3.0	3.0					7.0	7.0		2.0	2.0
Flash Dont Walk (s)	14.0	14.0		13.0	13.0					12.0	12.0		1.0	1.0
Pedestrian Calls (#/hr)	32	32		0	0					10	10		0	0
Act Effct Green (s)		19.5	41.0	32.8	32.8			90.2			73.7			
Actuated g/C Ratio		0.12	0.25	0.20	0.20			0.54			0.44			
v/c Ratio		1.33	0.40	0.84	0.51			1.86			0.36			
Control Delay		228.7	8.2	76.2	64.4			430.5			32.0			
Queue Delay		2.1	1.3	0.0	0.0			0.0			0.0			
Total Delay		230.8	9.5	76.2	64.4			430.5			32.0			
LOS		F	A	E	E			F			C			
Approach Delay		135.1			73.4			430.5			32.0			
Approach LOS		F			E			F			C			
90th %ile Green (s)	19.5	19.5		38.0	38.0		15.0			68.5	68.5		0.0	0.0
90th %ile Term Code	Max	Max		Max	Max		Max			Coord	Coord		Skip	Skip
70th %ile Green (s)	19.5	19.5		36.2	36.2		15.0			70.3	70.3		0.0	0.0
70th %ile Term Code	Max	Max		Gap	Gap		Max			Coord	Coord		Skip	Skip
50th %ile Green (s)	19.5	19.5		33.5	33.5		15.0			73.0	73.0		0.0	0.0
50th %ile Term Code	Max	Max		Gap	Gap		Max			Coord	Coord		Skip	Skip
30th %ile Green (s)	19.5	19.5		30.7	30.7		15.0			75.8	75.8		0.0	0.0
30th %ile Term Code	Max	Max		Gap	Gap		Max			Coord	Coord		Skip	Skip
10th %ile Green (s)	19.5	19.5		25.7	25.7		15.0			80.8	80.8		0.0	0.0
10th %ile Term Code	Max	Max		Gap	Gap		Max			Coord	Coord		Skip	Skip
Queue Length 50th (ft)		~377	0	289	163			~548			173			
Queue Length 95th (ft)		#572	71	348	236			#686			232			
Internal Link Dist (ft)		218			444			165			136			
Turn Bay Length (ft)				350										
Base Capacity (vph)		203	513	738	380			360			1292			
Starvation Cap Reductn		25	156	0	0			0			0			
Spillback Cap Reductn		0	0	0	0			0			0			
Storage Cap Reductn		0	0	0	0			0			0			
Reduced v/c Ratio		1.51	0.57	0.72	0.44			1.86			0.36			

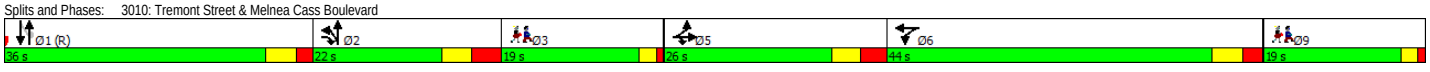
Intersection Summary

Area Type: CBD
Cycle Length: 166
Actuated Cycle Length: 166
Offset: 0 (0%), Referenced to phase 1:NBSB, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.86
Intersection Signal Delay: 181.5 — Intersection LOS: F
Intersection Capacity Utilization 87.9% — ICU Level of Service E
Analysis Period (min) 15

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

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

Splits and Phases: 3010: Tremont Street & Melnea Cass Boulevard



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø2
Lane Configurations													
Traffic Volume (vph)	2	1	0	59	26	298	1	35	126	267	68	1	
Future Volume (vph)	2	1	0	59	26	298	1	35	126	267	68	1	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor		0.95			0.95			0.93			0.96		
Frt						0.850		0.895					
Flt Protected		0.970			0.967						0.962		
Satd. Flow (prot)	0	1659	0	0	1654	1454	0	1433	0	0	1642	0	
Flt Permitted		0.929			0.846			0.997			0.962		
Satd. Flow (perm)	0	1501	0	0	1371	1454	0	1426	0	0	1586	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)						307		131					
Link Speed (mph)		25			25			25			25		
Link Distance (ft)		157			298			219			195		
Travel Time (s)		4.3			8.1			6.0			5.3		
Confl. Peds. (#/hr)	34		26	26		34	225		34	34		225	
Confl. Bikes (#/hr)									10			26	
Peak Hour Factor	0.38	0.38	0.38	0.97	0.97	0.97	0.96	0.96	0.96	0.96	0.96	0.96	
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Parking (#/hr)												0	
Adj. Flow (vph)	5	3	0	61	27	307	1	36	131	278	71	1	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	8	0	0	88	307	0	168	0	0	350	0	
Turn Type	Perm	NA		Perm	NA	pt+ov	Perm	NA		Split	NA		
Protected Phases		6			6	1 6		5		1	1		2
Permitted Phases	6			6			5						
Detector Phase	6	6		6	6	1 6	5	5		1	1		
Switch Phase													
Minimum Initial (s)	8.0	8.0		8.0	8.0		9.0	9.0		10.0	10.0		8.0
Minimum Split (s)	14.0	14.0		14.0	14.0		14.0	14.0		15.0	15.0		21.0
Total Split (s)	16.0	16.0		16.0	16.0		16.0	16.0		17.0	17.0		21.0
Total Split (%)	22.9%	22.9%		22.9%	22.9%		22.9%	22.9%		24.3%	24.3%		30%
Maximum Green (s)	12.0	12.0		12.0	12.0		12.0	12.0		13.0	13.0		18.0
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		2.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0		1.0
Lost Time Adjust (s)		0.0			0.0			0.0			0.0		
Total Lost Time (s)		4.0			4.0			4.0			4.0		
Lead/Lag	Lag	Lag		Lag	Lag		Lead	Lead		Lead	Lead		Lag
Lead-Lag Optimize?													
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0		2.0
Recall Mode	Max	Max		Max	Max		None	None		C-Max	C-Max		None
Walk Time (s)													7.0
Flash Dont Walk (s)													11.0
Pedestrian Calls (#/hr)													0
Act Effct Green (s)		35.3			35.3	52.3		9.7			13.0		
Actuated g/C Ratio		0.50			0.50	0.75		0.14			0.19		
v/c Ratio		0.01			0.13	0.26		0.54			1.15		
Control Delay		9.3			10.3	1.0		15.7			129.4		
Queue Delay		0.0			0.0	0.5		0.0			0.0		
Total Delay		9.3			10.3	1.6		15.7			129.4		
LOS		A			B	A		B			F		
Approach Delay		9.3			3.5			15.7			129.4		
Approach LOS		A			A			B			F		
90th %ile Green (s)	32.4	32.4		32.4	32.4		12.6	12.6		13.0	13.0		0.0
90th %ile Term Code	MaxR	MaxR		MaxR	MaxR		Gap	Gap		Coord	Coord		Skip
70th %ile Green (s)	36.0	36.0		36.0	36.0		9.0	9.0		13.0	13.0		0.0
70th %ile Term Code	MaxR	MaxR		MaxR	MaxR		Min	Min		Coord	Coord		Skip
50th %ile Green (s)	36.0	36.0		36.0	36.0		9.0	9.0		13.0	13.0		0.0
50th %ile Term Code	MaxR	MaxR		MaxR	MaxR		Min	Min		Coord	Coord		Skip
30th %ile Green (s)	36.0	36.0		36.0	36.0		9.0	9.0		13.0	13.0		0.0
30th %ile Term Code	MaxR	MaxR		MaxR	MaxR		Min	Min		Coord	Coord		Skip
10th %ile Green (s)	36.0	36.0		36.0	36.0		9.0	9.0		13.0	13.0		0.0
10th %ile Term Code	MaxR	MaxR		MaxR	MaxR		Min	Min		Coord	Coord		Skip
Queue Length 50th (ft)		2			18	0		15			~181		
Queue Length 95th (ft)		4			45	18		64			#332		
Internal Link Dist (ft)		77			218			139			115		
Turn Bay Length (ft)													
Base Capacity (vph)		756			691	1163		355			304		
Starvation Cap Reductn		0			0	501		0			0		
Spillback Cap Reductn		0			0	0		0			0		
Storage Cap Reductn		0			0	0		0			0		
Reduced v/c Ratio		0.01			0.13	0.46		0.47			1.15		

Intersection Summary

Area Type: CBD
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 17 (24%), Referenced to phase 1:SBTL, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.15
Intersection Signal Delay: 53.6 Intersection LOS: D
Intersection Capacity Utilization 53.2% ICU Level of Service A
Analysis Period (min) 15

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

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

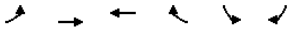
Splits and Phases: 2085: Columbus Ave & Melnea Cass Boulevard

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	604	171	21	529	81	242	210	44	160	203	64
Future Volume (vph)	55	604	171	21	529	81	242	210	44	160	203	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	120		0	120		0	0		225	0		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.96	0.93		0.94	0.98		0.97	0.98		0.95	0.98	
Frt		0.967			0.980			0.974			0.964	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3219	0	1719	3467	0	1805	1802	0	1805	1772	0
Flt Permitted	0.331			0.267			0.231			0.408		
Satd. Flow (perm)	593	3219	0	454	3467	0	427	1802	0	735	1772	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		37			17			9			13	
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		321			457			628			317	
Travel Time (s)		8.8			12.5			17.1			8.6	
Confl. Peds. (#/hr)	50		122	122		50	41		58	58		41
Confl. Bikes (#/hr)			7			4			13			18
Peak Hour Factor	0.95	0.95	0.95	0.97	0.97	0.97	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	1%	1%	5%	0%	1%	0%	1%	0%	0%	1%	2%
Parking (#/hr)												0
Adj. Flow (vph)	58	636	180	22	545	84	255	221	46	168	214	67
Shared Lane Traffic (%)												
Lane Group Flow (vph)	58	816	0	22	629	0	255	267	0	168	281	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases	6			2			4			8		
Detector Phase	1	6		5	2		7	4		3	8	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	12.0	54.0		12.0	54.0		20.0	38.0		16.0	34.0	
Total Split (s)	12.0	54.0		12.0	54.0		20.0	38.0		16.0	34.0	
Total Split (%)	10.0%	45.0%		10.0%	45.0%		16.7%	31.7%		13.3%	28.3%	
Maximum Green (s)	8.0	50.0		8.0	50.0		16.0	34.0		12.0	30.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
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	4.0		4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		10.0			10.0			7.0			7.0	
Flash Dont Walk (s)		15.0			15.0			17.0			17.0	
Pedestrian Calls (#/hr)		41			58			122			50	
Act Effct Green (s)	65.9	61.2		63.7	58.5		44.2	29.0		36.4	25.0	
Actuated g/C Ratio	0.55	0.51		0.53	0.49		0.37	0.24		0.30	0.21	
v/c Ratio	0.15	0.49		0.07	0.37		0.77	0.60		0.52	0.74	
Control Delay	14.0	21.1		13.7	20.9		43.1	44.7		31.8	54.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	14.0	21.1		13.7	20.9		43.1	44.7		31.8	54.4	
LOS	B	C		B	C		D	D		C	D	
Approach Delay		20.6			20.6			43.9			46.0	
Approach LOS		C			C			D			D	
90th %ile Green (s)	8.0	50.6		7.4	50.0		16.0	34.0		12.0	30.0	
90th %ile Term Code	Max	Coord		Gap	Coord		Max	Hold		Max	Max	
70th %ile Green (s)	8.0	54.8		6.6	53.4		16.0	30.6		12.0	26.6	
70th %ile Term Code	Gap	Coord		Gap	Coord		Max	Hold		Max	Gap	
50th %ile Green (s)	7.2	57.9		6.1	56.8		16.0	28.0		12.0	24.0	
50th %ile Term Code	Gap	Coord		Gap	Coord		Max	Hold		Max	Ped	
30th %ile Green (s)	6.5	68.0		0.0	57.5		16.0	28.5		11.5	24.0	
30th %ile Term Code	Gap	Coord		Skip	Coord		Max	Hold		Gap	Ped	
10th %ile Green (s)	0.0	74.8		0.0	74.8		12.6	24.0		9.2	20.6	
10th %ile Term Code	Skip	Coord		Skip	Coord		Gap	Ped		Gap	Hold	
Queue Length 50th (ft)	19	213		7	155		144	181		90	198	
Queue Length 95th (ft)	44	306		22	225		199	255		133	280	
Internal Link Dist (ft)		241			377			548			237	
Turn Bay Length (ft)	120			120								
Base Capacity (vph)	404	1660		329	1699		341	517		333	452	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
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	0.14	0.49		0.07	0.37		0.75	0.52		0.50	0.62	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 30.1 — Intersection LOS: C
Intersection Capacity Utilization 72.5% — ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 95: Columbus Ave & Massachusetts Ave



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	16	789	627	42	0	0
Future Volume (Veh/h)	16	789	627	42	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.97	0.97	0.92	0.92
Hourly flow rate (vph)	17	848	646	43	0	0
Pedestrians					42	
Lane Width (ft)					0.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		212	170			
pX, platoon unblocked	0.93				0.93	0.93
vC, conflicting volume	731				1168	386
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	572				1039	203
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				100	100
cM capacity (veh/h)	945				208	751

Direction, Lane #	EB 1	EB 2	WB 1	WB 2
Volume Total	300	565	431	258
Volume Left	17	0	0	0
Volume Right	0	0	0	43
cSH	945	1700	1700	1700
Volume to Capacity	0.02	0.33	0.25	0.15
Queue Length 95th (ft)	1	0	0	0
Control Delay (s)	0.7	0.0	0.0	0.0
Lane LOS	A			
Approach Delay (s)	0.2		0.0	
Approach LOS				

Intersection Summary				
Average Delay			0.1	
Intersection Capacity Utilization			36.5%	ICU Level of Service
Analysis Period (min)			15	

A

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	10	3	335	0	0	326
Future Volume (Veh/h)	10	3	335	0	0	326
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.65	0.65	0.95	0.95	0.96	0.96
Hourly flow rate (vph)	15	5	353	0	0	340
Pedestrians	63		37			1
Lane Width (ft)	12.0		12.0			12.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	5		3			0
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			195			
pX, platoon unblocked						
vC, conflicting volume	793	417			416	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	793	417			416	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	99			100	
cM capacity (veh/h)	331	606			1093	

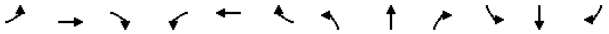
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	20	353	340
Volume Left	15	0	0
Volume Right	5	0	0
cSH	373	1700	1700
Volume to Capacity	0.05	0.21	0.20
Queue Length 95th (ft)	4	0	0
Control Delay (s)	15.2	0.0	0.0
Lane LOS	C		
Approach Delay (s)	15.2	0.0	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	28.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	313	25	21	326
Future Volume (Veh/h)	0	0	313	25	21	326
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.25	0.25	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	329	26	22	343
Pedestrians	58		39			
Lane Width (ft)	0.0		12.0			
Walking Speed (ft/s)	4.0		4.0			
Percent Blockage	0		3			
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			365			
pX, platoon unblocked						
vC, conflicting volume	826	400			413	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	826	400			413	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			98	
cM capacity (veh/h)	327	654			1157	

Direction, Lane #	NB 1	SB 1
Volume Total	355	365
Volume Left	0	22
Volume Right	26	0
cSH	1700	1157
Volume to Capacity	0.21	0.02
Queue Length 95th (ft)	0	1
Control Delay (s)	0.0	0.7
Lane LOS		A
Approach Delay (s)	0.0	0.7
Approach LOS		

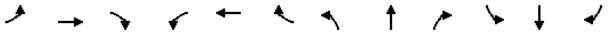
Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	37.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	0	21	4	0	12	11	302	0	0	322	6
Future Volume (Veh/h)	11	0	21	4	0	12	11	302	0	0	322	6
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.25	0.25	0.25	0.67	0.67	0.67	0.94	0.94	0.94	0.96	0.96	0.96
Hourly flow rate (vph)	44	0	84	6	0	18	12	321	0	0	335	6
Pedestrians		252			63			2			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		21			5			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								549				
pX, platoon unblocked												
vC, conflicting volume	956	998	592	832	1001	387	593			384		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	956	998	592	832	1001	387	593			384		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	70	100	79	97	100	97	98			100		
cM capacity (veh/h)	146	181	402	173	180	629	784			1123		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	128	24	333	341
Volume Left	44	6	12	0
Volume Right	84	18	0	6
cSH	251	380	784	1700
Volume to Capacity	0.51	0.06	0.02	0.20
Queue Length 95th (ft)	66	5	1	0
Control Delay (s)	33.4	15.1	0.5	0.0
Lane LOS	D	C	A	
Approach Delay (s)	33.4	15.1	0.5	0.0
Approach LOS	D	C		

Intersection Summary					
Average Delay	5.8				
Intersection Capacity Utilization	35.7%	ICU Level of Service		A	
Analysis Period (min)	15				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	86	10	79	0	0	0	18	299	8	3	248	33
Future Volume (Veh/h)	86	10	79	0	0	0	18	299	8	3	248	33
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.25	0.25	0.25	0.95	0.95	0.95	0.94	0.94	0.94
Hourly flow rate (vph)	92	11	85	0	0	0	19	315	8	3	264	35
Pedestrians		242			59			73			2	
Lane Width (ft)		12.0			0.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		20			0			6			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								727				
pX, platoon unblocked												
vC, conflicting volume	888	950	596	867	963	380	541			382		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	888	950	596	867	963	380	541			382		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	48	95	78	100	100	100	98			100		
cM capacity (veh/h)	176	204	380	160	200	670	829			1188		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	188	342	302
Volume Left	92	19	3
Volume Right	85	8	35
cSH	235	829	1188
Volume to Capacity	0.80	0.02	0.00
Queue Length 95th (ft)	149	2	0
Control Delay (s)	62.2	0.8	0.1
Lane LOS	F	A	A
Approach Delay (s)	62.2	0.8	0.1
Approach LOS	F		

Intersection Summary				
Average Delay		14.4		
Intersection Capacity Utilization		53.4%	ICU Level of Service	A
Analysis Period (min)		15		

Appendix D

Preliminary Energy Model

10 Energy

10.1 Introduction

The following sections outline the current energy performance and energy conservation measures (ECM) that can increase energy savings beyond that which is achieved by the mechanical systems outlined in the previous sections of the Schematic Design Report. Where possible, a simple payback is calculated for the ECM to help inform the optimum strategy.

Several of the ECM have been evaluated with the help of the manufacturer. This provides accurate results based on each one's real world knowledge of the strategies and how they integrate into a laboratory building. More holistic strategies are modeled by the design team allowing for the whole system to be modeled and analyzed, including impact to the LEED performance. The baseline for comparison for all ECM is the Proposed Design described in this report.

As it currently stands the project is designed to earn 15 LEED points under the Optimize Energy Performance credit, and all ECM aim to provide additional points beyond this threshold.

10.2 Energy Model Summary

The model is run with Integrated Environmental Solutions (IES) Virtual Environment version 2017.4.0.0. The software uses a 3D representation of the building to model internal and external loads within all spaces. Occupant schedules, lighting strategies, and mechanical system models are added resulting in a complete virtual model of the proposed building. This model is run using a historical weather file to determine energy consumption over a theoretical year.

As part of the schematic design process a number of options have been investigated, to understand the effect of various energy conservation strategies employed in the building. These options are looked at in comparison to a proposed system which uses systems outlined earlier in this report. The current proposed system is projected to achieve approximately 15 LEED points under the new Version 4 of the standard and therefore the percentage improvement of each ECM is likely to seem comparatively small. This is due to a large number of energy saving technologies and passive measures already having been applied.

The current energy model was constructed for the primary purpose of determining the relative energy savings above a proposed building provided by each ECM and evaluating them against costs to understand the likely payback of each. This will allow the design team to make a recommendation as to which technologies to apply to the building. It is also important to note that energy savings from each ECM are not additive when combined.

The model is not intended to predict the actual energy consumption of the proposed building.

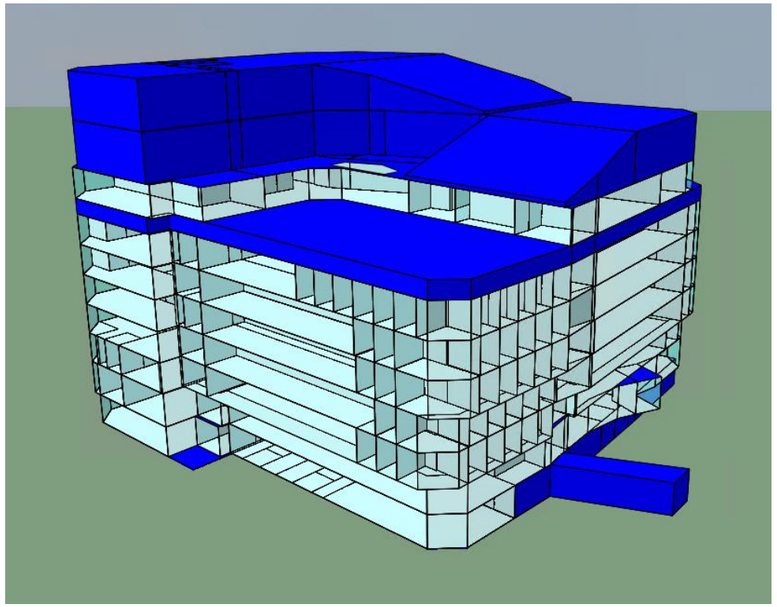


Figure 2 Current Energy Model

10.3 Utility rates, emissions factors and source energy factors

Summary of utility cost structure used to determine annual energy costs. Values are based on ISEC and should be reviewed

	Electricity per kWh Supply	Electricity per kWh Delivery	Electricity Customer Charge	Electricity per kW	Natural Gas per MMBTU
January	$ 0.08	$0.01	$ 237.07	$ 18.96	$ 12.39
February	$ 0.04	$0.01	$ 237.07	$ 18.96	$ 11.49
March	$ 0.04	$0.01	$ 237.07	$ 18.96	$ 6.44
April	$ 0.04	$ 0.01	$ 237.07	$ 18.96	$ 4.43
May	$ 0.06	$ 0.01	$ 237.07	$ 18.96	$ 3.98
June	$ 0.09	$ 0.01	$ 237.07	$ 24.93	$ 4.43
July	$ 0.09	$ 0.01	$ 237.07	$ 24.93	$ 4.50
August	$ 0.09	$ 0.01	$ 237.07	$ 24.93	$ 4.53
September	$ 0.06	$ 0.01	$ 237.07	$ 24.93	$ 4.02
October	$ 0.06	$ 0.01	$ 237.07	$ 18.96	$ 4.12
November	$ 0.04	$ 0.01	$ 237.07	$ 18.96	$ 5.78
December	$ 0.04	$ 0.01	$ 237.07	$ 18.96	$ 9.54

Summary of the metric tons of carbon-equivalent emissions per kBTU of energy per end-use. Values from Mass.gov to determine local electricity grid values

Carbon Emission Factors		
Electric	9.78898E-05	MT/kBTU
Natural Gas	5.3191E-05	MT/kBTU

Summary of source energy required to produce one unit of site energy. Source energy factors are from Table 401.2.2 in the 9th Edition of the CMR

Source Energy Factors	
Electric	3.01
Natural Gas	1.09

Using the aforementioned metrics, LEED determines percentage savings as:

$$Percentage\ improvement = 100\ x\ (Baseline\ building\ performance - Proposed\ building\ performance) / Baseline\ building\ performance$$

10.4 Current Proposed Results

Proposed design energy use compared to LEED baseline.

End Use	Baseline Design Energy (Mbtu)	Proposed Design Energy (Mbtu)	Percent Energy Savings	Percent of Baseline	Percent of Proposed
Space Cooling	6,988.7	6,466.1	7%	7%	13%
Heat Rejection	4,379.8	1,449.7	67%	5%	3%
Space Heating	45,386.8	13,177.2	71%	48%	26%
DHW	338.0	338.0	0%	0%	1%
Fans	13,655.7	7,820.2	43%	14%	15%
Pumps	1,798.9	392.5	78%	2%	1%
Plug Loads	18,379.7	18,403.5	0%	19%	36%
Lighting	3,389.5	3,389.5	0%	4%	7%
Misc Process	42.4	42.4	0%	0%	0%
Total	94,359.5	51,479.2	45.4%		
EUI (kBtu/sq ft/year)	227	124	Savings	42,880	

Proposed design energy cost compared to LEED baseline.

End Use	Baseline Design Cost (USD)	Proposed Design Cost (USD)	Percent Cost Savings	Percent of Baseline	Percent of Proposed
Space Cooling	407,456	315,787	22%	13%	17%
Heat Rejection	152,416	58,617	62%	5%	3%
Space Heating	1,212,184	378,703	69%	38%	20%
DHW	13,901	13,901	0%	0%	1%
Fans	441,176	242,797	45%	14%	13%
Pumps	95,922	13,876	86%	3%	1%
Plug Loads	699,052	699,533	0%	22%	37%
Lighting	139,552	139,552	0%	4%	7%
Misc Process	855	855	0%	0%	0%
Total	3,165,358	1,866,465	41.0%		
$/sq ft	7.63	4.50	Savings	1,298,893	

Proposed design carbon emissions compared to LEED baseline.

End Use	Baseline Design Carbon (MT)	Proposed Design Carbon (MT)	Percent Cost Savings	Percent of Baseline	Percent of Proposed
Space Cooling	0.684	0.633	7%	10%	14%
Heat Rejection	0.429	0.142	67%	6%	3%
Space Heating	2.414	0.701	71%	34%	16%
DHW	0.018	0.018	0%	0%	0%
Fans	1.337	0.766	43%	19%	17%
Pumps	0.176	0.038	78%	2%	1%
Plug Loads	1.799	1.802	0%	25%	41%
Lighting	0.332	0.332	0%	5%	7%
Misc Process	0.004	0.004	0%	0%	0%
Total	7.193	4.435	38.3%		
MT/1000 ft2	0.017	0.011	Savings	2.758	

10.5 Criteria for evaluation

Each ECM shall be evaluated against the following criteria:

- Energy savings
- Cost difference
- Maintenance
- Flexibility
- Space requirements

10.6 Energy Conservation Measures

System	Section reference	Proposed Design	Energy Conservation Measures
Lab Ventilation	5.5.10.1 Appendix A	Aircuity (ECM 1)	
Fume hood face velocities	5.5.10	80 fpm, Variable	
Lab Exhaust	5.5.4.2 and Appendix C	Manifolded lab and general exhaust with run around coil heat recovery 50% eff	Separate general and fume exhaust. General exhaust through desiccant wheel heat recovery and fume exhaust with ‘standard’ run around coil heat recovery (ECM 4)
Lab Heat Recovery	5.2.2, Appendix B, and Appendix C	Stick built run around coil 50% eff	Konvekta run around coil >70% eff (ECM 2)
Lab Exhaust Fans	5.5.9.1	Fixed volume fans with bypass damper	Variable speed fans with: Custom nozzle Wind speed monitor (ECM 5) Contaminant monitor (ECM 6)
Office Ventilation Heat Recovery	Appendix B	Energy recovery wheel	Desiccant wheel heat recovery (ECM 3)
Solar Wall	MSK.011	Solar Wall for vivarium AHUs	
Chillers	5.4.1	3 no. chillers and 3 no. cooling towers including 1 heat recovery – all high efficiency chillers	2 no. chillers and 2 no. cooling towers in Phase 2 (including 1 heat recovery) + 1 no. chiller and 1 no. cooling tower in Phase 1 and interconnecting pipework – all high efficiency chillers

Strategies	Manifolded Lab Exhaust	Aircuity	Separate General and Fume exhaust	Konvekta	Wind Speed Monitor Turndown	Contaminant Monitor Turndown	Office Dual wheel
Baseline	X						
ECM 1	X	X					
ECM 2	X			X			
ECM 3	X						X
ECM 4			X				X
ECM 5	X				X		
ECM 6	X					X	

10.6.1 ECM 1: Aircuity Centralized Demand Control Ventilation

A description of Aircuity can be found in Appendix A.

To calculate yearly energy savings, Aircuity was contacted to perform analysis based on the building geometry and laboratory arrangements of Phase 2. The results of the analysis are provided in the table below.

	Energy, MBtu			Dollars
Electricity Savings	2,913		Capital Cost	$500,000
Natural Gas Savings	2,505		Annual Savings	$150,000
Total Savings	5,418		Simple Payback	3 years

The savings reflect approximately 10% additional reduction in yearly energy use over the proposed. An estimated 1 additional LEED point is possible through this ECM. Further study will be done during Design Development (DD) as described in the future work section to confirm the LEED performance. A full copy of Aircuity's analysis is included in the Appendices, the analysis includes a yearly maintenance cost which is deducted from the yearly savings.

10.6.2 ECM 2: Konvekta High Performance Energy Recovery System

A description of Konvekta can be found in Appendix B1.2.

To calculate yearly energy savings, Konvekta was contacted to perform analysis based on the Schematic Design drawing and baseline system information within this report. The results of the analysis are provided in the table below.

	Energy, Mbtu			Dollars
Heating Savings (natural gas)	7,232		Capital Cost	$250,000[1]
Cooling Savings (electricity)	1,661		Annual Savings	$125,000
Fan + Pump Savings (electricity)	210		Simple Payback	2 years
Total Savings	9,103			

1 – the capital cost here reflects the additional cost over the traditional run around heat recovery system that is included in the baseline system

The savings reflect approximately 15% additional reduction in yearly energy use over the proposed. An estimated 2 additional LEED points are possible through this ECM. Further study will be done during DD as described in the future work section to confirm. A full copy of Konvekta's analysis is included in the Appendices.

10.6.3 ECM 3: Desiccant Wheel Heat Recovery for General System

A description of the system applied only to the General AHU can be found in Section B1.2. In this option, all other systems are as described in Section **Error! Reference source not found.**.

To calculate yearly savings, energy modeling was performed using IES Virtual Environment. The results of the analysis are provided in the table below.

	LEED Baseline	Proposed Design	ECM 3
Energy Use (MBTU)	94,400	51,500	49,700
Energy Savings (MBTU)	--	42,900 (45%)	44,700 (47%)
Energy Savings vs. Current Design (MBTU)	--	--	1,800 (3%)
Energy Cost ($)	$3,200,000	$1,900,000	$1,850,000
Energy Cost Savings ($)	--	$1,300,000 (41%)	$1,350,000 (42%)
Energy Cost Savings vs. Current Design ($)	--	--	$50,000 (3%)
LEED Points	--	15	16

All savings shown above are relative to the ASHRAE 90.1-2010 Appendix G Baseline used for the calculation of LEED points.

10.6.4 ECM 4: Dedicated Fume Exhaust and Desiccant Wheel Heat Recovery for Lab and General System

A description of the system applied to both the General AHU and Lab AHU can be found in Section B1.2. In this option, all other systems are as described in Section **Error! Reference source not found.**.

To calculate yearly savings, energy modeling was performed using IES Virtual Environment. The results of the analysis are provided in the table below.

	LEED Baseline	Proposed Design	ECM 4
Energy Use (MBTU)	94,400	51,500	44,900
Energy LEED Savings (MBTU)	--	42,900 (45%)	49,500 (52%)
Energy Savings vs. Current Design (MBTU)	--	--	6,600 (13%)
Energy Cost ($)	$3,200,000	$1,900,000	$1,700,000
Energy LEED Cost Savings ($)	--	$1,300,000 (41%)	$1,500,000 (47%)
Energy Cost Savings vs. Current Design ($)	--	--	$200,000 (11%)
LEED Points	--	15	17

All savings shown above are relative to the ASHRAE 90.1-2010 Appendix G Baseline used for the calculation of LEED points.

10.6.5 ECM 5: Wind Speed Monitor Lab Exhaust Turndown

Wind speed is an important factor when considering exit velocity of lab exhaust air. Due to the contaminated nature of lab exhaust air a velocity of 3,000 FPM is used. This ensures the contaminated air is disbursed upward and away from the building and surrounding area. This velocity can be reduced when the weather is more favorable than the design conditions, when the wind speed is low.

This is achieved through additional control points and close integration with the building's weather station. The energy and cost savings are achieved by turndown of the lab exhaust fans. Analysis will be done during DD to determine savings based on the IES:VE model and results of the ongoing wind study for the site.

10.6.6 ECM 6: Contaminant Monitor Lab Exhaust Turndown

Contaminant levels within lab exhaust air requires high exit velocities to ensure the air is kept away from the building and surrounding area. However, due to diversity at fume hoods and the generally clean air that accounts for a large percentage of lab exhaust, the contaminants are diluted. Through active sensing of the exhaust air, the exit velocity can be reduced below 3,000 FPM when the air is at agreed levels of dilution. Similar to ECM 5, savings are achieved by turndown of the lab exhaust fans when conditions allow.

Analysis will be doing during DD to determine savings based on IES:VE model and information from the manufacture.

10.7 ECM Summary

The ECM covered all provide some level of energy and cost savings over the proposed design.

- ECM 1 has both high energy savings and payback. In addition, this system provides additional safety in laboratories and therefore is recommended to be carried forward in the Proposed Design.
- ECM 2 has high energy savings and payback. Importantly the Konvekta helps to reduce the need for local fossil fuel use for heating, helping the project to be conditioned primarily with electricity. This is an important step in achieve carbon free operation in future. This ECM is recommended.
- ECM 3 has low energy savings as they are localized to the general AHU system limiting the total percentage savings. However, to energy savings for this system are high. The Desiccant Wheel Heat Recovery system allows for the optimized application of Active Chilled Beams in the office and other general spaces.
- ECM 4 has high energy savings at 13%, however has a large trade off with flexibility. In order separate the fume and general lab exhausts dedicated ductwork must be delivered to each space. To do so and maintain flexibility in all labs to have fume exhaust the ductwork required is very nearly doubled. This additional space requirement and additional cost makes this strategy ill-suited for a flexible laboratory as planned for EXP. As such this ECM is not recommended.
- ECM 5 and 6 will be evaluated as part of the future work. It is important to note that these ECM cannot be applied together as they aim to save the same portion of building energy, mainly excess exhaust fan energy when it may not be required.

It is important to note these ECM do not simply sum for an aggregate higher savings. The interactions of each will lead to lower total savings when combined. In order to determine the optimum combination, IES:VE will be used during DD to model the combined systems. Based on information currently available, we expect ECM 1, 2, 3, and the best of ECM 5 / ECM 6 to be the optimum solution.

10.8 Future work

As the design develops throughout Design Development, the energy model will be refined and used to inform developments of the HVAC system and building envelope design, including the shading system. Aircuity will be incorporated into the proposed design and act as the bases for testing further ECM.

This refined proposed model will inform the integrated ECM approach that will offer the maximum energy savings for the project.

Appendix E

Climate Resiliency Checklist

Boston Planning & Development Agency
Climate Resiliency Report Summary

boston planning & development agency

Submitted: 05/20/2019 09:45:24

A.1 - Project Information

Project Name:	EXP			
Project Address:	Columbus Avenue			
Filing Type:	Initial (PNF, EPNF, NPC or other substantial filing)			
Filing Contact:	Talya Moked	Epsilon Associates	tmoked@epsilonassociates.com	9784616223
Is MEPA approval required?	No	MEPA date:		

A.2 - Project Team

Owner / Developer:	Northeastern University
Architect:	Payette
Engineer:	Arup
Sustainability / LEED:	Soden Sustainability
Permitting:	Epsilon Associates, Inc.
Construction Management:	

A.3 - Project Description and Design Conditions

List the principal Building Uses:	Science and engineering research and teaching
List the First Floor Uses:	Robotics high bay space and research, makerspace, classrooms, commons area
List any Critical Site Infrastructure and or Building Uses:	

Site and Building:

Site Area (SF):	151853	Building Area (SF):	350000
Building Height (Ft):	126	Building Height (Stories):	8
Existing Site Elevation – Low (Ft BCB):	15.8	Existing Site Elevation – High (Ft BCB):	32.9
Proposed Site Elevation – Low (Ft BCB):	16.1	Proposed Site Elevation – High (Ft BCB):	32.9
Proposed First Floor Elevation (Ft BCB):	18.5	Below grade spaces/levels (#):	1

Article 37 Green Building:

LEED Version - Rating System:	LEED v4 BD+C	LEED Certification:	Yes
Proposed LEED rating:	Gold	Proposed LEED point score (Pts.):	67

Boston Planning & Development Agency
Climate Resiliency Report Summary

boston planning & development agency

Building Envelope:

When reporting R values, differentiate between R discontinuous and R continuous. For example, use "R13" to show R13 discontinuous and use R10c.i. to show R10 continuous. When reporting U value, report total assembly U value including supports and structural elements.

Roof:	26	Exposed Floor :	20
Foundation Wall:	28	Slab Edge (at or below grade):	28

Vertical Above-grade Assemblies (%'s are of total vertical area and together should total 100%):

Area of Opaque Curtain Wall & Spandrel Assembly:	23	Wall & Spandrel Assembly Value:	0.1
Area of Framed & Insulated / Standard Wall:	35	Wall Value:	20
Area of Vision Window:	41	Window Glazing Assembly Value:	0.36
		Window Glazing SHGC:	0.24
Area of Doors:	1	Door Assembly Value :	Overhead: 0.17 Entrance Door: 0.45

Energy Loads and Performance

For this filing – describe how energy loads & performance were determined	Energy and load performance is determined with IES: VE energy modeling software. The model is based on SD information and various performance assumptions.		
Annual Electric (kWh):	10294800	Peak Electric (kW):	2790
Annual Heating (MMbtu/hr):	13605	Peak Heating (MMbtu):	2166.4
Annual Cooling (Tons/hr):	569078	Peak Cooling (Tons):	101377
Energy Use - Below ASHRAE 90.1 - 2013 (%):	31	Have the local utilities reviewed the building energy performance?:	No
Energy Use - Below Mass. Code (%):	31	Energy Use Intensity (kBtu/SF):	163

Back-up / Emergency Power System

Electrical Generation Output (kW):	1600	Number of Power Units:	2
System Type (kW):	1600	Fuel Source:	Fuel Oil

Emergency and Critical System Loads (in the event of a service interruption)

Electric (kW):		Heating (MMbtu/hr):	
		Cooling (Tons/hr):	150

B – Greenhouse Gas Reduction and Net Zero / Net Positive Carbon Building Performance

Reducing greenhouse gas emissions is critical to avoiding more extreme climate change conditions. To achieve the City's goal of carbon-neutrality by 2050 the performance of new buildings will need to progressively improve to carbon net zero and net positive.

B.1 – GHG Emissions - Design Conditions

For this filing - Annual Building GHG Emissions (Tons): 4162000

For this filing - describe how building energy performance has been integrated into project planning, design, and engineering and any supporting analysis or modeling:

Early 'box' modeling was used to determine large factors to overall energy performance: envelope, HVAC systems, internal gains etc. These informed the initial system designs along with the detailed SD model used to assess performance against LEED baseline. This model, done in IES:VE, includes detailed geometry and HVAC systems that informed the required performance of these systems to meet energy performance goals.

Describe building specific passive energy efficiency measures including orientation, massing, building envelop, and systems:

Passive energy efficiency measures include exterior shading to reduce solar heat gain, opaque wall assemblies with high u-value and focus on detailing to reduce thermal bridging. Glazing consisting of triple pane insulating units with high-performance coatings. The compact building massing reduces envelope area. Vegetated and high solar reflectance roofing reduce heat gains.

Describe building specific active energy efficiency measures including high performance equipment, controls, fixtures, and systems:

A highly efficient HVAC system is being used for the Project. The systems include high efficient water-cooled chiller plant with heat recovery chiller and mag-lev technology. The heating system includes premium efficiency condensing boilers with a run-around heat recovery system. The building is served primarily via active chilled beams, helping to further reduce air loads in the building. The laboratories will be served by VAV with a night-time ACH turndown, reducing energy during unoccupied periods. The lighting will be LED with advanced controls for daylighting and occupancy/vacancy.

Describe building specific load reduction strategies including on-site renewable energy, clean energy, and storage systems:

The limited site does not allow for PV or other on-site renewable technologies. However, the extensive energy recovery systems integrated with the hydronic and air systems reduce the load in both heating and cooling.
A solar wall will be used to pre-heat air during cold months providing 'free' heating and load reduction during these times.

Describe any area or district scale emission reduction strategies including renewable energy, central energy plants, distributed energy systems, and smart grid infrastructure:

None currently in the design. A connection to the ISEC building for both power and cooling is being considered to create a connected, resilient system for the two buildings.

Describe any energy efficiency assistance or support provided or to be provided to the project:

The Project will reach out to the utility companies to discuss energy efficiency incentives as the HVAC and lighting design progresses.

B.2 - GHG Reduction - Adaptation Strategies

Describe how the building and its systems will evolve to further reduce GHG emissions and achieve annual carbon net zero and net positive performance (e.g. added efficiency measures, renewable energy, energy storage, etc.) and the timeline for meeting that goal (by 2050):

The building is being designed to exceed current minimum energy code and drive as close to future reductions as possible. The systems will also be designed with future upgrades in mind by providing means of connections, expansion or replacement of systems.
Due to the limited area for on-site renewables the project must integrate with the overall campus plan in order to reach carbon net-zero.

C - Extreme Heat Events

Annual average temperature in Boston increased by about 2˚F in the past hundred years and will continue to rise due to climate change. By the end of the century, the average annual temperature could be 56° (compared to 46° now) and the number of days above 90° (currently about 10 a year) could rise to 90.

C.1 – Extreme Heat - Design Conditions

Temperature Range - Low (Deg.):	8.4	Temperature Range - High (Deg.):	95.5
Annual Heating Degree Days:	5774	Annual Cooling Degree Days	2873

What Extreme Heat Event characteristics will be / have been used for project planning

Days - Above 90° (#):	30	Days - Above 100° (#):	2
Number of Heatwaves / Year (#):	5	Average Duration of Heatwave (Days):	3

Describe all building and site measures to reduce heat-island effect at the site and in the surrounding area:

The Project will include both vegetative and high reflectance “cool” roof assemblies. The site will include significant areas of planting and paving materials with a high solar reflectance value.

C.2 - Extreme Heat – Adaptation Strategies

Describe how the building and its systems will be adapted to efficiently manage future higher average temperatures, higher extreme temperatures, additional annual heatwaves, and longer heatwaves:

The Project is utilizing first principals of an energy efficient design to reduce loads (energy demands) through passive design strategies of a high-performance

building envelope, daylighting and reduction in heat island effects.
Active systems will be designed to be energy efficient. The HVAC system capacity will be designed for higher temperatures, e.g. 95-degree peak day.

At equipment end of life, the opportunity to increase cooling capacity can be considered to further adapt to increased temperatures.

Describe all mechanical and non-mechanical strategies that will support building functionality and use during extended interruptions of utility services and infrastructure including proposed and future adaptations:

The building is provided with generator backup for all critical systems. The generators are provided with local fuel oil storage to allow function without natural gas or electricity utility service.

D - Extreme Precipitation Events

From 1958 to 2010, there was a 70 percent increase in the amount of precipitation that fell on the days with the heaviest precipitation. Currently, the 10-Year, 24-Hour Design Storm precipitation level is 5.25". There is a significant probability that this will increase to at least 6" by the end of the century. Additionally, fewer, larger storms are likely to be accompanied by more frequent droughts.

D.1 – Extreme Precipitation - Design Conditions

What is the project design precipitation level? (In. / 24 Hours)	6

Describe all building and site measures for reducing storm water run-off:

The Project will be designed to reduce peak rates and volumes of storm water from the site and promote infiltration to the greatest extent practicable. The Project will decrease the impervious area onsite, use areas of green roof, collect rainwater for reuse in the building and construct surface and underground infiltration structures.

D.2 - Extreme Precipitation - Adaptation Strategies

Describe how site and building systems will be adapted to efficiently accommodate future more significant rain events (e.g. rainwater harvesting, on-site storm water retention, bio swales, green roofs):

A green roof is planned for a portion of the roof. A portion of rainwater will be collected and re-used in the building. The first inch of stormwater will be retained on site in an infiltration system.

E – Sea Level Rise and Storms

Boston Planning & Development Agency

Climate Resiliency Report Summary

boston planning & development agency

Under any plausible greenhouse gas emissions scenario, the sea level in Boston will continue to rise throughout the century. This will increase the number of buildings in Boston susceptible to coastal flooding and the likely frequency of flooding for those already in the floodplain.

Is any portion of the site in a FEMA Special Flood Hazard Area?	No	What Zone:	
What is the current FEMA SFHA Zone Base Flood Elevation for the site (Ft BCB)?			
Is any portion of the site in the BPDA Sea Level Rise Flood Hazard Area (see SLR-FHA online map)?	No		

If you answered YES to either of the above questions, please complete the following questions.
Otherwise you have completed the questionnaire; thank you!

E.1 – Sea Level Rise and Storms – Design Conditions

Proposed projects should identify immediate and future adaptation strategies for managing the flooding scenario represented by the Sea Level Rise Flood Hazard Area (SLR-FHA), which includes 3.2' of sea level rise above 2013 tide levels, an additional 2.5" to account for subsidence, and the 1% Annual Chance Flood. After using the SLR-FHA to identify a project's Sea Level Rise Base Flood Elevation, proponents should calculate the Sea Level Rise Design Flood Elevation by adding 12" of freeboard for buildings, and 24" of freeboard for critical facilities and infrastructure and any ground floor residential units.

What is the Sea Level Rise - Base Flood Elevation for the site (Ft BCB)?			
What is the Sea Level Rise - Design Flood Elevation for the site (Ft BCB)?		First Floor Elevation (Ft BCB):	
What are the Site Elevations at Building (Ft BCB)?		What is the Accessible Route Elevation (Ft BCB)?	

Describe site design strategies for adapting to sea level rise including building access during flood events, elevated site areas, hard and soft barriers, wave / velocity breaks, storm water systems, utility services, etc.:

Describe how the proposed Building Design Flood Elevation will be achieved including dry / wet flood proofing, critical systems protection, utility service protection, temporary flood barriers, waste and drain water back flow prevention, etc.:

Describe how occupants might shelter in place during a flooding event including any emergency power, water, and waste water provisions and the expected availability of any such measures:

Describe any strategies that would support rapid recovery after a weather event:

E.2 – Sea Level Rise and Storms – Adaptation Strategies

Describe future site design and or infrastructure adaptation strategies for responding to sea level rise including future elevating of site areas and access routes, barriers, wave / velocity breaks, storm water systems, utility services, etc.:

Describe future building adaptation strategies for raising the Sea Level Rise Design Flood Elevation and further protecting critical systems, including permanent and temporary measures:

Thank you for completing the Boston Climate Change Checklist!

For questions or comments about this checklist or Climate Change best practices, please contact:
John.Dalzell@boston.gov

Appendix F

Accessibility Checklist

Article 80 – Accessibility Checklist

A requirement of the Boston Planning & Development Agency (BPDA)
Article 80 Development Review Process

The Mayor's Commission for Persons with Disabilities strives to reduce architectural, procedural, attitudinal, and communication barriers that affect persons with disabilities in the City of Boston. In 2009, a Disability Advisory Board was appointed by the Mayor to work alongside the Commission in creating universal access throughout the city's built environment. The Disability Advisory Board is made up of 13 volunteer Boston residents with disabilities who have been tasked with representing the accessibility needs of their neighborhoods and increasing inclusion of people with disabilities.

In conformance with this directive, the BDPA has instituted this Accessibility Checklist as a tool to encourage developers to begin thinking about access and inclusion at the beginning of development projects, and strive to go beyond meeting only minimum MAAB / ADAAG compliance requirements. Instead, our goal is for developers to create ideal design for accessibility which will ensure that the built environment provides equitable experiences for all people, regardless of their abilities. As such, any project subject to Boston Zoning Article 80 Small or Large Project Review, including Institutional Master Plan modifications and updates, must complete this Accessibility Checklist thoroughly to provide specific detail about accessibility and inclusion, including descriptions, diagrams, and data.

For more information on compliance requirements, advancing best practices, and learning about progressive approaches to expand accessibility throughout Boston's built environment. Proponents are highly encouraged to meet with Commission staff, prior to filing.

Accessibility Analysis Information Sources:

1. Americans with Disabilities Act – 2010 ADA Standards for Accessible Design
   http://www.ada.gov/2010ADAstandards_index.htm
2. Massachusetts Architectural Access Board 521 CMR
   http://www.mass.gov/eopss/consumer-prot-and-bus-lic/license-type/aab/aab-rules-and-regulations-pdf.html
3. Massachusetts State Building Code 780 CMR
   http://www.mass.gov/eopss/consumer-prot-and-bus-lic/license-type/csl/building-codebbrs.html
4. Massachusetts Office of Disability – Disabled Parking Regulations
   http://www.mass.gov/anf/docs/mod/hp-parking-regulations-summary-mod.pdf
5. MBTA Fixed Route Accessible Transit Stations
   http://www.mbta.com/riding_the_t/accessible_services/
6. City of Boston – Complete Street Guidelines
   http://bostoncompletestreets.org/
7. City of Boston – Mayor's Commission for Persons with Disabilities Advisory Board
   www.boston.gov/disability
8. City of Boston – Public Works Sidewalk Reconstruction Policy
   http://www.cityofboston.gov/images_documents/sidewalk%20policy%200114_tcm3-41668.pdf
9. City of Boston – Public Improvement Commission Sidewalk Café Policy
   http://www.cityofboston.gov/images_documents/Sidewalk_cafes_tcm3-1845.pdf

Glossary of Terms:

1. ***Accessible Route*** – A continuous and unobstructed path of travel that meets or exceeds the dimensional and inclusionary requirements set forth by MAAB 521 CMR: Section 20
2. ***Accessible Group 2 Units*** – Residential units with additional floor space that meet or exceed the dimensional and inclusionary requirements set forth by MAAB 521 CMR: Section 9.4
3. ***Accessible Guestrooms*** – Guestrooms with additional floor space, that meet or exceed the dimensional and inclusionary requirements set forth by MAAB 521 CMR: Section 8.4
4. ***Inclusionary Development Policy (IDP)*** – Program run by the BPDA that preserves access to affordable housing opportunities, in the City. For more information visit: http://www.bostonplans.org/housing/overview
5. ***Public Improvement Commission (PIC)*** – The regulatory body in charge of managing the public right of way. For more information visit: https://www.boston.gov/pic
6. ***Visitability*** – A place's ability to be accessed and visited by persons with disabilities that cause functional limitations; where architectural barriers do not inhibit access to entrances/doors and bathrooms.

Article 80 | ACCESSIBILTY CHECKLIST

1. Project Information:

If this is a multi-phased or multi-building project, fill out a separate Checklist for each phase/building.

Project Name:	**EXP**
Primary Project Address:	**TBD Columbus Avenue**
Total Number of Phases/Buildings:	1
Primary Contact (Name / Title / Company / Email / Phone):	
Owner / Developer:	**NU**
Architect:	**Payette**
Civil Engineer:	**Nitsch Engineering**
Landscape Architect:	**Stephen Stimson Associates Landscape Architects, Inc.**
Permitting:	**Epsilon Associates, Inc.**
Construction Management:	**Suffolk Construction**

At what stage is the project at time of this questionnaire? Select below:

☑PNF / Expanded PNF Submitted	Draft / Final Project Impact Report Submitted	BPDA Board Approved
BPDA Design Approved	Under Construction	Construction Completed:

Do you anticipate filing for any variances with the Massachusetts Architectural Access Board (MAAB)? ***If yes,*** identify and explain.	No

2. Building Classification and Description:

This section identifies preliminary construction information about the project including size and uses.

What are the dimensions of the project?

Site Area:	*151,853 SF*	Building Area:	*350,000 GSF*
Building Height:	*126 FT.*	Number of Stories:	*8 Flrs.*
First Floor Elevation: **City of Boston Datum**	18.50 *FT.*	Is there below grade space:	*Yes*

What is the Construction Type? (Select most appropriate type)				
	Wood Frame	Masonry	☑Steel Frame	Concrete
What are the principal building uses? (IBC definitions are below – select all appropriate that apply)				
	Residential – One - Three Unit	Residential - Multi-unit, Four +	Institutional	☑Educational
	Business	Mercantile	Factory	Hospitality
	☑Laboratory / Medical	Storage, Utility and Other		
List street-level uses of the building:	*Robotics High Bay Research*			

3. Assessment of Existing Infrastructure for Accessibility:

This section explores the proximity to accessible transit lines and institutions, such as (but not limited to) hospitals, elderly & disabled housing, and general neighborhood resources. Identify how the area surrounding the development is accessible for people with mobility impairments and analyze the existing condition of the accessible routes through sidewalk and pedestrian ramp reports.

Provide a description of the neighborhood where this development is located and its identifying topographical characteristics:	The Project is part of the Northeastern University pedestrian campus, within the Roxbury Neighborhood.
List the surrounding accessible MBTA transit lines and their proximity to development site: commuter rail / subway stations, bus stops:	The Project is located adjacent to Ruggles multimodal transit station.
List the surrounding institutions: hospitals, public housing, elderly and disabled housing developments, educational facilities, others:	The Project site is located within the Northeastern campus, and is also in close proximity to Madison Park High and the New England Conservatory of Music.
List the surrounding government buildings: libraries, community centers, recreational facilities, and other related facilities:	The Project site is in close proximity to Northeastern's Snell Library and Carter Playground and Centennial Common, as well as Bessie Parkes Park.

4. Surrounding Site Conditions – Existing:

This section identifies current condition of the sidewalks and pedestrian ramps at the development site.

Is the development site within a historic district? ***If yes,*** identify which district:	No

Are there sidewalks and pedestrian ramps existing at the development site? ***If yes***, list the existing sidewalk and pedestrian ramp dimensions, slopes, materials, and physical condition at the development site:	Yes: Columbus Avenue Sidewalk Pedestrian Crosswalk at Ruggles Busway Pedestrian Crosswalk- Columbus Ave. at Melnea Cass Boulevard Pedestrian Crosswalk- Columbus Ave. at St. Cyprians Place
Are the sidewalks and pedestrian ramps existing-to-remain? ***If yes,*** have they been verified as ADA / MAAB compliant (with yellow composite detectable warning surfaces, cast in concrete)? ***If yes,*** provide description and photos:	No

5. Surrounding Site Conditions – Proposed

This section identifies the proposed condition of the walkways and pedestrian ramps around the development site. Sidewalk width contributes to the degree of comfort walking along a street. Narrow sidewalks do not support lively pedestrian activity, and may create dangerous conditions that force people to walk in the street. Wider sidewalks allow people to walk side by side and pass each other comfortably walking alone, walking in pairs, or using a wheelchair.

Are the proposed sidewalks consistent with the Boston Complete Street Guidelines? ***If yes***, choose which Street Type was applied: Downtown Commercial, Downtown Mixed-use, Neighborhood Main, Connector, Residential, Industrial, Shared Street, Parkway, or Boulevard.	Yes The Columbus Avenue sidewalk and the Southwest Corridor bikeway will extend the installation of the site established at the Phase One project.
What are the total dimensions and slopes of the proposed sidewalks? List the widths of the proposed zones: Frontage, Pedestrian and Furnishing Zone:	Streetscape frontage along Columbus Avenue is relatively flat with approximately 4” of vertical change along the approximate 250’ length from the existing pedestrian bridge walk landing at the east to the Ruggles Busway to the west. Cross slopes will not exceed 2%. Columbus Avenue curb zone; 4’-10” wide Columbus Avenue sidewalk zone; 8’-0” wide Columbus Avenue street tree zone; 8’-0” wide Southwest Corridor bikeway zone; 8’-0” wide University building frontage setback zone: from approximately 21’ to 42’
List the proposed materials for each Zone. Will the proposed materials be on private property or will the proposed materials be on the City of Boston pedestrian right-of-way?	Materials will extend the existing components of the Columbus Avenue sidewalk and the Southwest Corridor bikeway established at the Phase One project.

Will sidewalk cafes or other furnishings be programmed for the pedestrian right-of-way? ***If yes,*** what are the proposed dimensions of the sidewalk café or furnishings and what will the remaining right-of-way clearance be?	Yes Northeastern building frontage setback zone: between approximately 21' to 42' from the active Southwest Corridor bikeway will include plaza paving, landscape plantings, seating benches, and stormwater management planted bioswales consistent with the design and materials used for the adjacent ISEC landscape.
If the pedestrian right-of-way is on private property, will the proponent seek a pedestrian easement with the Public Improvement Commission (PIC)?	No
Will any portion of the Project be going through the PIC? ***If yes,*** identify PIC actions and provide details.	Yes Improvements to the Columbus Avenue and the Southwest Corridor Bicycle Path.
6. Accessible Parking: *See Massachusetts Architectural Access Board Rules and Regulations 521 CMR Section 23.00 regarding accessible parking requirement counts and the Massachusetts Office of Disability – Disabled Parking Regulations*.	
What is the total number of parking spaces provided at the development site? Will these be in a parking lot or garage?	No parking will be provided on-site.
What is the total number of accessible spaces provided at the development site? How many of these are "Van Accessible" spaces with an 8 foot access aisle?	No parking will be provided on-site.
Will any on-street accessible parking spaces be required? ***If yes,*** has the proponent contacted the Commission for Persons with Disabilities regarding this need?	No on-street accessible parking is anticipated.
Where is the accessible visitor parking located?	In the Renaissance Park or Columbus Garages.
Has a drop-off area been identified? ***If yes,*** will it be accessible?	No drop-off area has been identified.
7. Circulation and Accessible Routes: *The primary objective in designing smooth and continuous paths of travel is to create universal access to entryways and common spaces, which accommodates persons of all abilities and allows for visitability with neighbors*.	

Describe accessibility at each entryway: Example: Flush Condition, Stairs, Ramp, Lift or Elevator:	Columbus Avenue Building Level 1 front entrance; flush condition Building Level 1 plaza entrance; flush condition, with interior sloped corridor less than 5%. Building Level 1 west entrance (bicycle room entrance); flush condition Building Level 2 plaza entrance (access from pedestrian bridge); flush condition at door, walk surface as less than 5% with level zone at entrance less than 2%.
Are the accessible entrances and standard entrance integrated? ***If yes,*** *describe.* ***If no,*** what is the reason?	Yes
If project is subject to Large Project Review/Institutional Master Plan, describe the accessible routes way-finding / signage package.	Yes The Project as a completion of the Columbus Lot development will be integrated into the campus accessible pathway/wayfinding/signage system
8. Accessible Units (Group 2) and Guestrooms: (If applicable) NA *In order to facilitate access to housing and hospitality, this section addresses the number of accessible units that are proposed for the development site that remove barriers to housing and hotel rooms.*	
What is the total number of proposed housing units or hotel rooms for the development?	
If a residential development, how many units are for sale? How many are for rent? What is the breakdown of market value units vs. IDP (Inclusionary Development Policy) units?	
If a residential development, how many accessible Group 2 units are being proposed?	
If a residential development, how many accessible Group 2 units will also be IDP units? ***If none***, describe reason.	
If a hospitality development, how many accessible units will feature a wheel-in shower? Will accessible equipment be provided as well? ***If yes,*** provide amount and location of equipment.	

Do standard units have architectural barriers that would prevent entry or use of common space for persons with mobility impairments? Example: stairs / thresholds at entry, step to balcony, others. ***If yes,*** provide reason.	
Are there interior elevators, ramps or lifts located in the development for access around architectural barriers and/or to separate floors? ***If yes,*** describe:	
9. Community Impact: *Accessibility and inclusion extend past required compliance with building codes. Providing an overall scheme that allows full and equal participation of persons with disabilities makes the development an asset to the surrounding community.*	
Is this project providing any funding or improvements to the surrounding neighborhood? Examples: adding extra street trees, building or refurbishing a local park, or supporting other community-based initiatives?	This will be determined through the Article 80 process.
What inclusion elements does this development provide for persons with disabilities in common social and open spaces? Example: Indoor seating and TVs in common rooms; outdoor seating and barbeque grills in yard. Will all of these spaces and features provide accessibility?	
Are any restrooms planned in common public spaces? ***If yes,*** will any be single-stall, ADA compliant and designated as "Family"/ "Companion" restrooms? ***If no***, explain why not.	Yes Single stall restroom is proposed to be included for each floor of the building and designated as an "all gender" restroom.
Has the proponent reviewed the proposed plan with the City of Boston Disability Commissioner or with their Architectural Access staff? ***If yes,*** did they approve? ***If no,*** what were their comments?	To be scheduled
Has the proponent presented the proposed plan to the Disability	To be scheduled

Advisory Board at one of their monthly meetings? Did the Advisory Board vote to support this project? ***If no,*** what recommendations did the Advisory Board give to make this project more accessible?	

10. Attachments

Include a list of all documents you are submitting with this Checklist. This may include drawings, diagrams, photos, or any other material that describes the accessible and inclusive elements of this project.

Provide a diagram of the accessible routes to and from the accessible parking lot/garage and drop-off areas to the development entry locations, including route distances.

TBD

Provide a diagram of the accessible route connections through the site, including distances.

TBD

Provide a diagram the accessible route to any roof decks or outdoor courtyard space? (if applicable)

TBD

Provide a plan and diagram of the accessible Group 2 units, including locations and route from accessible entry.

TBD

Provide any additional drawings, diagrams, photos, or any other material that describes the inclusive and accessible elements of this project.

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This completes the Article 80 Accessibility Checklist required for your project. Prior to and during the review process, Commission staff are able to provide technical assistance and design review, in order to help achieve ideal accessibility and to ensure that all buildings, sidewalks, parks, and open spaces are usable and welcoming to Boston's diverse residents and visitors, including those with physical, sensory, and other disabilities.

For questions or comments about this checklist, or for more information on best practices for improving accessibility and inclusion, visit www.boston.gov/disability, or our office:

The Mayor's Commission for Persons with Disabilities
1 City Hall Square, Room 967,
Boston MA 02201.

Architectural Access staff can be reached at:

accessibility@boston.gov | patricia.mendez@boston.gov | sarah.leung@boston.gov | 617-635-3682